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SELF-EVALUATION REPORT

FIELD OF UNIVERSITY DOCTORAL STUDIES: *MECHATRONICS AND ROBOTICS*

CRAIOVA
April 2021

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PERIODIC SELF-EVALUATION REPORT

for

MAINTENANCE OF ACCREDITATION

OF THE DOCTORAL FIELD OF MECHATRONICS AND ROBOTICS

Endorsed by
the Quality Assurance Committee of the University of Craiova (CEAC-UCV)
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CRAIOVA
APRIL 2021

IOSUD - UNIVERSITY OF CRAIOVA
„CONSTANTIN BELEA" DOCTORAL SCHOOL
DOMAIN: MECHATRONICS AND ROBOTICS
FACULTY OF AUTOMATION, COMPUTERS AND ELECTRONICS
Craiova, Str. Al. I. Cuza, nr. 13, cod 200585, www.ucv.ro

SELF-EVALUATION REPORT

FIELD OF UNIVERSITY DOCTORAL STUDIES: *MECHATRONICS AND ROBOTICS*

Responsible *Mechatronics and Robotics*: **Prof. Dr. Eng. Dorian Cojocaru**
PhD Candidate. Eng. Florina Petcu

Director *„Constantin Belea" Doctoral School*: **Prof. Dr. Eng. Costin Bădică**

CRAIOVA
April 2021

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1. GENERAL INFORMATION

1.1 „CONSTANTIN BELEA" DOCTORAL SCHOOL

1.1.1 Establishment

The university education of Automation and Computers has a long and rich tradition within the University of Craiova, starting its activity since the academic year 1966 - 1967, with the establishment of the specialization of Automation. From the academic year 1976 - 1977, with the implementation of a new curriculum, two options were established in the Automation department: the Automation option and the Computers option, and the specialization changed its name to Automation and Computers. The primary role in the development of the specialization of Automation and Computers belonged to the late professor doctor docent engineer Constantin Belea, the founder of the School of Automation from Craiova.

In its current form, the "Constantin Belea" Doctoral School (Ș.D.C.B.) appeared within the University of Craiova by regrouping in a single doctoral school the three doctoral fields of Systems Engineering, Computers and Information Technology, Mechatronics and Robotics within the Faculty of Automation, Computers and Electronics, in accordance with the provisions of the National Education Law no. 1/2011 and as an effect of H.G. no.681 / 2011 regarding the Code of doctoral university studies. Initially, in 2012, the new doctoral school operated within the Doctoral School of Engineering Sciences (Annex_1.1.1.a), subsequently detached as a separate school, being directly subordinated to the I.O.S.U.D. University of Craiova, by the decision of the Senate of the University of Craiova from 29.09.2015 and MENCS Order no. 5382 / 17.11.2016 (Annex_1.1.1.b, Annex_1.1.1.c, Annex_1.1.1.d, Annex_1.1.1.e).

1.1.2 Evolution

Although young, the "Constantin Belea" Doctoral School had first-rate pioneers in the field of Automation. In 1968, Professor Constantin Belea obtained the quality of doctoral supervisor at the University of Craiova in the field of Automatic Systems. In the period since this historical event, the doctoral activity has known a continuous development, some of the then teachers of the Automation and Computers section obtaining the title of Doctor Engineer under the guidance of Professor Constantin Belea. The first doctoral thesis in Automatic Systems was presented in 1974 under the guidance of Professor Constantin Belea by Professor Mircea Ivănescu, who obtained his doctorate in 1975. The number of doctoral supervisors increased substantially after 1989. Thus, in 1993 the Professors Vladimir Răsvan, Mircea Ivănescu, Matei Vînătoru obtained the quality of doctoral supervisor in Automatic Systems, and in 1994, Professor Mircea Petrescu, obtained the quality of doctoral supervisor in Computers at the University of Craiova. In 2005, Professor Marin Constantin obtained the position of PhD supervisor in Automatic Systems. Subsequently, in 2007, professors Costin Bădică and Mihai Mocanu obtained the title of PhD supervisor in Computers and Information Technology, and in 2008, professors Dorian Cojocaru, Nicu George Bîzdoacă and Mircea Nițulescu obtained the title of PhD supervisor in Mechatronics and Robotics. At the same time, in 2008 Mr. Professor Dan Popescu and Mr. Professor Emil Petre obtained the title of PhD

supervisor in Systems Engineering, respectively in Computer and Information Technology Mr. Professor Dumitru Dan Burdescu. In 2016, Mr. Professor Dan Selișteanu obtained the habilitation certificate in Systems Engineering, being affiliated in the same year to the "Constantin Belea" Doctoral School. In 2018, Ms. Professor Elvira Popescu obtained the habilitation certificate in Computers and Information Technology, in Systems Engineering Mr. Professor Dorin Șendrescu and Ms. Professor Monica Roman, and Associate Professor Sorin Grigorescu from "Transilvania" University of Brașov joined the "Constantin Belea" Doctoral School after obtaining the habilitation certificate in Mechatronics and Robotics in the same year. In 2019, Ms. Professor Daniela Danciu obtained the habilitation certificate in Systems Engineering. In 2020, two other tenured teachers at the Faculty of Electrical Engineering and Computer Science – "Transilvania" University of Brașov obtained the habilitation certificate in the field of Mechatronics and Robotics: Lect. Dr. Eng. Cociaș Tiberiu-Teodor and Lect. Dr. Eng. Măcești Gigel. Subsequently, Prof. Dr. Eng. Sorin Grigorescu withdrew from S.D.C.B. and started the formalities for the authorization of a new doctoral school and a new field of doctoral studies in Mechatronics and Robotics, at the "Transilvania" University of Brașov together with Assoc. Prof. Dr. Eng. Gigel Măcești, respectively Assoc. Prof. Dr. Eng. Tiberiu Teodor Cociaș.

1.1.3 Structure

1.1.3.1. PhD supervisors

Within the "Constantin Belea" Doctoral School there are 11 tenured PhD supervisors, assigned to the 3 doctoral fields within the school as follows (Annex_1.1.3):

- 5 PhD supervisors in the field of Systems Engineering
- 3 PhD supervisors in the field of Computers and Information Technology
- 3 PhD supervisors in the field of Mechatronics and Robotics

The list of doctoral supervisors of the "Constantin Belea" Doctoral School is presented in the following table.

Table 1 Doctoral supervisors active at the level of the "Constantin Belea" Doctoral School.

Nr. crt.	First Name	Last Name	Affiliation	Degree/date of conferement
1. Computers and Information Technology				
1.	Costin	BĂDICĂ	Faculty of Automation, Computers and Electronics, University of Craiova	1805 / 20.08.2007
2.	Mihai Lucian	MOCANU	Faculty of Automation, Computers and Electronics, University of Craiova	1805 / 20.08.2007
3.	Elvira	POPESCU	Faculty of Automation, Computers and Electronics, University of Craiova	3379 / 22.03.2018
2. Systems Engineering				
1.	Dan	POPESCU	Faculty of Automation, Computers and Electronics, University of Craiova	3292 / 26.02.2008
2.	Dan	SELIȘTEANU	Faculty of Automation, Computers and Electronics, University of Craiova	4010 / 07.06.2016

3.	Monica	ROMAN	Faculty of Automation, Computers and Electronics, University of Craiova	3821 / 01.04.2019
4.	Gheorghe-Dorin	ȘENDRESCU	Faculty of Automation, Computers and Electronics, University of Craiova	3822 / 01.04.2019
5.	Daniela	DANCIU	Faculty of Automation, Computers and Electronics, University of Craiova	4105 / 28.05.2019
3. Mechatronics and Robotics				
1.	Nicu George	BÎZDOACĂ	Faculty of Automation, Computers and Electronics, University of Craiova	5842 / 04.11.2008
2.	Dorian	COJOCARU	Faculty of Automation, Computers and Electronics, University of Craiova	5842 / 04.11.2008
3.	Mircea	NIȚULESCU	Faculty of Automation, Computers and Electronics, University of Craiova	5842 / 04.11.2008

1.1.3.2. Council of „Constantin Belea" Doctoral School

The Council of „Constantin Belea" Doctoral School consists of 3 members of the doctoral school which are PhD supervisors, an external member PhD supervisor, and a PhD candidate within the doctoral school. This council is structured as follows:

1. PhD supervisors from the University of Craiova:
   - Prof. Dr. Eng. Costin Bădică – Director of the Doctoral School, PhD supervisor in Computers and Information Technology
   - Prof. Dr. Eng. Dorian Cojocaru, PhD supervisor in Mechatronics and Robotics
   - Prof. Dr. Eng. Daniela Danciu, PhD supervisor in Systems Engineering
2. External members:
   - Dr. Silviu Niculescu, Professor of Control Systems L2SCENTRALESUPELEC, France Web: https://l2s.centralesupelec.fr/u/niculescu-silviu-iulian/
3. PhD Candidates:
   - PhD Candidate Radu Lucian Constantinescu (Systems Engineering)

1.1.3.3. PhD Candidates

The "Constantin Belea" Doctoral School had in the period 2015-2020 a number of 15 doctoral graduates, distributed as follows:

- Systems Engineering - 7 graduates
- Computers and Information Technology - 5 graduates
- Mechatronics and Robotics - 3 graduates.

There are over 20 theses in progress in all three fields: Systems Engineering, Computers and Information Technology, Mechatronics and Robotics. All thesis presented by students of our doctoral school were confirmed by CNATDCU. This intense scientific activity has resulted in the publication by PhD Candidates of the Doctoral School, alone or in collaboration, of over 150 articles in journals and volumes of ISI-listed conferences and over 100 articles in journals and volumes indexed in international databases.

1.1.4 Research mission

S.D.C.B.'s mission derives from the mission of I.O.S.U.D. and the University of Craiova by training specialists for research and education in the fields of Computers and Information Technology, Systems Engineering and Mechatronics and Robotics by satisfying their desire for intellectual, professional and social development, but also the need for specialized workforce of society, and by promoting excellence in scientific research, development and innovation.

The main objectives of the S.D.C.B. are the following:

- Academic training, at the highest level of performance, of the PhD Candidate in order to satisfy the need for his intellectual, professional and social development, but also the need for specialized high-level workforce of the society;
- Preparation of PhD Candidates in order to participate in research programs
- Promoting excellence in the processes of scientific research, development, innovation and knowledge transfer to the Romanian society, thus responding to the need for its progress.
- Innovation in the field of research, technological development and knowledge transfer, for the creation of the Knowledge-Based Society and the European Research Area;
- The development of the young human resource, involved in academic and research activity, as well as the capitalization of the research profession.

1.1.5 Level of quality certification

In Romania, 97 universities operated in 2020 (of which 7 in liquidation): 54 public universities (including the military ones) and 43 private universities (of which 9 provisionally authorized). The University of Craiova is a traditional university and the first institution of this type regionally, constantly ranked among the top 8-10 universities in Romania: among the top 8 universities in Romania - Level One Institutions, in the 2000s, among the top 10 universities in Romania in 2020 and 2021 in the uniRank ranking, in which 78 Romanian universities are listed. The order is given by online, objective indicators: the authority of online domains, the accreditation of institutions, the educational offer and the preference for face-to-face education, https://www.4icu.org/reviews/3936.htm.

In 2009 the University of Craiova went through the process of periodic institutional evaluation by ARACIS for the first time, and following the evaluation the ARACIS Council issued the Certificate by which it was awarded the grade "High degree of trust", the documents being available on the website https://www.aracis.ro/ev_institutionala/universitatea-din-craiova-2009/.

In 2011, following the independent evaluation (National Research Evaluation Exercise - ENEC) led by UEFISCDI through a project financed from structural funds, the University of Craiova obtained very good results in the evaluation of research and doctoral programs. Within the engineering fields where the classification was made, the University of Craiova occupied very good positions (in the field P17: Systems Engineering - 5th place, field P18: Computers and Information Technology - 5th place, field P7: Mechanical and Mechatronics Engineering - 7th place).

In 2012, with the support of a project funded by structural funds "Performance in research, performance in teaching quality, diversity and innovation in Romanian universities", coordinated

by UEFISCDI, the University of Craiova was internationally institutionally externally evaluated by the Association of European Universities (EUA) through the Institutional Evaluation Program (IEP) included in the European Register of Quality Agencies, https://cis01.central.ucv.ro/eval_internationala/#.

In 2015, the University of Craiova was again institutionally evaluated by ARACIS, and following the external quality evaluation report, available on the website https://www.aracis.ro/ev_institutionala/universitatea-din-craiova-2015/, the ARACIS Council gave it the grade "High degree of trust". In the period 2015-2019, all 7 undergraduate programs of the Faculty of Automation, Computers and Electronics were externally evaluated by ARACIS, all obtaining re-accreditation, and in some of them the schooling capacity was increased.

In the Faculty of Automation, Computers and Electronics there are a number of 6 master's programs in the 3 fields of the faculty. In 2019, the procedure of periodic external evaluation by ARACIS of the master's fields was performed, all obtaining the re- accreditation.

1.1.6 Specific measures of quality management and promotion of ethics and deontology at the level of S.D.C.B.

The internal quality assurance system is in accordance with the provisions of the Regulation of Organization, Functioning and Internal Quality Assurance at the level of the "Constantin Belea" Doctoral School of the Faculty of Automation, Computers and Electronics of the University of Craiova (Annex_1.1.6.a), the regulations of the ethics commission https://www.ucv.ro/pdf/despre/structura/comisie_etica/2021/Regulamentul_de_organizare_si_functionare_a_Comisiei_de_Etica.pdf, as well as with the Internal Evaluation Procedure of the Activity of the Doctoral Schools of I.O.S.U.D. University of Craiova (Annex_1.1.6.b). So:

(1) The S.D.C.B. director prepares an annual self-evaluation report of the school, which will be presented to the General Assembly of Doctoral Supervisors and submitted to the S.D.C.B. Council for approval. This evaluates the efficiency of quality assurance procedures and structures, as well as the impact on the activities in doctoral studies.
(2) The conclusions of the annual quality self-assessment report are analyzed in the General Assembly of Doctoral Supervisors in order to identify problems and solutions for continuous quality improvement at the level of SDCB.
(3) The internal quality assurance and monitoring policy at the level of the SDCB is transparent, being implemented according to this regulation which includes in its articles clear and quantifiable criteria to be met for doctoral supervisors, PhD candidates and research results.
(4) The internal quality assurance at SDCB and its monitoring is performed by:

a) Periodic evaluation of doctoral supervisors from SDCB., according to Art. 3, points (3) - (6).
b) Periodic evaluation of the quality of the proposed doctoral study programs, according to Art. 7 and Art. 9 points (1), (2), (6) and (7).
c) Periodic evaluation of the quality of the students' research activity, according to Art.4, Art. 7 point (5), Art. 8, Art. 9 points (1), (3), (4), (6).
d) Periodic evaluation of the quality of the research results performed by PhD candidates, according to Art. 9 points (1), (4), (5), (6), Art. 10, Art. 11.

(5) The SDCB regulation is closely related to the quality assurance system and management at the level of the University of Craiova, according to Art. 1 points (3), (4).
(6) Personalities from IOSUD. University of Craiova, scientific personalities from the country or abroad, doctoral students, without having the right to vote, can be invited to the meetings of the SDCB Council.

In Annex_1.1.6.c1 and Annex_1.1.6.c2 are presented examples of annual reporting (2017, 2018), as well as the Self-Assessment Reports of SDCB from 2016 and 2019 (Annex_1.1.6.c3, Annex_1.1.6.c4).

1.1.7 Human Resources

The human resource of SDCB consists of the 11 tenured doctoral supervisors in the fields of doctoral studies within SDCB (3 Ms. and 8 Mr. Professors), of which: 5 doctoral supervisors in the field of Systems Engineering, 3 doctoral supervisors in the field Computers and Information Technology, respectively 3 PhD supervisors in the field of Mechatronics and Robotics.

To these are added 9 teachers of the ACE Faculty with recognized experience in research, as members of the Guiding Committees of PhD Candidates, namely: 3 teachers in the field of Computers and Information Technology, 3 teachers in the field of Systems Engineering and 3 teachers in the field of Mechatronics and Robotics.

Table 2 Active doctoral supervisors / number of doctoral students at the level of "Constantin Belea" Doctoral School

Field	PhD Supervisor	No. of PhD Candidates 2015-2016	No. of PhD Candidates 2016-2017	No. of PhD Candidates 2017-2018	No. of PhD Candidates 2018-2019	No. of PhD Candidates 2019-2020	No. of PhD Candidates 2020-2021
Systems Engineering	Daniela Danciu	-	-	-	-	-	-
	Dan Popescu	2	2	2	1	-	-
	Monica Roman	-	-	-	-	-	1
	Dan Selișteanu	-	1	1	6	8	10
	Dorin Șendrescu	-	-	-	-	1	3
	Alții (inactivați)	2	4	2	-	1	
Computers and	Costin Bădică	6	6	7	9	8	7

Information Technology	Mihai Mocanu	6	6	5	5	6	2
	Elvira Popescu	-	-	-	2	3	2
	Alții (inactivați)	2	2	2	-	-	-
Mechatronics and Robotics	Nicu Bîzdoacă	6	7	6	7	5	6
	Dorian Cojocaru	-	-	1	2	2	4
	Mircea Nițulescu	-	1	2	2	2	1
	Others	-	-	-	-	1	-

1.1.8 Research infrastructure

The "Constantin Belea" Doctoral School has the logistical support of the Research Centers assigned to each of its composite fields of study, of the Research Infrastructure in Applied Sciences -INCESA and of the teachers within the Faculty of Automation, Computers and Electronics, some of them members of the Guiding Committees. At the same time, SDCB benefits from the educational infrastructure of the ACE Faculty, which consists of lecture, seminar and laboratory rooms adequate for the development of teaching activities within SDCB.

The research activity within SDCB is carried out in close connection with the research activity within the Faculty of Automation, Computers and Electronics of the University of Craiova. This activity has the support of the Research Centers assigned to the fields of the faculty and of SDCB.

At the level of the Faculty of Automation, Computers and Electronics of the University of Craiova, in the period 2015-2020, the following Research Centers were active (Annex_1.1.8):

- Nonlinear automation, stability and oscillations (ANSO), in the field of Systems Engineering, certified by CNCSIS on 11.02.2021 (certificate no. 19 / CC-B attached to the file) and re-certified by CNCSIS on 12.09.2006 (certificate no. 10 attached to the file)
- Development of multimedia applications (DAM), in the field of Computers and Information Technology, accredited by CNCSIS on 12.09.2006
- "Mechatronics and Robotics" Research Center (CCMR), in the field of Mechatronics and Robotics, accredited by CNCSIS with no. 83 / 02.06.2005

The year 2021 brought to the fore the start of a procedure regarding the reorganization of research centers by proposing a new center called the Interdisciplinary Research Center in Computers, Automation and Robotics (CICCAR) which is being evaluated. This center comprises three research laboratories for each SDCB composite field of study.

For the last period, two of these elements are particularly important for the research infrastructure on which the field of doctoral studies Mechatronics and Robotics is based: the collaboration with the Research Infrastructure in Applied Sciences - INCESA and respectively the research contracts in which the PhD candidates were involved. In the activity of Research Infrastructure in Applied Sciences - INCESA, researchers in the field of PhD Mechatronics and Robotics had a major contribution starting with the establishment and endowment (Prof. Dr. Eng. Nicu George Bîzdoacă) and continuing with the use of research resources for obtaining concrete results (PhD Candidate Eng. Horațiu Roibu, PhD Candidate Eng. Lidia Băzăvan) by patent application no. A / 00174 / 08.05.2019, for the invention entitled "Automatic, Modular Architecture, with Cooperative Facilities". The invention was awarded a gold medal at the International Exhibition of Scientific Research, Innovation and Invention "PRO INVENT", edition XVII / 2019 and at the European Exhibition of Creativity and Innovation "EORO INVENT", edition 11/2019. Regarding the research contracts we can exemplify with the contract within the PN III program, Development of the national research-development system UEFISCDI no. 78 PCCDI / 2018, in which two young researchers were trained (PhD Candidate Eng. Andrei Dragomir and PhD Candidate Eng. Alexandru Mariniuc) who are now PhD candidates and who have constructively used the research infrastructure available in this framework (mobile robots, intelligent sensory and communication systems). Details on the research infrastructure in the field of Mechatronics and Robotics are presented in Chapter 2 of this report.

1.1.9 Elements of educational effectiveness

PhD candidates who obtained the title of doctor at the University of Craiova during 2011-2020, under the guidance of doctoral supervisors from SDCB, currently work in the university environment, in research institutes or in companies in the doctoral field, as follows:
- University environment: 17
- Research institutes: 2
- Companies in the field of the doctorate: 19

In terms of graduation, the results of doctoral studies are a real success in that PhDs are employed in IT companies and in academic environment (Table 3), thus following their path from graduation to the present.

Table 3 Field of activity of MR doctoral graduates at SDCB, 2011-2020

Graduate	PhD Supervisor	Graduation year	Doctoral field / Activity field / other details
Mănoiu-Olaru Sorin	Mircea Nițulescu	2013	MR/ IT Company, Hella TCC
Banța V. Viorel Costin	Dorian Cojocaru	2015	MR/ University environment
Gîlcă S. Gheorghe	Nicu Bîzdoacă	2016	MR/ University environment, Universitatea Constantin Brâncuși din Tg. Jiu
Ionescu Marian	Nicu Bîzdoacă	2020	MR/ University environment, Universitatea Constantin Brâncuși din Tg. Jiu

1.2 MECHANTRONICS AND ROBOTICS FIELD OF STUDY

1.2.1 Objectives

The University of Craiova received the quality of Organizing Institution for Doctoral University Studies (IOSUD) in the field of Mechatronics and Robotics (MR) by Order of the Minister of Education, Research and Youth no. 4969 / 31.08.2008 (Annex_1.2.1).

The doctoral field of *Mechatronics and Robotics*, is in agreement with the objectives proposed by the Organizing Institution of University Doctoral Studies - University of Craiova (IOSUD-UCV), "Constantin Belea" Doctoral School and the University of Craiova:

- ensuring the quality of scientific research and the educational process;
- maintaining the educational offer in accordance with the requirements of the society and with their foreseeable evolution;
- promoting flexible study programs, generating competencies and abilities with direct use in the profession and society, in agreement with the National Qualifications Framework;
- efficient management of human and material resources;
- supporting individual excellence;
- participation in programs of excellence in research and education;
- maintaining a high level of professional insertion of graduates, by developing consultative structures that include representatives of the economic environment and personalities from the external academic, cultural and professional environment;
- continuous increase of the international visibility of the institution, by disseminating the results of its own scientific research and participation in European academic programs;
- assuming the position of national scientific, cultural and educational pole;
- promoting initiatives in the field of university management and scientific research.

The main objective of the field is to achieve a program of fundamental and applied scientific research, specific to the field of **MECHATRONICS and ROBOTICS** and related, compatible with contemporary requirements and needs, using the full creative potential of PhD supervisors and other teachers, master students and PhD candidates, but also of well-known specialists in this field.

1.2.2 Mission

The field of studies **MECHATRONICS and ROBOTICS** has as **mission** both the specific didactic activity and the activity of specialized scientific research, stipulated in the Charter of the University of Craiova (Annex_1.2.2). In accordance with the assumed mission, this field has set a series of general objectives both in terms of teaching, instructional and educational research and scientific research. During its existence, the field of studies **MECHATRONICS and ROBOTICS** has known a continuous evolution materialized in the diversification of the educational offer, the development and modernization of the material base, the numerical and qualitative increase of the teaching staff, the increase of the number of students.

The unique feature of the field of studies **MECHATRONICS and ROBOTICS** is the singular existence with this specific both within the "Constantin Belea" Doctoral School of the

Faculty of Automation, Computers and Electronics, as well as within other doctoral schools in the country.

In this context, the doctoral supervisors and PhD candidates in the field of *Mechatronics and Robotics* within the "Constantin Belea" Doctoral School, aim that the scientific research carried out to contribute to increasing the prestige of the doctoral school, to enjoy the highest possible visibility and recognition, both in the academic environment and on the labor market, in the local, regional, national and international community, according to the highest quality standards in the doctoral field of Mechatronics and Robotics.

The doctoral field Mechatronics and Robotics promotes, within the scientific research activity, the following set of values:

1. Professionalism and ethical attitude towards research;
2. Research performance expressed through internationally recognized results and publications, conferences held at high national and international forums and concrete achievements of value to the economy and society;
3. Professional development;
4. Freedom of the researcher and of research.

1.2.3 Curricula

The curriculum contains imposed disciplines, optional and at the choice of the doctoral supervisor (depending on the topic approached), research activity and individual study. All disciplines in the training program based on advanced university studies (PPUA) are supported by teachers who have the quality of doctoral supervisor / habilitated (Annex_1.2.3).

The PPUA in the field of Mechatronics and Robotics includes the disciplines:

1. *Advanced Mechatronics Systems*
2. *Advanced Robotic Structures and Systems*
3. *Advanced Robotics Theory*
4. *Sensorial and Actuation Systems in Mechatronics and Robotics*
5. *Languages and Software for the Intelligent Home*
6. *Sensors and Sensor Networks for the Intelligent Home*
7. *Robotic Vision*
8. *CAD for Mechatronic Systems*
9. *Artificial Intelligence*

To these are added the disciplines of the common trunk *Methodology of Scientific Research, Ethics and Academic Integrity* and the activities of Scientific Research and Individual Study, according to Annex_1.2.3.

1.2.4 PhD Supervisors

By Order of the Minister of Education, Research and Youth no. 5842 / 04.11.2008 (Annex_1.2.4.a1) the following university professors were conferred the quality of doctoral supervisor within IOSUD University of Craiova, in the field of Mechatronics and Robotics: Prof.

Dr. Eng. Nicu George Bîzdoacă, Prof. Dr. Eng. Dorian Cojocaru and Prof. Dr. Eng. Ioan Dorian Mircea Nițulescu. This doctoral school is the result of assuming the internationally accepted concept according to which mechatronics is an integrative scientific field for the systemic approach of the elements of mechanics, electronics, computers and automation (Annex_1.2.4.b).

A great success can be considered the fact that in September 2018, Mr. Assoc. Prof. Dr. Eng. Sorin Grigorescu from "Transilvania" University of Brașov held the public lecture for the habilitation certificate in the field of Mechatronics and Robotics within the "Constantin Belea" Doctoral School of the Faculty of Automation, Computers and Electronics, IOSUD University of Craiova (Annex_1.2.4.a2).

After he obtained the habilitation certificate in Craiova, Mr. Assoc. Prof. Dr. Eng. Sorin Grigorescu was promoted to Professor at the "Transilvania" University of Brașov and Prof. Dr. Eng. Dorian Cojocaru was also part of the commission for this promotion.

In June 2020, two other tenured teachers at the Faculty of Electrical Engineering and Computer Science - "Transilvania" University of Brașov obtained the habilitation certificate in the field of Mechatronics and Robotics: Lect. Dr. Eng. Cociaș Tiberiu-Teodor and Lect. Dr. Eng. Măcești Gigel (Annex_1.2.4.a3, Annex_1.2.4.a4). After the habilitation certificates obtained in Craiova, the two researchers were promoted to the degree of Associate Professor at the "Transilvania" University of Brașov, and Prof. Dr. Eng. Dorian Cojocaru was also part of the commissions for this promotion.

In order to contribute to the development of the doctoral field of Mechatronics and Robotics in our country, starting from the pioneering activity in Craiova, Prof. Dr. Eng. Sorin Grigorescu withdrew from SCDB and started the formalities for the authorization of a new doctoral school and of a new field of doctoral studies in Mechatronics and Robotics, at the "Transilvania" University of Brașov. In this endeavor are also involved Mr. Assoc. Prof. Dr. Eng. Gigel Măcești, respectively Assoc. Prof. Dr. Eng. Tiberiu Teodor Cociaș. Also, in order to support this approach, in the spring of 2021 the formalities started for Prof. Dr. Eng. Claudiu Pozna from "Transilvania" University of Brașov, already PhD supervisor in another field, to receive the habilitation certificate in the field of Mechatronics and Robotics in Craiova.

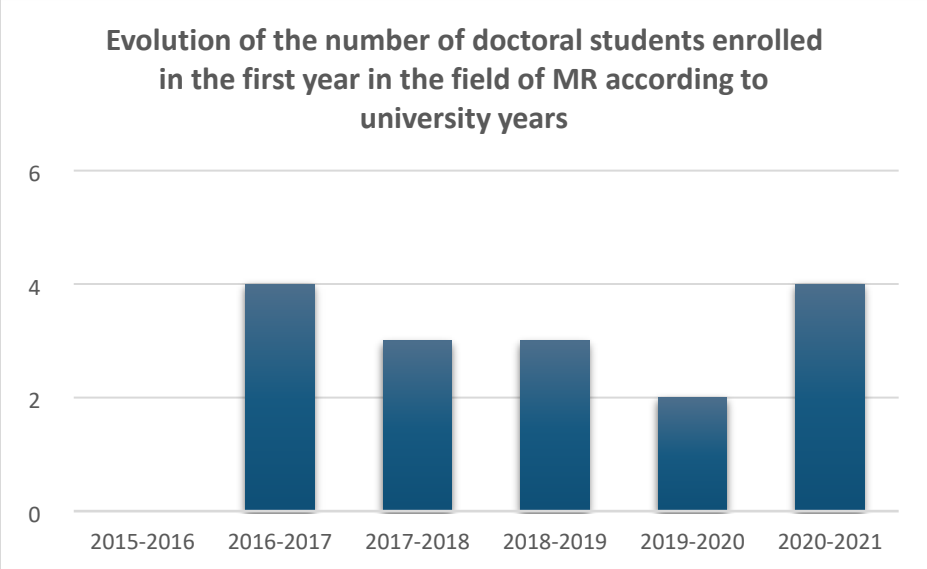
Table 4 Orders of habilitation PhD supervisors in the field of MR

Nr. Crt.	PhD Supervisor	Affiliation	Order and title conferment date
1.	Prof. Dr. Eng Dorian Cojocaru	Faculty of Automation, Computers and Electronics, University of Craiova	OMECT no. 5842/04.11.2008
2.	Prof. Dr. Eng. Nicu George Bîzdoacă	Faculty of Automation, Computers and Electronics, University of Craiova	OMECT no. 5842/04.11.2008

3.	Prof. Dr. Eng Mircea Dorian Ioan Nițulescu	Faculty of Automation, Computers and Electronics, University of Craiova	OMECT no. 5842/04.11.2008
4.	*Prof. Dr. Eng. Sorin Mihai Grigorescu	Faculty of Electrical Engineering and Computer Science, "Transilvania" University of Brașov	OMEN no. 5505/14.11.2018
5.	*Lect. Dr. Eng. Tiberiu -Teodor Cociaș	Faculty of Electrical Engineering and Computer Science, "Transilvania" University of Brașov	OM no. 5790/16.10.2020
6.	*Lect. Dr. Eng. Gigel Măceșanu	Faculty of Electrical Engineering and Computer Science, "Transilvania" University of Brașov	OM no. 5791/16.10.2020
* PhD supervisors who are in the process of habilitation an MR field at UniTBv			

1.2.5 The evolution of the number of PhD candidates and the number of PhDs in the last years

In the period 2015-2020, a number of 16 PhD candidates enrolled in doctoral studies in the field of Mechatronics and Robotics. At present, at SDCB - Doctoral Field Mechatronics and Robotics, a number of 11 PhD candidates are studying, one of them publicly presenting the thesis in January 2021, for which the confirmation order is awaited (Annex_1.2.5.a).



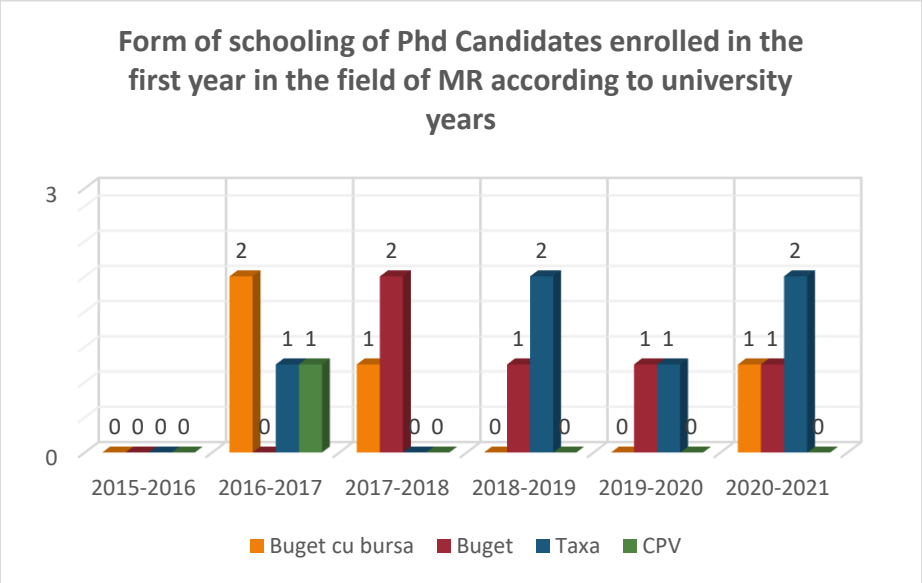


Table 5 PhD candidates and PhD supervisors

PhD Supervisor	**No. of students with ongoing studies 2020-2021**			
	Budget with scholarship	**Budget**	**Tax**	**CPV**
Nicu-George BÎZDOACĂ	1	2	3	-
Dorian COJOCARU	1	1	2	-
Mircea NIȚULESCU	-	-	-	1
Total	11			

Throughout the doctoral training course, PhD candidates benefit from the counseling / guidance of functional guidance committees, aspect reflected by guidance and feedback or regular meetings, complementary to those offered by the scientific doctoral supervisor, joint publications, participation of committee members in the presentation research papers and pre-presentations of the research project and the doctoral thesis.

In 2013, the first doctoral degree was obtained in the field of MR, by Mănoiu-Olaru Sorin, who completed his doctoral studies at the "Constantin Belea" Doctoral School during 2009-2013.

Under the scientific supervision of Prof. Dr. Dng. Mircea Nițulescu, he completed his doctoral thesis entitled "DEVELOPMENT OF A WALKING ROBOTIC STRUCTURE FOR STRUCTURED AND UNSTRUCTURED ENVIRONMENTS" which was successfully

presented in September 2013 before the National Commission designated for the award of doctorate in the field "Engineering Sciences".

So far, a number of 5 PhD candidates have publicly presented their doctoral thesis in Mechatronics and Robotics, 4 of them being confirmed by CATDCU (Annex_1.2.5.b).

For the period 2015-2020, 3 graduates of the field of Mechatronics and Robotics obtained the title of doctor, the information can be found in Table 6.

Table 6 Confirmation orders for Doctors in the field of Mechatronics and Robotics

PhD SUpervisor	PhD Title	Year of the thesis	Confirmation order
Mircea NIȚULESCU	Al-Atwan Nabeel Shaway Shyaa	January 2021	In the process of being released
Nicu-George BÎZDOACĂ	Ionescu Marian	July 2020	OMEC no.3252 from 09.02.2021
	Gîlcă Gheorge	September 2016	OMENCS no.6122 from 20.12.2016
Dorian COJOCARU	Banța Viorel Costin	October 2015	OMENCS no.5954 from 7.12.2015
Mircea NIȚULESCU	Mănoiu-Olaru Sorin	September 2013	OMEN no.5581MD from 03.12.2013

1.2.6 Laboratories and research centers

All PhD candidates have access to scientific research laboratories or other facilities within the Faculty of Automation, Computers and Electronics. The MR doctoral field also benefits from the research laboratories within the Research Infrastructure in Applied Sciences - INCESA. All INCESA laboratories, equipment and research services are presented on the ERRIS platform: https://erris.gov.ro/ .

PhD candidates have free access to 8 laboratories equipped with modern apparatus and equipment:

- "Computer Aided Engineering and Design" Laboratory - IPAC,
- "E-Mechantronics" Laboratory – E-Mec room
- "Robotics and Flexible Manufacturing Systems" Laboratory– R&SFF room

- "Management systems and equipment" Laboratory– SEC room
- "Innovative Techniques and Processes in Mechatronics and Robotics" Laboratories - rooms 201, 202, 212, 213 - INCESA

At the level of the University of Craiova and the Faculty of Automation, Computers and Electronics there are two research centers on the specifics of the doctoral field MR (Annex_1.2.6):

1. "Mechatronics and Robotics" Research Center (CCMR), coordinator: Prof. Dr. Eng. Mircea Ivănescu, accredited on 02.06.2005 Certificate no. 83 / CC-C, approval for the continuation of the functioning from 18.02.2013, the Senate of the University of Craiova, was re-evaluated in November 2016 at the level of the University of Craiova. The CCMR team comprises 13 members, of which 3 are PhD supervisors. According to the operating status, the Mechatronics and Robotics Research Center was established for the purpose of:

   a) carrying out a fundamental, experimental and technological scientific research activity. The research activity can be initiated on the basis of research contracts with state institutions, production companies, trade associations or others

   b) collaboration with similar associations in the country and abroad

   c) carrying out an activity of dissemination and publication of the scientific research results, either own or not

   d) carrying out an activity of training, continuous training, professional reconversion

   e) organization of scientific events (symposia, conferences, workshops, etc.)

2. Mechatronics and Robotics Research Laboratory within the Interdisciplinary Research Center in Computers, Automation and Robotics - CERCA, being established

1.2.7 Affiliations

Romanian Robotics Society (SRR)

The members of the Branch of the Romanian Robotics Society Craiova, tenured professors and PhD candidates from the field of Mechatronics and Robotics from SDCB are constantly involved in the research activity. It should be noted that over time SRR has been involved in several national actions: establishing curricula (in an attempt to standardize them), establishing the competencies of graduates (by participating in European programs), organizing scientific events especially in the field of Mechatronics and Robotics.

In Craiova are organized annually several actions in the field of robotics and mechatronics, both for students (Days of Mechatronic Education) and for high school students (school competitions, visits to our laboratories, etc.).

Among the members affiliated to the Romanian Robotics Society, we also find the PhD candidates from SDCB, most of them from the evaluated field of studies (Annex_1.2.7).

The Romanian Society of Automation and Technical Informatics (SRAIT) is a professional, autonomous, non-governmental, apolitical and non-profit organization. The aim is to contribute to increasing the role and efficiency of engineers working in the field of automation and technical informatics. Among the proposed objectives are: contributions to interdisciplinary

cooperation; improving the professional training of all specialists and workers in the field of automation and technical informatics through debates, conferences, domestic and international scientific events, exchange of knowledge and technological experience; support for exchanges of specialists with other similar organizations abroad in order to document and improve SRAIT members; facilitating the establishment of professional links between stakeholders, in order to promote the applications of automation and technical informatics in the management of industrial processes, including in related fields. Every year new members are received (http://www.automation.ucv.ro/srait/conducere.htm) including PhD candidates and PhD supervisors from the MR doctoral field (Prof. Dr. Eng. Dorian Cojocaru, Prof. Dr. Eng. Mircea Nițulescu, PhD Candidate Eng. Florina Besnea (Petcu), PhD Candidate Eng. Andrei Trăsculescu).

1.3 OPERATION OF THE INTERNAL QUALITY ASSURANCE SYSTEM

The internal quality assurance system at the level of doctoral studies in Mechatronics and Robotics is in accordance with the one provided in the Regulation of the SDCB (Annex_1.1.6.a), with the Procedure for internal evaluation of the activity of the doctoral schools of IOSUD University of Craiova, as well as with the Declaration of quality policy in the field of the Rector of the University of Craiova (Annex_1.1.6.b, Annex_1.3.1).

The director of SDCB annually prepares a self-evaluation report of SDCB (Annex_1.1.6.c1, Annex_1.1.6.c2, Annex_1.1.6.c3, Annex_1.1.6.c4), which is presented to the General Assembly of Doctoral Supervisors and submitted to the SDCB Board for approval. Thus, the efficiency of the internal quality assurance procedures and structures is evaluated annually, as well as their impact on the activities within the doctoral studies (Art. 15, SDCB Regulation). The conclusions of the annual quality self-assessment report at the SDCB level are analyzed in the General Assembly of Doctoral Supervisors in order to identify problems and solutions for continuous quality improvement at the SDCB level.

The internal quality assurance and monitoring policy at the level of SDCB is transparent, being carried out according to this regulation which includes in its articles clear and quantifiable criteria to be met for SDCB members PhD supervisors, PhD candidates and research results.

IOSUD - The University of Craiova is constantly concerned with ensuring the quality of the educational process and finding appropriate internal quality assurance policies. The objectives pursued by the University of Craiova in the field of quality management are included in the Quality Assurance Code of the University of Craiova (Annex_1.3.2), and are structured on three basic directions aimed at:

- the quality and efficiency of the educational act within the field of doctoral studies,
- the quality and efficiency of the research activity of PhD candidates,
- the quality of the research results carried out by both doctoral supervisors and PhD candidates.

The quality of the educational act within the field of doctoral studies is ensured by the periodic evaluation of the quality and structure of the doctoral study programs proposed in the curriculum posted on the web (Annex_1.2.3, http://www.ace.ucv.ro/sdcb/educatie.html), according to Art. 7 and Art 9 points (1), (2), (6) and (7) of the SDCB Regulation.

The periodic evaluation of the PhD supervisors from SDCB is performed according to the procedure and criteria provided in the SDCB Regulation Art 3, points (3) - (6).

The quality of the research activity of PhD candidates is periodically evaluated according to the criteria of the SDCB Regulation Art. 4, Art. 7 point (5), Art. 8, Art. 9 points (1), (3), (4), (6).

The quality of the research results carried out by PhD candidates is periodically evaluated according to Art. 9 points (1), (4), (5), (6), Art. 10, Art. 11.

The SDCB regulation is closely related to the quality assurance system and management at the level of the University of Craiova, according to Art. 1 points (3) and (4).

Personalities from IOSUD University of Craiova, scientific personalities from the country or abroad, PhD candidates, without having the right to vote, can be invited to the meetings of the SDCB Council.

The quality assurance system at the level of the Doctoral School is integrated in the quality management structure within the university. The supreme authority in this system is represented by the Senate of the University of Craiova. It consists of teachers and students elected by majority, universal, direct and secret ballot of teachers and researchers, respectively students.

The operative management of the University is ensured by the Administrative Body, composed of the rector, vice-rectors, the director of the council for doctoral studies, deans, the general administrative director and a student representative.

The Department of Quality Assurance (DMC) operates at the University. The DMC mission is established by the Charter of the University of Craiova, at Art. 162, and the objectives are specified at Art. 163. Details on the specific quality assurance activities and practices of DMC are presented in Annex_1.3.3, Annex_1.3.4.a, Annex_1.3.4.b, Annex_1.3.5 and Annex_1.3.2.

Quality assurance policies are set out in programmatic documents Annex_1.3.1, Annex_1.2.2, Annex_1.3.6 (according to Art. 162 of the Charter of the University of Craiova).

The quality assurance and evaluation policies and the means of realization in the field of education are elaborated, implemented and reported by DMC (Annex_1.3.7), and those in research by the Scientific Research Council of the University of Craiova (Annex_1.3.8), https://www.ucv.ro/cercetare/organizare/ccs/informatii_generale_CCS.php.

The Quality Assessment and Assurance Commission (CEAC) operates under the DMC, consisting of 6 members: 3 teachers from the University of Craiova, a representative of the University of Craiova union, a student representative and a representative of the economic environment and the Quality Council (Annex_1.3.9). The activity of the DMC is monitored by the *Commission for education, quality management and academic evaluation*, subordinated to the Senate, which reports according to the instructions of ARACIS (external evaluator).

The quality plan of the University of Craiova has direct addressability to the issue of opening the university to the economic and socio-cultural environment. This fact can also be deduced from the Strategic Plan of the DMC (Annex_1.3.4.a, Annex_1.3.4.b), which reflects the idea that the University of Craiova wants to be not only a generator of knowledge, but assumes the task of finding an application as well inserted in the realities of the social environment, economic and cultural, at regional, national and international level.

A doctoral field, with an obvious interdisciplinary character, represents the response of IOSUD, the University of Craiova and SDCB to the latest trends in global technical higher education as well as to the requirements of employers regarding the versatility of the highly trained workforce (Annex_1.3.10.a, Annex_1.3.10.b, Annex_1.3.11, Annex_1.3.12.a, Annex_1.3.12.b). The field of doctoral studies MR falls within the objectives of the University of Craiova, objectives that are also assumed by the Faculty of Automation, Computers and Electronics, by expanding the basic training of graduates and by diversifying the educational offer in accordance with labor market requirements and in accordance with the requirements of the Bologna Program.

2. FULFILLMENT OF CRITERIA, STANDARDS AND PERFORMANCE INDICATORS

This chapter contains the information necessary for assessing the degree of fulfillment of the criteria, standards and performance indicators, provided in the annex of the Order of the Minister of Education no. 3651 of April 20, 2021, accompanied by supporting documents accessible in electronic format.

A. INSTITUTIONAL CAPACITY

A.1. Institutional, administrative, management structures and financial resources

A.1.1. The institution authorized to organize doctoral programs (IOSUD) has implemented the mechanisms of efficient functioning as provided in the relevant law on the organization of doctoral programs.

A.1.1.1. Existence of specific regulations and their application at the level of the doctoral school of which the field of doctoral studies Mechatronics and Robotics is part

At the level of the "Constantin Belea" Doctoral School is applied in the last 5 years a series of regulations and methodologies for organizing and carrying out the doctoral activity. ***The institutional regulation for the organization and functioning of the doctoral studies programs of the Organizing Institution for Doctoral Studies - University of Craiova***, in force, was adopted by the Decision of the University Senate number 12 of November 24, 2016, with amendments and completions of the Senate of July 12, 2019, in the Senate meeting of September 26, 2019 and in

the Senate meeting of January 28, 2021, Annex_A.1.1.1.a. Thus, there are specific regulations and methodologies at the level of the doctoral school:

a) ***Regulations for the organization, functioning and internal quality assurance at the level of the "Constantin Belea" Doctoral School of the Faculty of Automation, Computers and Electronics of the University of Craiova*** can be accessed on the doctoral school website http://ace.ucv.ro/sdcb/ in the *Regulations* section *(*Annex_1.1.6.a*).*

b) At the SDCB level, ***the elections for the position of director*** of the Doctoral School Council (CSD), as well as the election by students of the representative in the CSD, are carried out according to the ***Regulations of the "Constantin Belea" Doctoral School - Art.2 The management structures of SDCB and of the Election Methodology at the level of the "Constantin Belea" Doctoral School*** *(*Annex_A.1.1.1.b1, Annex_A.1.1.1.b2*).* The results of the last elections held in 2020 can be consulted in Annex_A.1.1.1.b3.

At the level of the Council for Doctoral Studies from IOSUD - University of Craiova (CSUD - UCV) the elections are carried out according to the ***Methodology for appointing the members of the council for doctoral studies from IOSUD - University of Craiova (CSUD-UCV) and for organizing of the public competition for the appointment of the CSUD-UCV director*** (Annex_A.1.1.1.c1, Annex_A.1.1.1.c2)

c) ***Admission of PhD candidates***, completion of doctoral studies and enrollment and admission to postdoctoral studies are carried out in accordance with:

- Regulation regarding the organization and conduct of the competition for admission to undergraduate, master's and doctoral studies, for the academic year 2020-2021 (Annex_A.1.1.1.d1, Annex_A.1.1.1.d2)

https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/informatii/2020/Regulament_organiz_si_desf_concurs_de_admitere_2020_2021_v1.pdf
https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/2021/UCv-Metodologia_proprie_de_admitere_2021_2022.pdf
https://www.ucv.ro/invatamant/educatie/programe_doctorat/admitere_informatii.php
https://www.ucv.ro/invatamant/educatie/programe_doctorat/inscriere_online_doctorat.php

- Conditions for enrollment in the doctoral admission colloquium session September 2020 https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/2020/Conditi_de_admitere_2020.pdf, Annex_A.1.1.1.d2
- Extract regulation for the organization and functioning of doctoral and postdoctoral studies - Chapter 6 - Doctoral thesis and completion of doctoral studies, Annex_A.1.1.1.e1

https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/2021/Regulament_studii_doctorale_si_postoctorale_2021.pdf

- Methodology for enrollment and admission to postdoctoral studies within IOSUD - University of Craiova (Annex_A.1.1.1.e2)
  https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/2021/studii_postdoctorale/Metodologie_admitere_studii_postdoctorale.pdf

d) Within IOSUD there are ***mechanisms for recognizing the quality of doctoral supervisor*** and for equivalence of the doctorate obtained in other states through:

- Methodology for recognizing the quality of doctoral supervisor obtained in higher education institutions accredited abroad (Annex_A.1.1.1.f1) https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/informatii/reglementari/Metodologie_recunoastere_calitate_conducator_doctorat.pdf
- Methodology regarding the recognition of the doctoral diploma and the doctoral degree in sciences, obtained abroad (Annex_A.1.1.1.f2) https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/informatii/reglementari/Metodologie_recunoastere_diploma_doctorat_si_titlu_doctor.pdf

e) ***The functional management structure of SDCB*** is the Doctoral School Council (CSD-SDCB) whose activity and composition is regulated both by the IOSUD Regulation, Chapter III Art.7 and 8 and by the doctoral school's own regulations. The composition of the board can be found on the SDCB website http://ace.ucv.ro/sdcb/organizare.html , and includes a representative doctoral supervisor for each of the 3 fields of doctoral studies, a PhD candidate and an external member whose scientific activity has an international recognition. The CSD-SDCB meetings are held periodically according to Annex_A.1.1.1.g1, Annex_A.1.1.1.g2.

f) ***Candidates declared admitted to doctoral studies*** sign at registration a framework contract stating the rights and obligations of the parties (Annex_A.1.1.1.h1, Annex_A.1.1.1.h2) https://www.ucv.ro/invatamant/educatie/programe_doctorat/admitere_contracte_studiu.php

g) The "Constantin Belea" Doctoral School has ***internal procedures for analysis and approval*** of proposals on the subject of the training program based on advanced university studies (Annex_A.1.1.1.i)

A.1.1.2 The regulation of the doctoral school includes criteria, procedures and mandatory standards for the items specified in Art. 17(5) of the Code of doctoral programmes, approved by Government Decision no. 681/2011, with the subsequent amendments and completions.

The SDCB Regulation and the IOSUD Regulation include mandatory criteria, procedures and standards for the aspects specified in art. 17 para. (5) of the Code of doctoral university studies (https://www.ucv.ro/invatamant/educatie/programe_doctorat/reglementari.php), these being referred to in its own regulations through the articles:

a) *Art.3 Granting / withdrawing the quality of doctoral supervisor, university teacher, respectively researcher, affiliated to the doctoral school* from the SDCB Regulation

b) *Art.7 Advanced university training program* from the SDCB Regulation

c) Art.12 The change of a doctoral supervisor of a certain PhD candidate from the SDCB Regulation and *Art.8 par. d), e) l)* of the IOSUD Regulation

d) *Art.13 Terms for interruption of the doctoral program* from the SDCB Regulation, respectively *Art.32 and Art.33* from the IOSUD Regulation

e) *Art.11 Prevention and sanctioning of fraud in scientific research* from the SDCB Regulation and *Art.12* from the IOSUD Regulation

f) *Art.6 Ensuring the access to the research resources* from the SDCB Regulation, respectively *Art.14 par. f) and Art.28 paragraph (6)* of the IOSUD Regulation

g) *Art.7 Advanced university training program, Art.8 Research reports, Art.9 Evaluation of the capitalization of doctoral research and the assistance obligations* from the SDCB Regulation, which refer to the compulsory attendance for doctoral students

A.1.2. IOSUD has the logistics required to fulfill the mission of the doctoral programs.

A.1.2.1. The existence and effectiveness of an adequate software for the record of PhD candidates and their academic achievements

Student Records Information System of the University of Craiova (EvStud) ***http://cis01.central.ucv.ro/evstud/*** contains and processes the data of students from all cycles of education, cycle I, II, cycle III - Doctoral studies and postgraduate students (Annex_A.1.2.1.a).

After enrolling in studies, any change in the status of the PhD candidate is recorded in the electronic records at the level of each secretariat of the faculty within which the Doctoral School operates. The secretary appointed for the processing of doctoral students' data downloads in the Student Records the data on the results of the exams from the training program based on advanced university studies (PPUA) and the presented research reports, on interruptions, extensions, transfers from one PhD supervisor to another, payment of fees, public presentation of the thesis, expulsions (Annex_A.1.2.1.b, Annex_A.1.2.1.c1, Annex_A.1.2.1.c2, Annex_A.1.2.1.d).

At the request of MEN or other authorities that have this right, the Student Records Information System of the University of Craiova, generates annual or current statistical data on PhD candidates of IOSUD - University of Craiova (Annex_A.1.2.1.e).

The Doctoral Studies Office of IOSUD- University of Craiova, based on the Ministerial Order on conferring the scientific title of doctor, verifies all data on the schooling of PhD candidates in the Student Register and generates tables with doctoral graduates on the basis of which PhD diplomas are issued

Accessing and processing information in the database is done only by authorized persons, based on the password. For viewing their own school situation and for other information of general interest, each PhD candidate has a password generated by the Informatic System.

A.1.2.2. The existence and use of a software to check the similarity index of all doctoral theses, and supporting evidence of its use

The University of Craiova ensures the verification of the authenticity and originality of doctoral theses and other scientific papers with the help of the Program www.sistemantiplagiat.ro on the list of Programs recognized by the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU), according to art. 2 of the MEN Order No. 3485 of 04.04.2016.

For the use of the program, the University of Craiova has a subscription that ends annually, based on contract, for a fee (Annex_A.1.2.2.a). The presentation of the program www.sistemantiplagiat.ro is provided in Annex_A.1.2.2.b by www.sistemantiplagiat.ro.

The procedure by which the authenticity of a doctoral thesis is verified through www.sistemantiplagiat.ro is mentioned in the **Institutional Regulation of IOSUD-UCV, in the articles referring to the stages of completion of doctoral studies (respectively, art. 40, Stage I, Stage II a)** the following steps:

1. The PhD candidate submits to the Doctoral Studies Office of IOSUD- University of Craiova an application for obtaining a similarity report for the doctoral thesis elaborated, as well as the doctoral thesis in electronic format, specifying the title of the paper, the scientific supervisor, the doctoral field and other identification data, endorsed by the Director of the Doctoral School and the scientific supervisor and registered at the university registry;

2. The staff of the Doctoral Studies Office verifies if the document is correctly prepared to be introduced in the verification program.

3. Using a password, the person designated as administrator of the program www.sistemantiplagiat.ro uploads the doctoral thesis. In a maximum of 24 hours, the program generates the similarity report for the verified work, and this report is sent electronically to the doctoral supervisor and the thesis author..

4. The doctoral supervisor completes a resolution of interpretation of the values of the similarity coefficients and confirms or refutes the originality of the paper, based on the study of the integral similarity report on the doctoral thesis. If the originality of the thesis is confirmed, the doctoral supervisor expresses in the resolution his / her agreement to present the doctoral thesis by the PhD candidate before the guiding committee and the scientific supervisor.

5. **The value of the Similarity Coefficient No. 2** recommended by www.sistemantiplagiat.ro as being within acceptable limits, which do not arouse suspicion of plagiarism and which was assumed by IOSUD - University of Craiova is **≤5%.**

6. The PhD candidate submits to the Doctoral School the request to present the thesis in front of the guiding committee and of the supervisor, attaching to the request the report of similarities and the thesis.

7. The Guiding Committee and the scientific supervisor analyze both the thesis and the similarity report and express their agreement to publicly present the thesis, if the thesis meets all the requirements of the Doctoral School and the legislation in force. Otherwise, the doctoral student is recommended to revise the thesis and return to obtain the agreement to publicly present the rewritten thesis, according to the recommendations, for which he is obliged to obtain, upon request, a new similarity report through the program www.sistemantiplagiat.ro.

IOSUD-University of Craiova uses the program www.sistemantiplagiat.ro as a modern working tool in verifying the originality of the scientific creations of PhD candidates, without basing its analysis and conclusions exclusively on the data generated by the program for verifying authenticity.

The experience and professional training of the doctoral supervisors, of the members of the guiding commissions, of the reference members of the commission for public presentation of the

doctoral thesis and, last but not least, the method of selection for admission of PhD candidates ensures the quality of doctoral scientific research within our institution Annex_A.1.2.2.c.

A.1.3. IOSUD ensures that financial resources are used optimally, and the revenues obtained from doctoral studies are supplemented by additional funding to that provided by the Government.

A.1.3.1. Existence of at least one research or institutional development / human resources grant in implementation at the time of submission of the internal evaluation file

An essential factor for boosting the research and professional development activities of PhD candidates in a certain field of doctoral studies is the ability of doctoral supervisors to attract additional financial resources through grants.

The 3 scientific supervisors working at the level of SDCB in the field of Mechatronics and Robotics are involved in research activities, both fundamental and applied. All supervisors are part of teams of grants obtained through competition and have managed to attract additional funding to support the work of PhD candidates. In order to demonstrate the fulfillment of the research grants indicator, we mention the following examples that can also be consulted in Annex_A.1.3.1:
- at least one research or institutional development / human resources grant in implementation at the time of submission of the internal evaluation file:

- INTELLIGENT AND DISTRIBUTED MANAGEMENT OF 3 COMPLEX AUTONOMOUS SYSTEMS INTEGRATED IN EMERGING TECHNOLOGIES FOR PERSONAL MEDICO-SOCIAL ASSISTANCE- CIDSACTECH, PN III, program 1 - Development of the national research-development system, subprogram 1.2, Institutional performance, 78PCCDI/2018, 2018-2021, value 1,057,500.00 lei, **Director: Dorian Cojocaru; Members: Bîzdoacă Nicu-George, Nițulescu Mircea, Dragomir Andrei, Mariniuc Alexandru**
- CENTER OF RESOURCES AND ASSISTANCE IN LEARNING AND TRAINING (CRAIF), ROSE, AG 98 / SGU / CI / II / 17.12.2018, 2019-2021, value 929,190.00, **Project Director: Bîzdoacă Nicu-George**

- at least two research or institutional development / human resources grants obtained by doctoral supervisors in the field evaluated in the last 5 years:
  - RESEARCH INFRASTRUCTURE IN APPLIED SCIENCES - INCESA, OSCCE - A.2. - O.2.2.1. - 2009 - 4, SMIS CODE - CSNR 13845, Contract number: 256 / 28.09.2010, 2012-2016, **Implementation Responsible: Bîzdoacă Nicu-George**
  - ENSURING TRANSPARENCY IN STUDENT MANAGEMENT AND IMPLEMENTATION OF THE SINGLE REGISTRATION REGISTER (RMU) IN THE UNIVERSITY OF CRAIOVA THROUGH THE ITUCV PLATFORM WITH INTEGRATED SERVICES, Grant for Institutional Development - CNFIS- FDI-2016-0027, Target field: 3, Ensuring transparency in student management and implementation of the Unique Matriculation Register of Romanian Universities, 2016, 135.000,00, **Project Director: Bîzdoacă Nicu-George**
  - FORD ROMANIA - UNIVERSITY OF CRAIOVA PARTNERSHIP FOR THE TRANSFER, IMPLEMENTATION AND ADAPTATION OF FORD ECO-TECHNOLOGIES TO THE

REALIZATION OF THE ECOSPORT MODEL IN CRAIOVA - ECOFORDUCV, UEFISCDI, PN-III-P2-2.1-BG-2016-0123 BRIDGE, BG 92/2016, 2016-2018, 460.000 LEI, **Director: Nicu George Bîzdoacă**

- INTELLIGENT AND DISTRIBUTED MANAGEMENT OF 3 COMPLEX AUTONOMOUS SYSTEMS INTEGRATED IN EMERGING TECHNOLOGIES FOR PERSONAL MEDICO-SOCIAL ASSISTANCE - CIDSACTECH, PN III, program 1 - Development of the national research-development system, subprogram 1.2 - Institutional performance, 78PCCDI/2018, 2018-2021, value 1.057.500,00 lei, **Director: Dorian Cojocaru; Members: Bîzdoacă Nicu-George, Nițulescu Mircea, Dragomir Andrei, Mariniuc Alexandru**
- QUALITY TEACHING ACTIVITY, DEONTOLOGY AND ACADEMIC ETHICS - PERMANENT PRIORITIES AT THE UNIVERSITY OF CRAIOVA, Institutional Development Grant - CNFIS- FDI-2017-0091, Target field: 7: improving the quality of teaching, including respect for deontology and academic ethics, 2017, 180.000,00, **Project Director: Bîzdoacă Nicu-George**
- PROMOTING EXCELLENCE IN FUNDAMENTAL AND APPLIED RESEARCH - A STRATEGIC PRIORITY AT THE UNIVERSITY OF CRAIOVA, Institutional Development Grant - CNFIS- FDI-2018-0032, Target field: 6 Supporting research excellence in universities, 2018, 372.000,00 lei, **Project Director: Bîzdoacă Nicu-George**
- INNOVATION, KNOWLEDGE, DISSEMINATION - EFFICIENT SOLUTIONS TO SUPPORT RESEARCH OF EXCELLENCE AT THE UNIVERSITY OF CRAIOVA, Institutional Development Grant - CNFIS- FDI-2019-0447, Target field: 6 Supporting research excellence in universities, 2019, 388.000,00, **Project Director: Bîzdoacă Nicu-George**
- UCV RESEARCH AND KNOWLEDGE HUB - IMPLEMENTATION OF A PERFORMING STRUCTURE FOR INTERCONNECTING RESEARCH AND KNOWLEDGE IN THE UNIVERSITY OF CRAIOVA, Institutional Development Grant - CNFIS- FDI-2020-0243, Target field: 6 Supporting research excellence in universities, 400.000,00, **Project Director: Bîzdoacă Nicu-George**

A.1.3.2. Proportion of PhD candidates existing at the time of evaluation, who benefit, for a minimum of six months, from other sources of funding than government funding

Within the field of doctoral studies in Mechatronics and Robotics, there are a total number of 5 doctoral students benefiting from the financing from the state budget. The number of PhD candidates who are involved in research projects and teams, for a period of at least six months, is 7 (Annex_A.1.3.2.a):

- Besnea (Petcu) Florina Luminița - 3 projects (9 months, 2017-2018; 7 months, may-december 2018; 20 months, 2018-2020)
- Roibu Horațiu - 2 projects (9 months, 2017-2018; 33 months, 2018-2020)
- Băzăvan Lidia - 1 project (9 months, 2017-2018)
- Cismaru Ștefan Irinel - 2 projects (7 months, february-september 2020, 3 months, january-march 2021)
- Abagiu Marian - 1 project (16 months, 2019-2020)
- Dragomir Andrei - 1 project (8 months ca doctorand, 2018-prezent)
- Mariniuc Alexandru - 1 proiect (8 months as PhD candidate, 2018-present)

The Human Capital Operational Program is currently underway, Call POCU/380/6/13, OS 6.13 - Support for PhD candidates and postdoctoral researchers entitled ***"Entrepreneurial University - higher education and training system for the Romanian labor market by providing scholarships for doctoral students and postdoctoral researchers and the implementation of innovative entrepreneurial training programs",*** **ID: POCU/380/6/13/123990, Duration: 36 months (2019-2022), Value: 7.082.571,00 lei (**Annex_A.1.3.2.b1**).**

Within this project a number of 4 PhD candidates have benefited and are benefiting from doctoral scholarships, for a period of more than six months **(**Annex_A.1.3.2.b2**):**

- Besnea (Petcu) Florina Luminița - series I (2019-2020)
- Ionescu Marian - series I (2019-2020)
- Cismaru Ștefan Irinel - series II (october 2020 - october 2021)
- Roibu Horațiu - series II (october 2020 - october 2021)

Also, as a postdoctoral student, Banța Viorel obtained a postdoctoral scholarship, for a period of 12 months, within the POCU Entrepreneurial University project (Annex_A.1.3.2.b3).

Through the **QFORIT Doctoral and Postdoctoral Scholarship Program**, the University of Craiova, Faculty of Automation, Computers and Electronics awarded doctoral / postdoctoral scholarships with funding obtained through private sponsorship (S.C. CASA NOASTRĂ S.A.), based on a competition of files (projects) - Annex_A.1.3.2.c1. The scholarships were addressed to PhD candidates and postdoctoral students of the University of Craiova, Faculty of Automation, Computers and Electronics. ***PhD Candidate*** Cismaru Ștefan Irinel benefited from additional income than those obtained through government funding by winning a private QForIT doctoral scholarship for a period of 5 months (Annex_A.1.3.2.c2, Annex A.1.3.2.c3, Annex A.1.3.2.c4).

According to the above, it appears that out of the 11 PhD candidates studying at the time of the evaluation, 7 of them are or have been involved in projects to obtain additional funding for at least six months, the percentage being 63.63%.

**A.1.3.3. Doctoral grants and tuition fees to finance PhD candidates' training expenses*

The list of PhD candidates' tuition fees and their amount can be consulted in Annex_A.1.3.3.a.

SDCB Regulation, according to **Art.6 Ensuring access to research resources, para. (2) and (3) SDCB supports the research activity for PhD candidates from all forms of education by providing financial support and settlement of travel expenses, accommodation and access fees, for the professional training of PhD candidates and dissemination of scientific results obtained in the activity of doctoral research**.

At the University of Craiova, the accounting statement of income and expenses is made at the level of doctoral schools, and not at the level of doctoral studies. Therefore, the situation at the level of the "Constantin Belea" Doctoral School is presented below. Thus, in Annex_A.1.3.3.b are presented the revenues and expenditures for the period 2016-2020, and in Annex_A.1.3.3.c are broken down the SDCB expenditures for the period 2016-2020. From these documents results the situation of

doctoral school income / expenses with the training of PhD candidates (participation in conferences, summer schools, courses and internships, publication of articles, etc.) for SDCB, presented in summary below - Table 7.

Table 7 Revenues and expenses for SDCB PhD candidates in the period 2016-2020

Year	Income - lei	Expenses for training PhD candidates - lei	Percent	Additional training expenses for MR PhD candidates - lei
2016	252120	0	0	0*
2017	208404	3956	1,89%	0*
2018	103972	0	0	7564,53
2019	221167	26135	11,81%	9331
2020	208504	2543	1,21%	4800,70
TOTAL	994167	32634	3,28%	**21998,60**

* this year the PhD candidates were funded from the research projects in which they were employed

The University of Craiova has set up a special fund, in addition to the income related to doctoral grants, the Support Fund for Scientific Research Activity which aims to support especially young researchers, including PhD candidates, to participate in prestigious international conferences and to cover publication in internationally listed journals (Annex_A.1.3.3.d1, Annex_A.1.3.3.d2).

In Annex_A.1.3.3.e is presented a situation of the expenses made by UCV for the training of PhD candidates from the "Constantin Belea" Doctoral School, from additional sources (research fund). It results that significant amounts were invested from additional funds, which represent 112,147.40 lei in the period 2016-2020 (which would mean a percentage of 11.28% of SDCB revenues). We mention that here were not considered the expenses incurred for PhD candidates directly from the SDCB funds, which are included in the amounts presented in Table 7.

As the accounting statements are made only at the level of SDCB, for estimating the revenues of the MR field in the last 5 years, we will further present the situation of PhD candidates studying in each academic year. Thus, in the academic years 2015-2020, 154 PhD candidates were enrolled (73 from the budget and 81 for a fee) throughout the Constantin Belea Doctoral School (the enrollment of doctoral students was taken into account every year - Annex_A.1.3.3.f. In the MR field, 45 students were enrolled (26 in the budget and 19 in the fee). It results that the percentage of PhD candidates in

the field of MR compared to the total SDCB is 29.22% (16.88% in the budget, 12.33% in the fee). Therefore, with a reasonable degree of robustness, it can be considered that the revenues of the MR domain were not higher than one third (33.33%) of the total revenues of SDCB. From here results a maximum income of 331,389 lei in the period 2016-2020 (Table 7).

From Annex_A.1.3.3.e it results that in 2016-2020, 21998.60 lei were spent from additional funds. This amount, although not spent directly from the Doctoral School funds, represents a percentage of 6.63% of the previously estimated MR domain revenues (the expenses made for the MR domain from the SDCB funds were not considered here).

A.2. Research infrastructure

A.2.1. IOSUD / The doctoral schools have a modern research infrastructure that supports the development of the related activities.

A.2.1.1. The spaces and the material endowment of the doctoral school allow the accomplishment of the research activities, in the evaluated field, in accordance with the assumed mission and objectives.

The field of studies MECATRONICS and ROBOTICS has its own infrastructure materialized in lecture and seminar rooms, laboratories for studying the disciplines corresponding to the specializations of bachelor, master and doctorate, having a modern endowment with specific equipment, to achieve a modern training of future specialists *(*Annex_A.2.1.1.a1*)*.

Since 2016, the Research Infrastructure in Applied Sciences - INCESA has been operating, which includes 48 modern research laboratories, with an area of approx. 2300 m^2 www.incesa.ro (Annex_A.2.1.1.a2). ***The INCESA infrastructure and the offer of research services are publicly presented on the ERRIS platform:*** http://erris.gov.ro/Research-Infrastructure-in-A. INCESA laboratories are equipped with modern equipment and software and offer conditions for high-level research and experiments.

IOSUD through the University of Craiova proves that it has a library equipped with a reading room and its own book fund, corresponding to the disciplines provided in the curricula for the doctoral university study cycle. The libraries of the University of Craiova, http://biblio.central.ucv.ro/, provide a number of places in the reading rooms corresponding to at least 10% of the total number of students.

The library has in its organization the Unique Depository that brings together valuable, reference works (approx. 170,000 titles), benefiting from a fully computerized database that can offer the reader quick access to information. Library users also have at their disposal a Multimedia room and a conference room, located within the Lăpuș headquarters of the Library. The library organization regulations, the organizational chart, the budget, the databases, as well as the statistics on the use of the databases can be found in Annex_A.2.1.1.b1, Annex_A.2.1.1.b2, Annex_A.2.1.1.c1 și Annex_A.2.1.1.c2**.**

At the level of IOSUD and the University of Craiova, there is an ITC network that includes all the education and research spaces, the spaces for the administrative staff as well as the student

campuses of the university. It is managed by the IT and Communications Service (https://www.ucv.ro/it_fonduri_eur/informatizare/sic/prezentare.php). The network provides both wired and wireless internet access. Students can access, in compliance with the protocols and regulations for the use of the computer network (Annex_A.2.1.1.d1, Annex_A.2.1.1.d2 **)** the ITC network of the University of Craiova through the terminals located in the teaching laboratories, in the reading rooms, etc.

For **student accommodation** The University of Craiova has 11 consolidated and modernized dormitories, with a capacity, in the academic year 2019-2020, of 2,805 places that fully cover the requests from students (Annex_A.2.1.1.e1, Annex_A.2.1.1.e2). The university has four university restaurants or dining spaces accessible to students, as well as grounds and gyms (Engineering Faculty Complex, Mechanics Complex, FEFS Complex), spaces for recreation and socialization (University Club, Botanical Garden, Rânca Chalets, Vila Mircea), etc. (Annex_A.2.1.1.f).

Students from the doctoral program in the field of MR can benefit from the services of the Library of the University of Craiova through the following branches (Annex_A.2.1.1.g).

1. **Library of the Faculties of Automation and Electrical Engineering** which holds:

- Book deposit and home loan center with a book fund of 62758 volumes.
- Reading room with free access to the shelf which has 30 seats and a fund of 5854 volumes. The room is equipped with 4 computers and a multifunction printer.
- Periodical deposit and reading room with a serial publication fund of 9978 volumes. The reading room has 20 seats. The room is equipped with 2 computers and a multifunction printer.

2. **Library of the Faculty of Mechanics**, which owns:

- Book deposit and home loan center with a book fund of 30667 volumes.
- Reading room with free access to the shelf which has 60 seats and a background of 6015 vol. The room is equipped with 4 computers and a multifunctional printer.
- Periodic storage and reading room with a collection fund of 30775 vol. The reading room has 20 seats. The room is equipped with 2 computers and a multifunction printer.

3. **UNICATE Library**

- Book deposit with encyclopedic profile with a fund of 134355 volumes.
- Reading room with 100 seats.
- Multimedia room with 30 computers and 2 multifunction printers.

IOSUD-University of Craiova proves that it allows access to the following multidisciplinary / specialized fulltext, bibliographic, bibliometric scientific databases accessible within the university (Annex_A.2.1.1.h1):

I. Full text multidisciplinary scientific databases

1. Science Direct Freedom Collection
2. SpringerLink Journals
3. Taylor and Francis Journals (archive)
4. Cambridge Journals

II. Full text specialized scientific databases

1. IEEE/IET electronic library (IEL)
2. American Institute of Physics (AIP)
3. Mathscinet – American Mathematical Society
4. CAB abstracts
5. EBSCO Host – Business Source Complete

III. Bibliographic, bibliometric scientific databases

1. Clarivate Analytics (Web of Knowledge - Thomson Web of Science, Thomson Journal Citation Reports, Thomson Derwent Innovations Index)
2. SCOPUS

IV. Electronic books (ebooks accessible via IP from the university campus; they can be found in the electronic catalog, as well as in the total book fund)

1. Elsevier
2. Wiley
3. Ebrary (Proquest ebook central)
4. Emerald - Business, Management and Economics Ebook Series Collection 2011

ISOUD - University of Craiova provides students with magazines and publications in the field of robotics, computer automation, electronics, as well as specialized collections (Annex_A.2.1.1.g, Annex_A.2.1.1.h2, Annex_A.2.1.1.h3, Annex_A.2.1.1.h4).

The spaces and material endowment of SDCB allow the realization of the research activities, in the evaluated field, in accordance with the mission and the objectives assumed:

- computers, specific software, apparatus, laboratory equipment (video projection system, Internet connection), available to PhD candidates
- "Computer Aided Engineering and Design" Laboratory - IPAC,
- "E-Mechatronics" Laboratory – E-Mec room
- "Robotics and Flexible Manufacturing Systems" Laboratory – R&SFF room
- "Management systems and equipment" Laboratory – SEC room
- Laboratories of "Innovative Techniques and Processes in Mechatronics and Robotics" - rooms 201, 202, 212, 213 - INCESA
- Access to international databases is offered on the premises of UCV, but also by mobile access to the *Anelis Plus* database and other databases to which the university has access by opening an access account by the UCV Computer Center; through the Library of the Faculty of Automation, Computers and Electronics, PhD candidates can easily access both databases and specialized collections necessary for individual study or research.

  The research infrastructure and the offer of research services are presented publicly for the access to the Anelis Plus platform.

It should be mentioned that 3 projects were submitted and declared winners for the rehabilitation and modernization of educational spaces on the campus of electric faculties, with a value of over 18 million euros from non-reimbursable funds from the budget allocated to SV Oltenia Region through POR 2014-2020, Priority Axis 10 aimed at "Improving the educational infrastructure", Operation 10.3 - Increasing the relevance of university tertiary education in relation to the labor market and competitive economic sectors. Through these projects, the

buildings will be consolidated, new elevators will be installed, all constructions will be thermally rehabilitated, the facades of the buildings will be remodeled, the existing installations will be replaced, compartments and modernizations will be made, and the rooms will be equipped with specific furniture with library and laboratory equipment, with multimedia equipment and software, etc. The estimated completion date of the planned works is 29.12.2023.

PhD candidates in the field of MR have access to the research infrastructure of the Faculty of Automation, Computers and Electronics of the University of Craiova. In addition, they can use the research infrastructure related to the research centers and groups within the Faculty of Automation, Computers and Electronics and the Department of Mechatronics and Robotics of the University of Craiova:

- INCESA Applied Sciences Research Infrastructure (http://www.incesa.ro/)
- "Mechatronics and Robotics" Research Center, recognized by CNCSIS in 2005 and re-accredited by the UCV Senate - which has among its founding members the 3 teachers, PhD supervisors in the field of *Mechatronics and Robotics*.
- MR Research Laboratory - in progress of establishment https://www.ucv.ro/cercetare/ics/centre_cercetare/prezentare_centre.php, https://www.ucv.ro/pdf/cercetare/unitati_cdi/centre_de_cercetare/2021/Calendar_infiintare_evaluare_centre2021.pdf

In the last 5 years, high-performance equipment and software packages that are available in the field of Mechatronics and Robotics have been purchased and received through sponsorships (Annex_A.2.1.1.i1, Annex_A.2.1.1.i2, Annex_A.2.1.1.i3, Annex_A.2.1.1.j1, Annex_A.2.1.1.j2, Annex_A.2.1.1.j3, Annex_A.2.1.1.j4) among which we mention:

- Two robots Sawyer Robot System - from the company SMART ID Dynamics, received as sponsorship for the development of research and doctoral theses, worth approximately 50,000 Euros (received in December 2020)
- Virtual gloves or computer gloves
- OMRON-TJ1-FLO2 control module;2 axes two fast inputs, 2 dedicated inputs, 2 dedicated outputs-10-10v
- Stereoscopic head mounted display system (HMD), diag.17.78cm, res.1280x800, LCD 60Hz, motion tracking system (sampling rate -1000Hz, gyroscope, magnetometer, accelerometer), soft model Oculus Rift Developer
- Advanced eye movement tracking device / single eye TOBII PRO NANO HARDWARE PACKAGE, 59 grams, 170x13x18mm.
- Software system for processing sensory information
- Robotic manipulator system for mobile seats KINOVA GEN3 LITE ROBOTIC ARM
- Sensory systems in LiDAR technology

The offer of research services within the three doctoral fields from SDCB is folded on the related research areas and directions of the Interdisciplinary Research CEnteR in Computing, Automation, and Robotics (CERCA). The structure of the center includes three research

laboratories in the fields of Computers and Information Technology, Systems Engineering and Mechatronics and Robotics, respectively, services that can be consulted in Annex_A.2.1.1.k.

Laboratories / groups / directions of scientific research:

Laboratory 1: "Computers and Information Technology" / CATI

Laboratory 2: "Nonlinear Automation and Intelligent Systems (ANSI)"

Laboratory 3: "Mechatronics and Robotics" / MR

The **Research Laboratory in Mechatronics and Robotics** integrates the interdisciplinary fields in rapid development of engineering research that deals with the design and realization of intelligent products, systems and processes. The research is included in the laboratories of the Faculty of Automation, Computers and Electronics that have specific technical equipment and dedicated software that ensures the proper conduct of activities.

The MR team has 16 members, of which 4 are PhD supervisors (of which 1 associate), 1 assistant, 4 experienced researchers and 7 PhD students. All 4 experienced researchers in the team have over 1/5 CNATDCU professor norms (equivalent score) in the last 5 years. Component groups / directions:

- *Medical bioengineering*
- *E-learning*
- *Mobile robotics*
- *Biomimetic robotic systems*
- *Image acquisition, processing and recognition*

A.3. Quality of human resources

A.3.1. At the level of each field there are qualified staff with the necessary experience to carry out the doctoral study program.

A.3.1.1. PhD supervisors and meeting the minimum CNATDCU standards in the field of Mechatronics and Robotics

The degree of fulfillment of the minimum CNATDCU standards in force at the time of the evaluation, necessary and obligatory for obtaining the habilitation certificate is revealed by the *sheets of fulfillment of these existing standards* for each teacher who is PhD supervisor and affiliated to the "Constantin Belea" Doctoral School, Mechatronics and Robotics field.

The sheets for fulfilling the minimum mandatory standards for obtaining the qualification, by each doctoral supervisor are in Annex_A.3.1.1.a1, Annex_A.3.1.1.a2, Annex_A.3.1.1.a3, including the CVs of the doctoral supervisors who support the teaching activities (Annex_A.3.1.1.b1, Annex_A.3.1.1.b2, Annex_A.3.1.1.b3, Anexa_A.3.1.1.b4).

Table 8 Meeting the CNATDCU minimum standards

Nr. Crt.	First name and last name of the doctoral supervisor / institution where he / she is the holder	Order to appoint a doctoral supervisor	Score according to minimum standards CNATDCU COMMISSION: 17. MECHANICAL, MECHATRONIC AND ROBOTIC ENGINEERING COMMISSION [according to OMENCS no. 6129 / 20.12.2016]		Findings on compliance with minimum standards
			Minimum provided (A1+A2+A3)	Accomplished (A1+A2+A3)	
1.	Prof. Dr. Eng Dorian Cojocaru / University of Craiova	OMECT no.5842/ 04.11.2008	129	2.472,42	Fulfilled
2.	Prof. Dr. Eng Nicu George Bîzdoacă / University of Craiova	OMECT no.5842/ 04.11.2008	129	20.158,08	Fulfilled
3.	Prof. Dr. Eng Mircea Dorian Ioan Nițulescu / University of Craiova	OMECT no.5842/ 04.11.2008	129	924,12	Fulfilled

In Annex_A.3.1.1.b4 there is the professional and journalistic experience of Mr. Prof. Dr. Gabriel Olteanu, PhD supervisor in law, who teaches the course of Ethics and Academic Integrity at the "Constantin Belea" Doctoral School.

A.3.1.2. PhD supervisors in the field of Mechatronics and Robotics tenured within IOSUD

Within the field of Mechatronics and Robotics, all the doctoral supervisors affiliated to the "Constantin Belea" Doctoral School are tenured of IOSUD-UCV (Annex_A.3.1.2.a, Annex_1.1.3). This also emerges from the job descriptions for the period 2016-2021 within the "Constantin Belea" Doctoral School, which also includes teaching activities (Annex_A.3.1.2.b).

A.3.1.3. The disciplines in the training program based on advanced university studies related to the field of Mechatronics and Robotics are supported by teachers

Most of the disciplines in the training program based on advanced university studies in the field of doctoral Mechatronics and Robotics (10 disciplines) are supported by teachers, with the teaching degree of university professor and who have the quality of doctoral supervisor: Prof. Dr. Eng. Dorian Cojocaru , Prof. Dr. Eng. Nicu George Bîzdoacă and Prof. Dr. Eng. Mircea Dorian

Ioan Nițulescu (Annex_A.3.1.3.a, Annex_A.3.1.3.c, Annex_A.3.1.3.d, Annex_A.3.1.3.e, Annex_A.3.1.3.f, Annex_A.3.1.3.g, Annex_A.3.1.3.h, Annex_A.3.1.3.i, Annex_A.3.1.3.j, Annex_A.3.1.3.k). The discipline of Ethics and Academic Integrity has as tenured Prof. Dr. Gabriel Olteanu (Annex_A.3.1.3.b).

A.3.1.4. The share of doctoral supervisors who coordinate at the same time more than 8 PhD candidates, but not more than 12, who are in the period of doctoral studies

According to Annex_A.3.1.4 it turns out that there are no doctoral supervisors in the field of Mechatronics and Robotics who coordinate more than 8 PhD candidates at the same time. The statistics can also be consulted in the following table:

Table 9 Number of PhD candidates in their studies

PhD Supervisor	**No. of coordinated PhD candidates in 2020-2021**
Nicu-George BÎZDOACĂ	6
Dorian COJOCARU	4
Mircea NIȚULESCU	1
TOTAL	11

A.3.2. The doctoral supervisors in the field carry out an internationally visible scientific activity.

A.3.2.1. Indexed publications and international visibility in the last five years of doctoral supervisors in the field of Mechatronics and Robotics

The doctoral supervisors affiliated to SDCB of IOSUD - University of Craiova carry out an internationally visible scientific activity, the degree of fulfillment of this evaluation criterion being highlighted by the ***Minimum Standards Compliance Form, the CV and the List of existing papers for each affiliated PhD supervisor*** in the field of Mechatronics and Robotics ***(***Annex_A.3.2.1.a1, Annex_A.3.2.1.a2, Annex_A.3.2.1.a3***).***

The international visibility of PhD supervisors in Mechatronics and Robotics is proven by scientific papers published in international journals listed or indexed in Web of Science or other prestigious databases, by their presence in the scientific committees of international conferences, by the presence in the editorial teams of some international journals, the participation in invention salons, by the quality of member in the scientific committees of the international publications and

conferences as well as by the obtained prizes (Annex_*A.3.2.1.b*, Annex_A.3.1.1.b1, Annex_A.3.1.1.b2, Annex_A.3.1.1.b3).

Within the Romanian Robotics Society (SRR), the society of those who work in academia, research, design or are simple supporters of this scientific field of great perspective in our country, we find in the management team, starting uninterrupted since 2000, two representatives of the Craiova doctoral school. Mr. Prof. Dr. Eng. Mircea Ivănescu is the President of SRR, and Mr. Prof. Dr. Eng. Mircea Nițulescu is General Secretary of SRR (http://www.robotics-society.ro/conducere.html). As can be seen from the SRR website at www.robotics-society.ro, the Romanian Robotics Society has legal personality, being established as a non-profit company and is affiliated to the global profile body IFR - International Federation on Robotics.

A.3.2.2. Doctoral supervisors assigned to the field of Mechatronics and Robotics continue to be scientifically active in the last 5 years obtaining at least 25% of the score required by the minimum standards CNATDCU

All the mentioned doctoral supervisors are scientifically active in the last five years, this being highlighted in the annexes Annex_A.3.2.2.a1, Annex_A.3.2.2.a2, Annex_A.3.2.2.a3. The following table reveals the fulfillment of the CNATDCU criteria for the last 5 years.

Table 10 Meeting the minimum CNATDCU standards in the last 5 years

Nr. Crt.	**First name and last name of the doctoral supervisor / institution where he / she is tenured**	**Score according to minimum standards CNATDCU COMMISSION: 17. MECHANICAL, MECHATRONIC AND ROBOTICS ENGINEERING COMMISSION [according to OMENCS no. 6129 / 20.12.2016]**		**Findings regarding the fulfillment of the minimum standards (minimum 25%) in the last 5 years**
		Minimum provided **(A1+A2+A3)**	Made in the last 5 years **(A1+A2+A3)**	
1.	Prof. dr. ing. Dorian Cojocaru / Universitatea din Craiova	129	472,418	Fulfilled
2.	Prof. dr. ing. Nicu George Bîzdoacă / Universitatea din Craiova	129	15.667,846	Fulfilled
3.	Prof. dr. ing. Mircea Dorian Ioan Nițulescu / Universitatea din Craiova	129	166.63	Fulfilled

B. EDUCATIONAL EFFICIENCY

B.1. Number, quality and diversity of candidates participating in the admission examination

B.1.1. The institution organizing doctoral studies has the capacity to attract candidates from outside the higher education institution or in greater numbers than the number of places financed from the state budget.

B.1.1.1. The ratio between the number of master's degree graduates of other higher education institutions in the country or abroad who have registered for the competition for admission to doctoral studies in the last five years and the number of places financed from the state budget put up for competition in the field of doctoral studies or the ratio between the number of candidates in the last five years and the number of places financed from the state budget put up for competition in the field of doctoral studies

In the period 2015 - 2020, a number of **9 places from the state budget** *were allocated for admission to the Doctoral School in the field of Mechatronics and Robotics*. In order to occupy the 9 budgeted places, a total number of 16 candidates presented themselves at the admission colloquium (of which 6 students were admitted to the form of education with fee and only one foreign candidate in fee-CPV regime) according to the Annex B.1.1.1. Of these, **9 students enrolled on budget** come from the master's programs at the University of Craiova (8 PhD candidates completing their masters at the Faculty of Automation, Computers and Electronics), and of the 7 admitted to the fee, 4 PhD candidates completed the master's degree at another university.

Therefore, the ratio between the number of master's degree graduates of other higher education institutions in the country or abroad who have entered the competition for admission to doctoral studies in the last 5 years and the number of places financed from the state budget put up for competition within the doctoral school of Mechatronics and Robotics is **4/9 = 0.44> 0.2**.

Referring to the ratio between the number of candidates in the last five years and the number of places financed from the state budget put up for competition within the field of doctoral studies, the result is **16/9 = 1.77> 1.2**.

B.1.2. Candidates admitted to doctoral studies demonstrate academic, research and professional performance.

B.1.2.1. Evaluation criteria for doctoral admission within the "Constantin Belea" Doctoral School

IOSUD The University of Craiova has a mechanism for selecting candidates for doctoral studies aimed at guaranteeing the quality of PhD candidates, to guarantee the soundness of the knowledge accumulated during their previous university studies, bachelor's and master's degrees. Thus, only graduates who obtained an average of 8 in the previous cycle of studies (long form /

master), calculated as an arithmetic mean between the average of the years of study and the average of the exam (long form) or master's degree, have the right to enroll in the admission colloquium for doctoral studies. This criterion also applies to all Romanian or EU, EEA or EEA candidates. Also, IOSUD University of Craiova has a policy of stimulating the enrollment of PhD candidates from disadvantaged social backgrounds, by allocating special places for admission, for example for Roma candidates.

In the SDCB Regulation Art.4 are found aspects that refer to the selection and admission of PhD candidates, supported by Annex_A.1.1.1.d2 and Annex_B.1.2.1**.**

B.1.2.2. The expulsion rate of PhD candidates, including after dropping out of studies, 3 and 4 years after admission, does not exceed 30%.

The quality of the candidates registered for admission to SDCB in the field of Mechatronics and Robotics between 2015 and 2020 is also shown by the fact that out of the 16 candidates who were registered, only 3 of them were expelled. The dropout percentage is therefore 3/16 = 0.18, meaning **18% < 30%**, the standard being fulfilled (Annex_B.1.2.2).

B.2. Content of doctoral study programs

B.2.1. The training program based on advanced university studies is adequate to improve the research skills of doctoral students and to strengthen ethical behavior in science.

B.2.1.1. The training program based on advanced university studies includes at least three disciplines relevant for the training of scientific students in scientific research, of which at least one discipline is intended for the in-depth study of research methodology and / or statistical data processing.

The curricula of the "Constantin Belea" Doctoral School (Annex_1.2.3) contain a discipline dedicated to the in-depth study of the methodology of scientific research in the field of Mechatronics and Robotics, which also covers the subject of statistical data processing *(*Annex_A.3.1.3.a*).*

The nomination of the advanced study disciplines for each module is made annually by the doctoral supervisors in accordance with the topics of the doctoral theses corresponding to the PhD candidates enrolled in the first year of studies and is specified as an annex to the curriculum. The didactic activities related to the training plan are carried out for a period of 14 weeks, according to the structure of the academic year approved by the Senate of the University of Craiova. The forms of verification for the subjects in the curriculum take place in the exam session of the semester in which the teaching activities took place. By going through the curriculum, PhD candidates acquire both professional and transversal skills.

B.2.1.2. There is at least one discipline dedicated to ethics in scientific research and well-defined intellectual or thematic property on these topics within a discipline taught in the training program.

In accordance with the Order of the Minister of National Education 3131 of January 30, 2018, regardless of the provisions of the Law on National Education and of H.G. 681/2011, regardless of whether or not the PhD candidate opts for enrollment in the advanced university training program, the **Ethics and Academic Integrity Course is mandatory for all PhD candidates of the University of Craiova enrolled in the first year of studies, from the 2018-2019 academic year**.

The curriculum of the field of Mechatronics and Robotics contains a discipline dedicated to the in-depth study of ethics and academic integrity, through the discipline "Ethics and Academic Integrity", taught in the first semester by Prof. Dr. Gabriel Olteanu, university teacher at the Faculty of Law of the University of Craiova *(*Annex_A.3.1.3.b, Annex_1.2.3*)*.

B.2.1.3. IOSUD has created the mechanisms to ensure that the training program based on advanced university studies, related to the evaluated field, aims at "learning outcomes", specifying the knowledge, skills and responsibility and autonomy that PhD candidates should acquire after completing each discipline. or through research activities.

IOSUD - The University of Craiova has created the mechanisms that ensure that within the program of advanced doctoral studies (PPUA) to acquire the competences, skills and aptitudes that PhD candidates must possess after completing the disciplines in the curriculum and research activities (Annexes of Discipline sheets). The fulfillment of this criterion results from the analysis of the files from each discipline included in the advanced university training programs of the "Constantin Belea" Doctoral School. *The regulation on the organization and functioning of the doctoral and postdoctoral study programs at IOSUD-UCV* (Annex_A.1.1.1.a) regulates these mechanisms in chapters III and V.

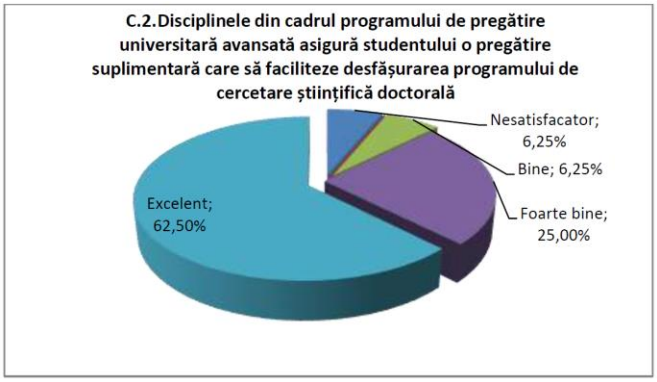
Also, the establishment of the disciplines in the curriculum of the field is done with the help of the **Romanian Robotics Society** by establishing skills and abilities that graduates acquire (by participating in European programs, organizing events supported by IFR - International Federation on Robotics or by the European Union, through the annual European Robotics Days). The **Romanian Society of Automation and Technical Informatics** is also involved in improving the curricula in the field of automation and technical informatics, correlated with the concrete requirements of industry and other sectors of economic and social activity by organizing postgraduate and advanced courses.

Economic partners provide support mechanisms for PhD candidates by proposing projects and research directions that require the enhancement of the skills acquired by doctoral students in the field of MR through PPUA. A good example is the recent collaboration with **SMART ID Dynamics** by proposing research topics for PhD candidates and developing applications with collaborative robots such as Rethink Robotics Sawyer with direct applicability in the industry.

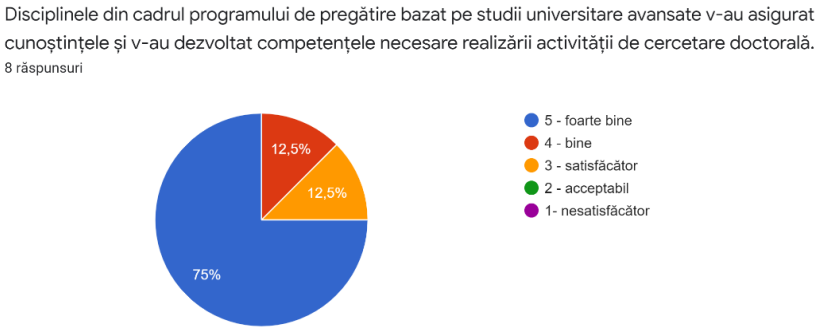
This proposal has already materialized through a sponsorship from the company with two robots of the type mentioned above, so the learning outcomes acquired by PhD candidates so far can be used through such research activities.

The PhD candidates admitted to doctoral studies benefit, starting with the academic year 2014-2015, from guidance groups formed by the doctoral supervisor and 3 specialist members, teachers or researchers in the field of the doctoral topic. The guidance committee works throughout the internship in preparation for the elaboration of the doctoral thesis, offers specialized advice to the PhD candidate, participates in the evaluation of the research activity during the internship and in the support of the research reports at the end of each year. The guiding committee studies and reports on the quality of the doctoral thesis and admits or rejects the final presentation of the doctoral thesis before the doctoral committee.

At the IOSUD level, the completion of the Questionnaire for the evaluation of study programs by PhD candidates is started periodically (Annex B.2.1.3.a1), whose result is embodied in a statistical interpretation report (Annex B.2.1.3.a2). According to the surveys, a number of 16 questionnaires were completed for SDCB. The result regarding the way in which the disciplines within the advanced university training program offer the candidate an additional training to facilitate the development of the doctoral scientific research program, 62.50% evaluated him with a maximum grade - "excellent", 25% with "very good". For 6.25% of the respondents, the evaluation of this criterion was done by using the grades “good” and “unsatisfactory”.



However, in order to receive targeted answers, at the level of the doctoral field of Mechatronics and Robotics, a completion form was made (in the first semester) regarding the *Assessment by PhD candidates of the field of Mechatronics and Robotics followed within the "Constantin Belea" Doctoral School* (Annex_B.2.1.3.b1). Through this mechanism, the PhD candidates appreciated with positive answers the provision of knowledge and the development of the skills necessary to carry out the doctoral research activity through the disciplines of the advanced doctoral studies program, the feedback received being directly and anonymously from the PhD candidates (Annex_B.2.1.3.b2).

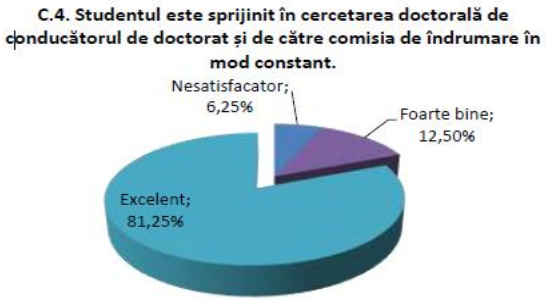


B.2.1.4. Throughout the doctoral training period, PhD candidates in the field benefit from the counseling / guidance of functional guidance commissions, aspect reflected by guidance and points of view expressed in writing or regular meetings.

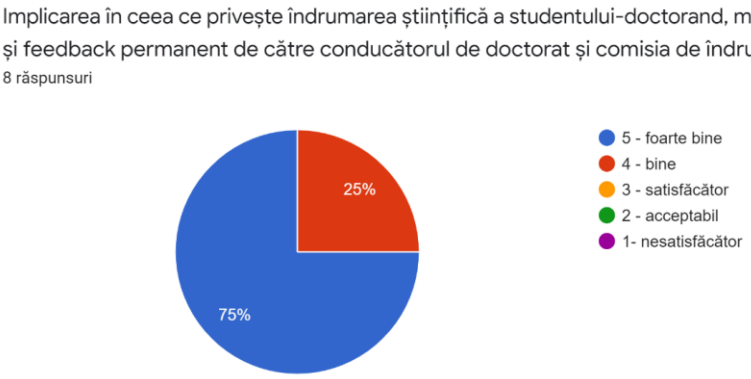
Throughout the doctoral training period, PhD candidates in the field of Mechatronics and Robotics benefit from the advice / guidance of functional guidance commissions, reflected in written guidance and feedback or regular meetings, complementary to those offered by the doctoral supervisor (Annex B.2.1.4).

In view of the health situation, the activity of guiding PhD candidates has migrated to the online environment through various institutional platforms - Google Classroom, Google Meet, Cisco Webex. Thus, the PhD candidates quickly adapted to the situation, presenting without problems the research reports and the activities provided in the curriculum together with the guidance commission.

At the level of the Doctoral School of the Faculty of Automation, the answers given by completing the evaluation questionnaire of the study programs (Annex B.2.1.3.a1) state that PhD candidates are supported in the doctoral research by the doctoral supervisor and the guidance committee, and this support is constantly offered; as can be seen from the chart below, at criterion no. 4 evaluation, 81.25% of the respondents rated using the grade "excellent", 12.50% using the grade "very good", and 6.25% the grade "unsatisfactory".



Applying the questionnaire of appreciation of PhD candidates in the field of MR, highlighted that 75% of respondents consider that both the leader and the steering committee are very well involved in doctoral counseling and training.



B.2.1.5. For a field of doctoral studies, the ratio between the number of PhD candidates and the total number of teachers / researchers providing guidance should not exceed 3: 1.

At present, the 3 doctoral supervisors guide a number of 11 PhD candidates in internship, one of them waiting for the confirmation order after presenting the thesis at the beginning of 2021, according to the table PhD candidates in internship and according to Annex_A.3.1.4.

Table 11 PhD candidates in internship

Nr. crt.	PhD candidate	PhD supervisor	Year of registration
1.	Trășculescu Andrei Costin	Bîzdoacă Nicu George	2020
2.	Antohi Radu Dumitru	Bîzdoacă Nicu George	2020
3.	Dragomir Andrei	Cojocaru Dorian	2020
4.	Mariniuc Alexandru	Cojocaru Dorian	2020
5.	Cismaru Ștefan Irinel	Bîzdoacă Nicu George	2019
6.	Ginerică Cosmin George	Cojocaru Dorian	2019
7.	Abagiu Marian Marcel	Cojocaru Dorian	2018
8.	Besnea Florina Luminița	Bîzdoacă Nicu George	2017
9.	Roibu Horațiu	Bîzdoacă Nicu George	2016
10.	Băzăvan Cristina Lidia	Bîzdoacă Nicu George	2016
11.	*Al-Alwan Nabeel Shaway Shyaa	Nițulescu Mircea	2016
* thesis presented in 2021			

In addition to the 3 habilitated, there are 5 more teachers who support the academic and research approach of PhD candidates: 2 are PhD supervisors (Prof. Dr. Eng. Costin Bădică, Prof. Dr. Gabriel Olteanu), and 3 have the quality of professor but they are not habilitated (Prof. Dr. Liana Stănescu, Prof. Dr. Viorel Stoian, Prof. Dr. Dorin Popescu) (Annex_B.2.1.4). Therefore, the ratio between the number of PhD candidates in study and the total number of teachers providing guidance is **1.3: 1**.

B.3. The results of doctoral studies and their evaluation procedures

B.3.1. The research is capitalized by PhD candidates through presentations at scientific conferences, scientific publications, through technology transfer, patents, products, service orders.

B.3.1.1. Relevant contributions per PhD candidates who has obtained a doctorate in the last 5 years

Between 2015 and 2020, a number of 3 PhD candidates obtained the title of doctor in the field of doctoral studies *Mechatronics and Robotics* subject to evaluation, a fourth is in the process of obtaining a doctoral degree after presenting his thesis in January 2021

Graduates of the doctoral school of Mechatronics and Robotics have capitalized on the theoretical knowledge gained and the experimental results obtained in research teams by publishing a number of articles published in **ISI-listed journals**, **BDI journals** and communications at international events (Annex_B.3.1.1.a).

In the documents Annex_B.3.1.1.b1, Annex_B.3.1.1.b2, Annex_B.3.1.1.b3, Annex_B.3.1.1.b4 there are representative works of each graduate of the doctoral school of Mechatronics and Robotics, elaborated during the doctoral internship.

Table 12 Graduates and presented thesis

Graduate	PhD supervisor	Title of the thesis	Year of thesis presentation	Confirmation order
Banța Viorel Costin	Dorian COJOCARU	Design and development of a class e Metrology for calibration of the tanks in the oil industry	October2015	OMENCS no.5954 of 7.12.2015
Gîlcă Gheorge	Nicu-George BÎZDOACĂ	Contributions to the Improvement of the Cognitive-Affective Reactions Recognition Systems	September 2016	OMENCS no.6122 of 20.12.2016
Ionescu Marian	Nicu-George BÎZDOACĂ	Biomimetic Architectures with Affective-Cognitive Reactions	Iuly 2020	OMEC no.3252 of 09.02.2021
Al-Atwan Nabeel Shaway Shyaa	Mircea NIȚULESCU	Intelligent Home	January 2021	In the process of being released

Interns in the field of MR have capitalized on the theoretical knowledge gained and experimental results obtained in research teams by publishing articles in **ISI-listed journals** and communicating scientific papers at international events.

The research papers and activities of the trainee PhD candidates can be found by consulting the PhD candidates' files (Annex_B.3.1.1.c1, Annex_B.3.1.1.c2, Annex_B.3.1.1.c3, Annex_B.3.1.1.c4, Annex_B.3.1.1.c5, Annex_B.3.1.1.c6, Annex_B.3.1.1.c7, Annex_B.3.1.1.c8, Annex_B.3.1.1.c9, Annex_B.3.1.1.c10) and their CVs (Annex_B.3.1.1.d1, Annex_B.3.1.1.d2, Annex_B.3.1.1.d3, Annex_B.3.1.1.d4, Annex_B.3.1.1.d5, Annex_B.3.1.1.d6, Annex_B.3.1.1.d7, Annex_B.3.1.1.d8, Annex_B.3.1.1.d9, Annex_B.3.1.1.d10).

As a result of the research activities carried out, a team of PhD candidates formed by Roibu Horațiu, Băzăvan Lidia Cristina and Andrițoiu Dan developed for Ford Romania the prototype of an **Autonomous Guided Vehicle**. The prototype is intended to completely automate the process of supplying raw materials and components of workstations in production lines. In addition to the autonomous navigation capability, the vehicle has other characteristics, the most important being the possibility of detecting and giving priority to human operators, but also for other vehicles that may intersect on the travel trajectory. The prototype was tested in laboratory conditions and later in real conditions, within the engine assembly line of the Ford Craiova factory. The test results in the industrial environment were very good, and the solution was evaluated in order to identify the potential for implementation by a team of international experts from Ford. Also, these results were materialized through 3 ISI articles and a patent application:

1. Roibu Horatiu, Andritoiu Dan, Bazavan Lidia-Cristina, Bizdoaca Nicu George, „Cooperative Cheap Automated Guided Vehicles", Carpathian Control Conference, May, 2019, Krakow-Wieliczka, Poland, IEEEXplore; 10.1109/Carpathian CC.2019.8766042 IEEE.
2. Bazavan Lidia-Cristina, Roibu Horatiu, Andritoiu Dan, Bizdoaca Nicu George, „Cheap Automated Guided Vehicles - concept and experiments", Carpathian Control Conference, May, 2019, Krakow-Wieliczka, Poland, IEEEXplore; 10.1109/CarpathianCC.2019.8766016 IEEE.
3. Roibu Horatiu, Bazavan Lidia-Cristina, Resceanu Ionut, Andritoiu Dan, Bizdoaca Nicu-George, „Automated Modular Architecture with Cooperative Facilities", The 23rd International Conference on System Theory, Control and Computing, October, Sinaia, România, IEEEXplore; DOI: 10.1109/ICSTCC.2019.8885473 IEEE
4. Patent application no. A/00174/08.05.2019, for the invention entitled AUTOMATIC, MODULAR ARCHITECTURE, WITH COOPERATIVE FACILITIES having as applicant the UNIVERSITY OF CRAIOVA, CRAIOVA, OJ, RO was registered with no. Al00174/2019, it was assigned according to art.14' paragraph 1, filing date 19/03/2019 and the national regulatory deposit no. a 2019 00174 according to art.15' para 4.

Another result of the research activities is that of the PhD candidates team formed by Petcu (Besnea) Florina-Luminița and Cismaru Ștefan-Irinel who developed and practically demonstrated a cheap solution for identifying cars by VIN (Vehicle Identification Number) and their location in the FORD S.A. car park, a solution presented and approved by the manager of Ford Romania S.A. The solution was discussed in order to be implemented with a team of international experts from Ford. The project consists of an Android application that is able to record the internal identification number as well as the GPS coordinates of a vehicle when storing it in a parking lot, in order to later use the data for easier location. At the same time, the data are transmitted and stored on one of the company's internal servers, at the time of completing the operation of storing the vehicle in the available space. Subsequent identification for extracting the car from the parking lot for delivery to the customer takes place by accessing data stored on the server through a web interface, developed within the same project, which provides the necessary and relevant information (vehicle identification number and GPS location) in order to get the vehicle. Tests carried out on the premises of Ford, in a car park intended for such use, showed a number of promising results in terms of working hours and identification of cars, which are lower during the use of the application compared to the classic method used until then.

Contributions of PhD candidates in the field of Mechatronics and Robotics include over 30 articles published at conferences and journals listed ISI and BDI and over 35 presented at international events. The most relevant works of doctoral students can be found in Annex_B.3.1.1.e1, Annex_B.3.1.1.e2, Annex_B.3.1.1.e3, Annex_B.3.1.1.e4, Annex_B.3.1.1.e5, Annex_B.3.1.1.e6, Annex_B.3.1.1.e7, Annex_B.3.1.1.e8.

B.3.1.2. The ratio between the number of presentations of PhD candidates who completed their doctoral studies in the evaluated period (last 5 years), including posters, exhibitions, made at prestigious international events (held in the country or abroad) and the number of PhD candidates who have completed their doctoral studies in the evaluated period (last five years) is at least equal to 1.

The 3 graduates of the doctoral field of Mechatronics and Robotics from 2015 - 2020 and the Arab graduate from 2021 capitalized on the theoretical knowledge gained and the experimental results obtained in research teams by publishing a number of articles in ISI-listed journals and indexed articles in databases, as well as through presentations at 22 international scientific communications and events held in the country or abroad. The ratio between the number of papers and scientific achievements (22) and the number of graduates (3) is **7.33: 1** (22/3 = 7.33) (Annex_B.3.1.2.a, Annex_B.3.1.2.b1, Annex_B.3.1.2.b2, Annex_B.3.1.2.b3, Annex_B.3.1.2.b4).

The evolution in the professional career of the graduates of the Doctoral School of Mechatronics and Robotics can be highlighted by the following elements.

Mister Dr. Eng. Viorel Costin Banța also held the positions of Senior Consultant SAP RPA - Robotic Process Automation at SC OMV PETROM S.A. - OMV PETROM Global Solutions Bucharest - Romania, respectively associate professor (course and laboratory) at several

higher education institutions in the country, including the Polytechnic University of Bucharest, Faculty of Automatics and Computers, respectively the University of Craiova, Faculty of Automatics, Computers and Electronics. As a postdoctoral student he was part (scholarship holder) of the grant "Entrepreneurial University - higher education and training system for the Romanian labor market by awarding scholarships for PhD students and researchers" where he was involved in using RPA (Robotic Process Automation) technologies in systems modeled in the ERP (Enterprise Resource Planning) environment. He is currently a tenured professor, Lecturer at the Academy of Economic Studies in Bucharest - Romania - Faculty of Accounting and Management Informatics, Department of Management Informatics as a specialist in SAP (System of Applications and Products) - Annex_B.3.1.2.c1

Mr. Lect. Dr. Eng. Gheorghe Gîlcă holds the position of Lecturer in the Department of Automation, Energy and Environment, within the Faculty of Engineering of the "Constantin Brâncuși" University of Târgu-Jiu, where he carries out his teaching activity and is also a member of the bachelor, master and admission commissions of the same university. Obtaining the title of doctor took place after the completion of the paper entitled "Contributions to improving the recognition systems of cognitive-affective reactions". He also participated in projects funded by the European Social Fund through the Human Capital Operational Program 2014-2020: "Practice for the future" and "The first step to a successful career!". Annex_B.3.1.2.c2

Mr. Dr. Eng. Ionescu Marian made, for the presentation of his doctoral thesis, the paper entitled "Biomimetic architectures with affective-cognitive reactions". He participated as a doctoral student (scholarship holder) in the research grant "Entrepreneurial University - higher education and training system for the Romanian labor market by awarding scholarships for doctoral students and postdoctoral researchers and implementing innovative entrepreneurial training programs". He also works as a member in projects, funded by the European Social Fund through the Human Capital Operational Program 2014-2020, "The first step to a successful career!". Annex_B.3.1.2.c3

Nabeel Shaway Shyaa AL-ATWAN completed his doctoral studies at the "Constantin Belea" Doctoral School during 2017-2021, the foreign exchange account (CPV) variant, being a teacher at Southern Technical University Basra, Faculty of Engineering Technology, Iraq, higher education institution where he still works. He previously obtained a Master's degree in Information Technology from Dr. Babasaheb Ambedkar Marathwada University in Aurangabad, Maharashtra, India. Under the scientific supervision of Prof. Dr. Eng. Mircea Nițulescu, he completed his doctoral thesis entitled "Intelligent Home" which was successfully presented in January 2021 before the National Commission designated for the award of the doctorate in the field of "Engineering Sciences", specialty Mechatronics and Robotics ". His thesis focused on the design and experimental testing of solutions suitable for the smart home of the future, with various high-performance smart subsystems to control several critical parameters: lighting, temperature, humidity, condition of doors and windows, house energy consumption, protection electricity

consumers, the need for garden irrigation, etc. The paper includes essential aspects regarding the design and implementation of a home security system, cheap and safe, but also easy to use for a user with an average level of training. Microcontroller development boards, wireless sensor networks as well as a series of open-source software packages introduce attractive features to the proposed purpose from several points of view: cost, compactness, modularity, scalability, ease of implementation, simplicity of maintenance, automatic operation , remote control, customization possibilities of the entire system, development of a mobile communications service with the owner (via SMS, Email and Web) to increase the level of monitoring and security of the house, etc. The doctoral student wanted and studied in this thesis two issues specific to his country and the area where he lives (Basra, southern Iraq), and which can be integrated in defining a "smart home" solution: protection and control of the house in terms of food its electricity (currently a very critical issue in his country), as well as adequate control of irrigation in the vicinity of the house, given that the whole Arab area is known to have extreme positive temperatures and very low humidity, in parallel with extremely fresh water resources. limited) – Annex_B.3.1.2.c4

B.3.2. The doctoral school appeals to a significant number of external scientific references in the commissions for public presentation of doctoral theses for the analyzed field.

B.3.2.1. The number of doctoral theses assigned to a certain referent coming from a higher education institution, other than the evaluated IOSUD, must not exceed two (2) for the theses coordinated by the same doctoral supervisor, in a year.

The composition of the commissions for public defense of theses from the last 5 years can be found in Annex_B.3.2.1.a, highlighted also in Annex_B.3.2.1.b1, Annex_B.3.2.1.b2, Annex_B.3.2.1.b3, Annex_B.3.2.1.b4. These reveal the fact that there were no situations in which a certain referent from a higher education institution, other than IOSUD - University of Craiova, to be involved in two commissions in the same academic year.

B.3.2.2. The ratio between the number of doctoral theses assigned to a certain scientific referent from another higher education institution than the one in which the doctoral thesis is organized and the number of doctoral theses presented in the same field of doctoral studies within the doctoral school must not be greater than 0.3, compared to the situation recorded in the last five years. It is analyzed only if in the evaluated doctoral field at least ten doctoral theses have been presented in the last five years.

Within the field of doctoral studies Mechatronics and Robotics, 3 doctoral theses were presented in the period 2015-2020, according to Annex_B.3.2.1.a.

C. QUALITY MANAGEMENT

C.1. Existence and regular development of the internal quality assurance system

C.1.1. The institutional framework exists and policies and procedures are applied for relevant internal quality assurance

C.1.1.1. The doctoral school in which the field of doctoral studies falls is proof of the constant development of the process of evaluation and internal quality assurance in accordance with a procedure developed and applied at IOSUD level.

SDCB and IOSUD - University of Craiova are constantly concerned with ensuring the quality of the educational process and finding appropriate internal quality assurance policies. The objectives pursued by the University of Craiova in the field of quality management are included in the Quality Assurance Code of the University of Craiova and in the Quality Policy Statement of the Rector of the University of Craiova *(*Annex_1.3.1, Annex_1.3.2*)*.

There is an open, permanent dialogue between the Council for Doctoral Studies of IOSUD - University of Craiova and the management of doctoral schools. The meetings of the Council for Doctoral University Studies were held and are held each time with the participation of all directors of doctoral schools, in order to identify and solve problems, to monitor the activity of doctoral schools.

At the meeting of December 5, 2018, the **Procedure for the annual internal evaluation of the activity of the doctoral and monitoring schools IOSUD - University of Craiova** was approved **(**Annex_1.1.6.b**):**

1. The scientific activity of doctoral supervisors carried out during a university year.
2. Infrastructure and logistics necessary to carry out the research activity:
3. Subsequent procedures and rules on the basis of which doctoral studies are organized
4. The scientific activity of PhD candidates;
5. Training program based on advanced university studies of PhD candidates;
6. Social and academic support services (including participation in various events, publication of articles) and counseling provided to PhD candidates.

Periodically IOSUD - University of Craiova implements this procedure, as evidence exists for the periodic evaluation of the field of Mechatronics and Robotics The Self-Evaluation Report of the Doctoral School in the field of Mechatronics and Robotics from 2016 and 2019 (Annex_1.1.6.c3, Annex_1.1.6.c4).

At UCV level, there is and applies the *Regulation on the initiation, approval and periodic evaluation of study programs* as a **quality management system in order to ensure continuity and relevance** (Annex_C.1.1.1.a**).**

At the level of SDCB in close collaboration with the Faculty of Automation, Computers and Electronics, quality activities are carried out coordinated by the *Commission for Evaluation and Quality Assurance and Curricula (*Annex_C.1.1.1.b), subordinated to CEAC in the university.

Through its composition, the Faculty Quality Assurance Commission supports the creation of a culture of quality and ensures the broad involvement of teachers and all students in the actions taken to ensure, evaluate and improve quality performance indicators. The CEAC includes teachers and a doctoral supervisor from the MR field with academic and pedagogical experience, including ARACIS expertise. Information on the operation of the quality assurance system can also be found in section *1.3 Operation of the internal quality assurance system*.

C.1.1.2. During the doctoral training internship, evaluation mechanisms are implemented aimed at identifying the needs, as well as the general level of satisfaction with the doctoral studies program of PhD candidates, in order to continuously improve the academic and administrative processes. Following the analysis of the obtained results, it is proved the elaboration and implementation of a plan of measures.

During the doctoral training internship, feedback mechanisms are implemented by PhD candidates to identify their needs, as well as their level of satisfaction with the doctoral program as a whole, in order to continuously improve the academic and administrative services offered. **The procedure for completing the evaluation questionnaire by the PhD candidates of the doctoral school, of the advanced university study programs of the scientific research programs** and the Evaluation Questionnaire are the basis of this mechanism. (Annex_B.2.1.3.a1).

Following the start of the period for completing the questionnaire at the level of doctoral schools within IOSUD - UCV, the PhD candidate requests / receives on the institutional e-mail address an access code that can be used through the portal https://chestionar.ucv.ro/. The feedback provided is anonymous and voluntary from the students.

Following the completion of the evaluation questionnaire, the results are included in a Statistical Interpretation Report, advanced university study programs and scientific research programs (Annex_B.2.1.3.a2).

Also, this type of mechanism for identifying the satisfaction of doctoral students is implemented in the field of Mechatronics and Robotics through the Google Forms platform, anonymously (Annex_B.2.1.3.b1), to improve the academic and research process (Annex_B.2.1.3.b2).

Starting with the admission process and continuing with the educational activities and those of transmitting specialized knowledge throughout his life, IOSUD - University of Craiova develops a functional partnership with the PhD candidate (Annex_C.1.1.2.a, Annex_C.1.1.2.b).

C.2. Transparency of information and accessibility to learning resources

C.2.1. The information of interest for the PhD candidates, the future candidates, respectively the information of public interest are available for consultation in electronic format.

C.2.1.1. IOSUD publishes, on the website of the higher education institution, in compliance with the regulations in force regarding data protection

IOSUD - The University of Craiova together with the "Constantin Belea" Doctoral School ensures the transparency of information and accessibility to learning resources by displaying on the IOSUD-UCV website, as well as on the faculty websites the necessary information for doctoral students, in compliance with general regulations regarding data protection (https://www.ucv.ro/invatamant/educatie/programe_doctorat/prezentare_programe_de_doctorat.php#, https://www.ucv.ro/, http://www.ace.ucv.ro/) - Annex_C.2.1.1:

1. **Doctoral School Regulations**
   http://ace.ucv.ro/sdcb/files/regulament_SDCB.pdf
2. **Admission regulations;**
   https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/2021/Regulament_studii_doctorale_si_postoctorale_2021.pdf
3. **Doctoral studies contract;**
   https://www.ucv.ro/invatamant/educatie/programe_doctorat/admitere_contracte_studiu.php
4. **Regulations for the completion of studies, including the procedure for public presentation of the thesis and the procedure for online presentation of doctoral theses;**
   https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/admitere/2021/Regulament_studii_doctorale_si_postoctorale_2021.pdf
   https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/informatii/reglementari/Pages_from_Regulament_studii_doctorale_si_postoctorale_2021.pdf
   https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/informatii/II_Proceduri_sustinere_teza_de_doctorat_on_line.pdf
5. **Content of study programs;**
   http://ace.ucv.ro/sdcb/files/PlanDeInvatamantSDCtinBelea2020-2021.pdf
6. **The scientific profile and research interests / topics of the doctoral supervisors in the school, as well as their institutional contact details;**
   http://ace.ucv.ro/sdcb/organizare.html
   https://www.ucv.ro/invatamant/educatie/programe_doctorat/lista_conducatori_doctorat.php
   https://www.ucv.ro/invatamant/educatie/programe_doctorat/admitere_teme_propuse.php
7. **List of PhD candidates in the school with basic information (year of enrollment; supervisor);**
   http://ace.ucv.ro/sdcb/doctoranzi.html
8. **Information on the elaboration standards of the doctoral thesis;**
9. https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/informatii/reglementari/Pages_from_Regulament_studii_doctorale_si_postoctorale_2021.pdf
   http://ace.ucv.ro/sdcb/files/procedura_elaborare_teza.pdf
10. **Links to abstracts of doctoral theses to be presented publicly, as well as the date, time, place where they will be presented, at least 20 days before the defense**
    https://www.ucv.ro/invatamant/educatie/programe_doctorat/programate.php

C.2.2. IOSUD / Doctoral school provides PhD candidates access to the resources needed to conduct doctoral studies.

C.2.2.1. All PhD candidates have free access to a platform with academic databases relevant to the field of doctoral studies analyzed.

The University of Craiova is part of the national program *Association of Universities, Research Institutes - Development and Central University Libraries in Romania* - ANELIS-PLUS (http://biblio.central.ucv.ro/bib_web/ro/Anelis_Plus.php) through which PhD candidates, PhD supervisors and researchers can access the latest electronic scientific information resources for education and research.

Mobile access within the ANELIS PLUS project is done through:

(i) Access to databases
(ii) Access to all other resources (E-nformation provider). The provider E-nformation provides access to the following databases relevant to the field of doctoral studies *Mechatronics and Robotics*:

- Cambridge Journals
- IEEE/IEL Electronic Library (IEL)
- InCites Benchmarking, InCites Journal and Highly Cited Data
- Institute of Physics Journals
- MathSciNet
- Oxford Journals
- PROQUEST Dissertations & Theses
- ScienceDirect Freedom Collection, Elsevier
- Scopus, Elsevier
- SpringerLink Journals, Springer
- Taylor & Francis Journals
- Web of Science - Core Collection, Journal Citation Reports, Derwent Innovations Index, Thomson Reuters
- Wiley Journals

The infrastructure related to the Library is presented publicly and available through the online catalog, TINREAD, through which users can have access to information related to location, availability of copies and identification code, but also to full text publications (http://catalog.ucv.ro/opac). Also, the offer of research publications is publicly presented through the Anelis Mobil platform (http://www.anelisplus.ro/?page_id=64), from the statistics provided by the Anelis Plus Association (January 2020 - December 2020) resulting in over 365,183 accesses (in UCV) of users based on IP and via mobile access. These details are addressed in *section A.2. Research infrastructure*.

C.2.2.2. Each PhD candidate has access, upon request, to an electronic system for verifying the degree of similarity with other existing scientific or artistic creations.

All PhD candidates have access to scientific research laboratories or other facilities depending on the specifics of the field (s) within the doctoral school. For the verification of doctoral theses, the computer program **Sistemantiplagiat.ro** is used upon request **(**A.1.2.2.a, A.1.2.2.b**).** This information can also be found in *section A.1.2.2.*

C.2.2.3. All PhD candidates have access to scientific research laboratories or other facilities depending on the specifics of the field / fields within the doctoral school, according to internal regulations.

PhD candidates have access to the research infrastructure of IOSUD, SDCB and the Faculty of Automation, Computers and Electronics of the University of Craiova. In addition, they can use the research infrastructure related to the research centers and groups within the Faculty of Automation, Computers and Electronics and the Department of Mechatronics and Robotics of the University of Craiova. These aspects are reflected in *section A.2. Research infrastructure*.

C.3. Degree of internationalization

C.3.1. There is a strategy and it is applied to increase the international level of doctoral studies

****C.3.1.1. International mobility***

Foreign PhD candidates, from Europe and other countries, have been present, in the last five years, at the University of Craiova for a doctoral or postdoctoral internship, through the **Eugen Ionescu Scholarship** program, with the consent of doctoral supervisors in the field of research requested by foreign doctoral students. Currently, within the MR-SDCB there is an Arab PhD candidate in internship under the supervision of Prof. Dr. Eng. Mircea Nițulescu, for paid studies.

The PhD candidates of the University of Craiova benefit from financial support through the **Erasmus program which includes numerous agreements concluded with different international universities** *(*Annex_C.3.1.1a, Annex_C.3.1.1b*)*, during the doctoral research, thus widening their access information for doctoral research, however very few PhD candidates at SDCB choose such mobility.

PhD candidates have made known the partial results of their doctoral research, constantly participating in international conferences and publishing articles in prestigious international journals, individually or together with coordinating professors, as shown by the lists of scientific papers of interns (Annex_B.3.1.1.c1, Annex_B.3.1.1.c2, Annex_B.3.1.1.c3, Annex_B.3.1.1.c4, Annex_B.3.1.1.c5, Annex_B.3.1.1.c6, Annex_B.3.1.1.c7, Annex_B.3.1.1.c8, Annex_B.3.1.1.c9, Annex_B.3.1.1.c10).

In connection with the **international relations of the PhD candidates**, respectively with the **connections between their professional activities** and the approached doctoral research field, the following arguments can be presented.

PhD Candidate Andrei Dragomir developed a paper on "Applications with ARDUINO: Sensory system for a mobile robot" to complete his undergraduate studies. The work for the completion of master's studies had as its theme "Applications for new educational technologies with ARDUINO". The paper also used the experience gained in the **international program FP7** "European Project PELARS - Practice based Experiential Learning Analytics Research And Support". In this project he was a tutor for two students from **IUT Bordeaux, France**. Andrei Dragomir was integrated as a young researcher in the complex research project "Intelligent and distributed management of 3 complex autonomous systems integrated in emerging technologies for personal medical and social assistance and service of flexible precision manufacturing lines (CIDSACTEH)" from the PN program III, program 1 - Development of the national research-development system, subprogram 1.2 - Institutional performance. From this position he was employed as a researcher at the University of Craiova - Research Infrastructure in Applied Sciences (INCESA) - Annex_B.3.1.1.c5, Annex_B.3.1.1.d1, Annex_B.3.1.1.e1

PhD Candidate Eng. Alexandru Mariniuc elaborated for the completion of his undergraduate studies a paper with a topic related to the acquisition and processing of images for industrial applications. The work for the completion of master's studies was related to the results obtained, as a young researcher, in the **complex research project** "Intelligent and distributed management of 3 complex autonomous systems integrated in emerging technologies for personal medical and social assistance and service of flexible manufacturing lines precision (CIDSACTEH)" from the PN III program, program 1 - Development of the national research-development system, subprogram 1.2 - Institutional performance. From this position he was employed as a researcher at the University of Craiova - Research Infrastructure in Applied Sciences (**INCESA**). He was a team leader at the international **BOSCH Future Mobility Challenge**. He has a degree in programming for embedded systems organized by the **international company Continental**. Participated in the international online school Brain Interfaces - Computer & Neurotechnology organized and hosted by **G.tec Medical Engineering GmbH Austria.** Annex_B.3.1.1.c7, Annex_B.3.1.1.d2, Annex_B.3.1.1.e1

PhD Candidate Eng. Cosmin Ginerica works at the **international company Elektrobit** where he is a programmer for industrial applications in the field of car manufacturing. He has good communication skills, thanks to the collaboration with **international teams** in the workplace. He is the co-author of two inventions. (Annex_B.3.1.1.c6, Annex_B.3.1.1.d5, Annex_B.3.1.1.e3)

PhD Candidate Eng. Marian Abagiu worked for **international** companies. At **Pirelli** in the Maintenance - Manufacturing Department where he was involved in the use of PLCs and SCADA systems. La **Hella** addressed the issue of using integrated systems. Since 2016 he has

been the co-author of 7 scientific articles in the field (Annex_B.3.1.1.c1, Annex_B.3.1.1.d6, Annex_B.3.1.1.e2).

PhD Candidate Eng. Lidia Băzăvan elaborated for the completion of her undergraduate studies a paper with the theme "Tri-axial gimbal. Imaging tracking system for gimbal-based targets ". The paper for the completion of master's studies had as its theme "Mechatronic sorting system". Lidia Băzăvan was integrated as a member of the research team within the complex research project "BRIDGE GRANT - knowledge transfer to the economic agent" from the program PN-III-CERC-CO-BG-2016, no. 92 BG / 2016 Partnership Ford Romania s.a. - University of Craiova for the transfer, implementation and adaptation of Ford eco-technologies to the realization of the Ecosport model in Craiova. During this time she taught at the University of Craviova laboratories for disciplines such as "Robot Programming Languages", "Java" and "Intelligent Materials and Structures". Starting with January 2019, she is employed within Kautex Romania as a PLM system administrator. The research results were materialized with a patent application no. A / 00174 / 08.05.2019, for the invention entitled "Automatic, Modular Architecture, with Cooperative Facilities". The invention was awarded a gold medal at the International Exhibition of Scientific Research, Innovation and Invention "PRO INVENT", edition XVII / 2019 and at the European Exhibition of Creativity and Innovation "EORO INVENT", edition 11/2019. So far, the results of the PhD candidate's research activity have been disseminated through a total of 15 published papers and 3 in progress at international conferences. (Annex_B.3.1.1.c3, Annex_B.3.1.1.d4, Annex_B.3.1.1.e7)

PhD Candidate Eng. Horațiu Roibu elaborated for the completion of the bachelor studies a paper with the theme "Automatic system driven through the Siemes S controller". The work for completing the master's studies was based on "Pick and place robotic system". After completing his studies, Horațiu Roibu was hired in 2015 by the company S.C. Kautex SRL on the position of Automation Engineer, later being promoted to the position of Process Engineer. In 2018, the doctoral student left Kautex to work for S.C. Hella SRL as Functional Safety Manager. As a research activity, he was involved in the project proposed by Smart ID Dynamics, which donated two Rethink Robotics Sawyer robots to the Mechatronics and Robotics Research Center and participated, as a team member, in 3 research projects. He is also co-author of patent application no. A / 00174 / 08.05.2019, for the invention entitled "Automatic, Modular Architecture, with Cooperative Facilities". The invention was awarded a gold medal at the International Exhibition of Scientific Research, Innovation and Invention "PRO INVENT", edition XVII / 2019 and at the European Exhibition of Creativity and Innovation "EORO INVENT", edition 11/2019. So far, the PhD candidate's research activity has materialized through a series of 23 published papers and 4 in progress at international conferences. From 2019 until now, the doctoral student is the technical mentor of the RaSky robotics team of the "Elena Cuza" National College, Craiova (Annex_B.3.1.1.c10, Annex_B.3.1.1.d7, Annex_B.3.1.1.e6).

Between 04/16/2018 and 03/01/2019, Roibu Horațiu participated in training courses at Mechatronics Academy held at Gratz Technical University in Austria in collaboration with Kautex Textron. The theme of the modules focused on: Automotive mechatronics; Electrical and IT engineering; Sensors, actuators and electric motor technology; Quality management; Matlab-Simulink; Control engineering; Advanced system and component design - Annex_C.3.1.1.c.

PhD Candidate Eng. Ștefan-Irinel Cismaru elaborated for the completion of his undergraduate studies a paper on "Embedded system controlled via bluetooth using Android". The work for the completion of the master studies had as its focus "Intelligent system for the control of traffic light intersections (I - Software)". he second paper also used the experience gained within the company S.C Continental Automotive Systems S.R.L during 2017-2019. He is currently employed at S.C. HELLA Romania S.R.L., since 2019. Research activity includes: involvement in 3 grants, 9 articles published at various conferences and magazines, two others in the process of publication (Annex_B.3.1.1.c4, Annex_B.3.1.1.d8, Annex_B.3.1.1.e4).

PhD Candidate Eng. Florina-Luminița Besnea (Petcu) elaborated for the completion of her undergraduate studies a paper on "Mobile applications for monitoring data on NATIONAL INSTRUMENTS platforms". The work for the completion of master's studies was based on "Automotive Applications - I". As a research activity, she was involved in 3 research grants, published 16 articles in journals and at national and international conferences, and four more articles were being published. (Annex_B.3.1.1.c8, Annex_B.3.1.1.d9, Annex_B.3.1.1.e8)

PhD Candidate Eng. Andrei Costin Trăsculescu elaborated for the completion of his bachelor's studies a paper on "Embedded system for vehicles". The work for the completion of the master studies had as its focus "SPICE simulation of electronic components". The two works also used the experience gained within the company S.C. HELLA Romania SRL, where he has been employed since 2015. As a research activity, he was involved in the project proposed by Smart ID Dynamics, which donated two Rethink Robotics Sawyer robots to the Mechatronics and Robotics Research Center, published 4 articles in different conferences and magazines, three other articles being published (Annex_B.3.1.1.c9, Annex_B.3.1.1.d10, Annex_B.3.1.1.e5).

Similar to the above, the following information can be presented for habilitated researchers in the field:

Mr. Sorin Grigorescu was the leader of **international** research projects (development of an artificial vision system for a robotic application, respectively autonomous control of the manipulator arms for rehabilitation robots) at the Institute of Automation, University of Bremen, Germany. He also obtained his doctorate from the **University of Bremen, Germany**. He has won prizes (5) for scientific research including a conference in Germany (best poster) and a design competition organized by the IEEE.

Mr. Gigel Măceşanu, as a student, won many (7) prizes at national and international student competitions (**Germany**) in the field of Robotics. He held the positions of Software Engineer and

Team Manager at **Elektrobit** where he addressed the issue of developing artificial vision algorithms and autonomous mobile robots. He did internships and collaborated with the Department of Information Technology at the University of **Szczecin Hungary** (image processing for the control of mobile robots), respectively the Department of Electrical Engineering, Automatic Control and Instrumentation at the University of **Coimbra, Portugal** (algorithms for estimating the direction of view for human operators). He was a visiting researcher at **KAIST University (Korea Advanced Institute of Science and Technology)**, a postdoctoral researcher at the **Technical University of Munich (TUM) Germany**, a visiting researcher at **Castellon University in Plana Spain**.

Mr. Tiberiu Cocias, as a student, has won many (8) prizes at national and international student competitions (**Germany**) in the field of Robotics. He held the positions of engineer at Benchmark Electronic, respectively Software Engineer at **Elektrobit** where he approached the problem of developing artificial vision algorithms. He did internships and collaborated with the Department of Information Technology at the University of **Szczecin Hungary**, respectively at the Media Technology Group, **Technical University Munich, Germany**.

C.3.1.2. Within the evaluated field of studies, it is supported, including financially, the organization of doctorates in international co-supervision, respectively the invitation of first-rate experts to give courses / lectures for PhD candidates.

Prof. Dr. Eng. Dorian Cojocaru has a long scientific collaboration with Prof. Dr. Eng. Dan Marghitu from Auburn University, Alabama, USA. The collaboration also materialized through 14 papers published in the last 10 years: 6 in journals (4 WOS) and 8 in conference volumes (3 WOS. 1 IEEE, 3 SCOPUS) – Annex_C.3.1.2.a1. One of the directions of scientific research for the field of doctoral studies Mechatronics and Robotics is the study of mechanical impact based on information from numerical images. **PhD candidates Andrei Dragomir and Alexandru Mariniuc** are the ones who implemented the experimental stands used and collected the resulting data. The collaboration also materialized in attracting Prof. Dr. Eng. Dan Marghitu in the "Anale" magazine team.

Also, within the actions of **international level** of the activity of the doctoral studies team Mechatronics and Robotics is also the collaboration with researchers from European countries (Sweden, Germany, Spain, Iceland, Bulgaria, France, Portugal, UK) and which materialized in the publication of 16 articles. scientific journals in journals or conference volumes (10 WOS, 3 IEEE, 1 SCOPUS - Annex_C.3.1.2.a2).

Among the team's international publications, the one referring exactly to the way in which the PhD candidates **Andrei Dragomir and Alexandru Mariniuc** were trained as young researchers and later as PhD candidates: Cojocaru D., Manta L.F., Resceanu C., Patrascu Pana D., 2018, Young Engineers Involved in Education and Research, The 28th EAEEIE Annual Conference, September 26-28, Reykjavik, Islanda, Electronic ISBN: 978-1-5386-7711-7, Article number 8534208, DOI: 10.1109/EAEEIE.2018.8534208, Date Added to IEEE Xplore: 15 November 2018, WOS:000495079100005.

Another representative work for the national involvement in doctoral studies is the one related to the **supply and demand of doctoral university studies** in statistical data, Academic Year 2017-2018: Petrescu, I., Gogu, E., Cojocaru, D., Stanciu, Ș., Chiș, A., 2018, Supply and demand for doctoral studies in statistical data, Academic year 2017-2018; Copyright © 2018 ARACIS, ISBN 978-973-0-26592-7.

In 2018 Prof. Dr. Eng. Dorian Cojocaru obtained an **international** funding, an individual scholarship (EEA Funds 2014-2021 EEA-MG-RO-NO-2018-0355) for a collaboration with the University of Reykjavik Iceland. The collaboration also supported an international grant proposal "Artificial Intelligence Technologies in Facial Emotions Recognition For Robotic Support Of People With Special Needs" for EEA Grants Call for Proposals 2018, a proposal that involved **PhD supervisors from two fields of SDCB**, Mechatronics and Robotics and respectively Computers and Information Technology.

At the beginning of 2020, an agreement of **international** academic collaboration with a Brazilian university, Universidade Paulista, was approved in the Senate of the University of Craiova. The agreement provides for all levels of studies - bachelor, master and doctorate: exchange of teachers and students, cooperation for the development of courses and programs, cooperation in scientific research projects, cooperation for scientific publications. Prof. Dr. Eng. Dorian Cojocaru initiated this collaboration agreement and was appointed as a representative of the University of Craiova.

Prof. Dr. Eng. Nicu-George Bîzdoacă involves PhD candidates under his supervision, in international research teams materialized by publishing articles with international experts (https://l2s.centralesupelec.fr/u/hamdan-hani/):

1. Besnea (Pectu) F., Cismaru Ș.I., Trăsculescu A.C., Reșceanu I.C., Ionescu M., **Hamdan H.**, Bîzdoacă N.G., *Integration of a Haptic Glove in a Virtual Reality-Based Environment for Medical Training and Procedures*, ACTA Technica Napocensis of the Technical University of Cluj-Napoca, Vol. 64, Issue Special II: Applied Mathematics, Mechanics and Engineering, pp. 281-290, ISSN 1221-5872, February 2021,
2. Cristina Pană, Ionel Vladu, Florina Besnea, Stefan Cismaru, Andrei Trasculescu, **Hani Hamdan**, Nicu Bizdoaca, *Smart design solution for improving life of people with locomotion disabilities*, IEEE International Carpathian Control Conference 2021
3. Florina Besnea, Ionut Resceanu, Andrei Trasculescu, Cristina Pană, Stefan Cismaru, **Hani Hamdan,** Nicu Bizdoaca, *Brain-Computer Virtual Reality Interface System for Brainwave Analysis in Medical Recovery*, IEEE International Carpathian Control Conference 2021

During the International Conference on System Theory, Control and Computing, technically co-sponsored by the IEEE Control Systems Society, to which the Faculty of Automation, Computers and Electronics is co-organizer, famous personalities in the field are invited to give lectures every year. invited, addressed to the PhD candidates of the school (http://ace.ucv.ro/icstcc2020/speakers.php). Thus, guest lectures were given by Mirjana IVANOVIC (Serbia) - "Influence of Artificial Intelligence on Personalized Medical Predictions, Interventions and Quality of Life Issues"; Igor KOTENKO (Russia) - "Intelligent Situational

Awareness for Cyber Security"; Ioan-Dore LANDAU (France) - "Adaptive Youla-Kucera Parametrization for Active Vibration and Noise Attenuation"; Ulrich RUCKERT (Germany) - "Cognitronics: Resource-efficient Architectures for Cognitive Systems".

There are also special sessions dedicated to PhD candidates and young researchers. For example, at ICSTCC 2020, under the auspices of the faculty, the session was organized*: Round Table: Young Researchers Meetup in Control Engineering and Computer Science* with the participation of two PhD students from the doctoral field MR (PhD Candidate Eng. Florina Besnea (Petcu) and PhD Candidate Eng. Horațiu Roibu): https://controls.papercept.net/conferences/conferences/STCC20/program/STCC20_ProgramAtAGlanceWeb.html

In 2020 was initiated the organization and financing of a special workshop dedicated to PhD candidates of the "Constantin Belea" Doctoral School: *1st International Doctoral Workshop on Advanced Approaches in Robotics, Control and Computing - A2RC2*, originally scheduled for March-April 2020, but which was postponed due to the pandemic, to be reorganized in 2021. They were invited to give lectures and accepted prestigious professors such as: Andrzej BARTOSZEWICZ (Institute of Automatic Control, Lodz University of Technology, Poland), Paolo MERCORELLI (Control and Drive Systems Unit, Leuphana University of Lüneburg, Germany), Sorin Olaru (CNRS Laboratory of Signals and Systems, CentraleSupélec, France), Ramon VILANOVA I ARBOS (Department of Telecommunication and Systems Engineering, Autonomous University of Barcelona, Spain) – Annex_C.3.1.2.b**.**

C.3.1.3. Internationalization of doctoral studies activities is also supported by other concrete measures.

The internationalization of the activities within the doctoral studies is supported by various measures with concrete results:

1. **Participation in international exhibitions and shows:**

- *Gold medal at China (Shanghai) Exposition of Inventions, MODULAR PLATE SYSTEM FOR THE OSTHEOSYNTHESIS OF THE LONG BONES FRACTURES AND METHOD FOR THEIR USE, patent A/0072/2009, authors: Daniela Tarniță, Dan Tarniță,* ***Nicu George Bîzdoacă****, May 2017*
- *Gold Award, MODULAR PLATE SYSTEM FOR THE OSTHEOSYNTHESIS OF THE LONG BONES FRACTURES AND METHOD FOR THEIR USE, patent A/0072/2009, authors: Daniela Tarniță, Dan Tarniță,* ***Nicu George Bîzdoacă****, International Research Innovation Symposium Malaesia, – IDRIS 2017*
- *Certificates – Ecole Marocaine des Sciences de L'Inginenieur, AUTOMATIC, MODULAR ARCHITECTURE, WITH COOPERATIVE FACILITIES, Patent application: A/00174 / 2019, University of Craiova, authors: Dan Andrițoiu, Horațiu Roibu, Lidia Băzăvan, Daniela Tarniță****, Nicu George Bîzdoacă,*** *2019*
- *Special Honour of Invention – Toronto International Society of Inovation & Advanced Skills, SPHERICAL JOINT BASED ON SMART FLUIDS, Patent application: A/00213 /*

2019, authors: Vladu Ionel Cristian, Pană Cristiana Floriana, Stoian Viorel,Pătrașcu Pană Daniela Maria, Vladu Ileana, Grecu Dan Cristian,Tarniță Daniela, ***Bîzdoacă Nicu George****, 2019*

- *Gold Medal – Technical University of Moldova****,*** *WHEEL WITH VARIABLE GEOMETRY BASED ON SMART FLUIDS, Patent application: A/00212 / 2019, authors: Pană Cristiana Floriana, Vladu Ionel Cristian, Pătrașcu Pană Daniela Maria, Manta Liviu Florin, Cojocaru Dorian, Tarniță Daniela,* ***Bîzdoacă Nicu George****,* 2019
- *Gold Medal & Diploma of Achievement - granted by International Jury INVENTICA 2020 - System of modular plate for the ostheosynthesis of the long bones fractures and method for their use Inventors: Tarniță Daniela, Tarniță Dănuț-Nicolae,* ***Bîzdoacă Nicu****, 2020*

2. PhD candidate Ginerică Cosmin is part of the research team of ROVIS Laboratory https://rovislab.com/index.html, based on real-time artificial intelligence for connected, perception-aware robotic applications. The research activity in the laboratory is materialized through international publications including participation in the European Robotics Forum 2019.

3. Attracting international PhD candidates:

Nabeel Shaway Shyaa AL-ATWAN has completed his doctoral studies at the "Constantin Belea" Doctoral School in Mechatronics and Robotics in the period 2017-2021, the own account foreign exchange (CPV) variant, under the supervision of Prof. Dr. Eng. Mircea Nițulescu, being a teacher at Southern Technical Basra University, Faculty of Engineering Technology, Iraq, higher education institution where he still works.

Van Dong Hai NGUYEN has completed his doctoral studies at the "Constantin Belea" Doctoral School between 2015 and 2018. He won a doctoral scholarship offered by our country to the Republic of Vietnam, his native country, where he worked as a teacher at the University of Technical Education in Ho Chi Minh, Automation and Control department, a higher education institution where he still works. In the spring of 2018, he benefited, through the diligences of Prof. Dr. Eng. Mircea Nițulescu and through the Doctoral School from an ERASMUS + scholarship, for 3 months, at the University of Cassino, Italy, LARM laboratory, a team specialized in the theory of mechanisms and robotics coordinated by Prof. Marco Ceccarelli. Under the scientific supervision of Prof. Dr. Eng. Mircea IVĂNESCU, and with the scientific support of Prof. Dr. Eng. Mircea Nițulescu, he completed his doctoral thesis entitled "Control Algorithms For Balancing Pendulum Models With Elastic Components" which was defended with success in July 2018 before the National Commission designated for the award of the doctorate in the field of "Engineering Sciences", specialty "Systems Engineering". would be: development of dynamic behavioral models, evaluation of approximation solutions in order to reduce complexity, definition and testing of appropriate control methods (sliding mode control, sliding mode hierarchical control, Fuzzy sliding mode control, Fuzzy sliding mode hierarchical control, LQR linear quadratic regulator, algorithms and controllers based on Lyapunov techniques, genetic algorithms, controllers hybrids, controllers with conventional regulation laws PD), development of bipedal humanoid step control algorithms with lower elastic elements and possible applications for people

with severe motor disabilities, comparative evaluation of the results obtained by repeated modeling / simulation processes for them.

The internationalization of the activities within the doctoral studies of Mechatronics and Robotics is also supported by:

A. Conferences planned and organized by the Romanian Robotics Society in the last 10 years, in internal and external partnerships:

1) 2012 – MTM & ROBOTICS 2012 – Clermont-Ferrand, France
http://www.jc-iftomm.org/english/pic/mtm-robotics-second_call_for_papers.pdf
https://col-westernsem.primo.exlibrisgroup.com/discovery/fulldisplay/alma991001267292404770/01COL_WTS:WTS
2) 2014 - MTM & ROBOTICS 2014 – Bucharest, Romania
https://www.scientific.net/book/mechatronics-and-robotics/978-3-03826-900-7
3) 2016 – MTM & ROBOTICS 2016 – Aachen, Germany
https://link.springer.com/book/10.1007/978-3-319-45450-4
4) 2018 – MTM & ROBOTICS 2018 – Iași, Romania
http://www.robotics2018.tuiasi.ro/topics.html
(planned edition, but which in the end did not take place due to the very small number of papers)
5) 2020 – MTM & ROBOTICS 2020 – Timișoara, Romania
'MTM & Robotics 2020. The Joint International Conference of the XIII International Conference on Mechanisms and Mechanical Transmissions (MTM) and the XXIV International Conference on Robotics (Robotics)'
https://mctr.mec.upt.ro/mtm-robotics-2020/
https://www.springer.com/gp/book/9783030600754
(edition which in the end, due to sanitary restrictions, included only the publication of the volume of works in Ed. Springer)

B. Symposiums under the auspices of IFR (ISR - International Symposium of Robotics) in which Professor Mircea Nițulescu has constantly participated in recent years on behalf of SRR

https://ifr.org/international-symposium-of-robotics
Last edition 2020 (52th ISR) https://www.isr-robotics.org/isr

C. The international conference "Daegu Global Robot Business Forum 2020" which was attended online by SRR Professor Mircea Nițulescu

http://higrc.org/main/

He also registered SRR as a new full member of the GRC (Global Robot Cluster) http://higrc.org/main/page.php?mnu_uid=949&

3. STRATEGIES AND PROCEDURES IMPLEMENTED AS MEASURES FOR CONTINUOUS IMPROVEMENT OF QUALITY

In this section of the report, measures will be presented for continuous improvement of the quality of doctoral study programs, other than those provided by the minimum standards, regulated by Annex no. 2 of the Order of the Minister of Education and Research no. 3651 of April 12, 2020, published in the Official Monitor no. 414 of April 20, 2021.

3.1. Alternative procedures for evaluating scientific research

At the level of IOSUD - University of Craiova were established in 2020 *Alternative procedures for evaluating the doctoral scientific research of interns, until the approval of the public presentation of the doctoral thesis and the approval of the public presentation committee* (Annex_3.1) that is also applied in the field of Mechatronics and Robotics.
https://www.ucv.ro/pdf/invatamant/educatie/programe_doctorat/informatii/I_Proceduri_de_evaluare_a_activitatii_de_cercetare_st_doctorala.pdf

The three PhD supervisors in Mechatronics and Robotics are all part of a single department, D35 Department of Mechatronics and Robotics. Prof. Dr. Eng. Dorian Cojocaru is the Director of the Department and a member of the SDCB Council, Prof. Dr. Eng. Nicu George Bîzdoacă is Vice-Rector of the University of Craiova, and Prof. Dr. Eng. Mircea Nitulescu is Secretary General of the Romanian Robotics Society. Through these positions, the team is strongly integrated, including in terms of ensuring and implementing the quality system, in the system of the University of Craiova, in particular the Faculty of Automation, Computers and Electronics and the SDCB. In this way, all the conditions are ensured that all the strategies and procedures related to quality assurance in education are adopted at these levels, to be taken over and implemented at the level of Mechatronics and Robotics.

The fact that this field of doctoral studies is the only one in the country, at this moment, makes the integration in the staff of the Faculty of Automation, Computers and Electronics and respectively of SDCB to be, on the one hand, an implementation of the team's vision on the character field, but on the other hand in an obvious competitive factor. The team has permanently acted on three strategic directions: for the constructive takeover of the scientific and professional heritage of the team of specialists in Automation and Computers, for capitalizing the applied technical skills of students in Mechatronics and Robotics and, respectively, for expanding this field of doctoral studies and at other universities in the country, especially where it can be developed in collaboration with the fields of Automation and Computers.

At the level of SDCB, two main directions of action are targeted, which allow the achievement of objectives related to increasing the quality of doctoral programs and research performance. On the one hand, the organization and development of specific events with an important contribution, conferences of the faculty and the doctoral school, respectively, on the

other hand, seminars, meetings, regular debates of the members of the Doctoral School with representatives of the socio-economic environment from the Oltenia region.

3.2. Partnerships and meetings with the socio-economic environment for research and doctoral activities

In order to improve the quality of the doctoral study program in the field of Mechatronics and Robotics, as well as to increase the applicability of research results in industry, strategic steps have been taken to strengthen collaboration with partners of the Faculty of Automation, Computers and Electronics with activities in Mechatronics and Robotics: Ford Romania SA, Smart ID Dynamics, Continental Automotive Sibiu, Hella Craiova, QFort / Casa Noastra and other economic agents. It should be mentioned that the employees of some of these companies are PhD candidates in the field of Mechatronics and Robotics at the University of Craiova.

The QforIT private doctoral scholarship system (Annex_A.1.3.2.c1) is a model that will be continued, so as to make as strong a link as possible between doctoral studies and areas of applicability in the industry.

In 2020, collaboration agreements were signed / extended by the University of Craiova and the Faculty of Automation, Computers and Electronics with strategic partners (Annex_3.2.a, Annex_3.2.b), the agreements having special chapters dedicated to the activity of research and doctoral programs.

The objectives pursued are to establish sustainable partnerships with economic agents on various national and international research projects; joint solution of various research topics while respecting intellectual and industrial property rights, as well as promoting innovative ideas of PhD candidates among economic agents.

These meetings resulted in collaboration offers (Q4IT) and research topics that can be solved in partnership (Continental); a series of economic agents sent to the doctoral school the educational offer in order to grant scholarships to PhD candidates and to carry out in partnership some research topics even under the aspect of some doctoral theses.

The fact that PhD candidates in the field of Mechatronics and Robotics were also engaged in teams of prestigious companies (eg Hella, Kautex, Elektrobit, Continental,) in the field allowed a permanent dialogue with these companies which is a factor in supporting quality in doctoral education in the field.

3.3 Partnerships for research and doctoral programs with national research institutes

Another direction of action for improving the quality of the doctoral program in the field of Mechatronics and Robotics is the collaboration with the Research Institutes, for the development of projects based on the activity of the members of the Doctoral School. Thus, cooperation with research institutes partners of the team of the Doctoral School of Mechatronics and Robotics, such as the National Institute for Laser, Plasma and Radiation Physics (INFLPR) and the National Research-Development Institute for Mining Security and Explosive Protection (http://ppam.inflpr.ro/national.html, https://alexandrapalla.wixsite.com/testes) within the research

contract no. 15PCCDI / 2018, Contracting Authority: Executive Unit for Financing Higher Education, Research, Development and Innovation, complex project title: Manufacture, calibration and testing of advanced integrated sensor systems for applications in social security, Component Project no. 3: Mobile pressure sensors for monitoring shock waves due to explosions based on ceramic - polymer heterostructures, financing duration: 01.03.2018 - 31.12.2020.

Also, the strategy of the institution is to conclude new agreements with strong research institutes, such an agreement being concluded in 2020 with the *National Institute for Research and Development in Informatics (ICI) Bucharest* (Annex 3.3.a), which is entitled objectives identification of new areas of intelligent specialization, participation in funding programs from reimbursable and non-reimbursable funds, joint organization of symposia and scientific communications, collaboration to establish cooperative relations with institutions in Romania and abroad for the promotion and execution of programs and research projects etc. In this context, ICI invited the members of the academic community and especially the members of the Doctoral School to contribute with the publication of the research results in prestigious journals, published under the auspices of ICI Bucharest (Annex 3.3.b).

3.4 Publications for PhD candidates, round tables, workshops

In order to increase the quality of doctoral studies, within the field of Mechatronics and Robotics, the aim is to improve the training of PhD candidates by their participation in events such as workshops and seminars. Thus, in addition to the internationalization measures already presented in the **Degree of internationalization** section, the following actions are implemented:

- Based on good practices from 2020, the annual organization of the ICSTCC International Conference on System Theory, Control and Computing, technically co-sponsored by the IEEE Control Systems Society and co-organized by the Faculty of Automation, Computers and Electronics, a dedicated workshop PhD candidates and young researchers.
- Publication of PhD candidates' results in dedicated journals:

Thus, the aim is to publish their work in the Journal of Young Researchers, edited by UCV, (https://www.ucv.ro/cercetare/programe_de_cercetare/jyr.php).

3.5. Conferences of the faculty and doctoral school

The National Symposium on Systems Theory (SINTES), the traditional event organized by the Faculty of Automatics in Craiova, which had almost 25 editions, was incorporated in the annual conference ICSTCC (International Conf. On System Theory, Control and Computing), which is organized by the "Gheorghe Asachi" Technical University of Iași (through the Faculty of Automatics and Computers), the "Dunărea de Jos" University of Galați (through the Faculty of Automatics, Computers, Electronics and Electrical Engineering), the Polytechnic University of Timișoara (through the Faculty of Automation and Computers), respectively the University of Craiova (through our faculty). In 2021, a jubilee edition will take place in Iași, which will, like previous editions, have an important participation of PhD candidates from several university

centers (*Joint Conference of SINTES 25, SACCS 21, SIMSIS 25, CONTI 14. Oct.20–23, 2021, Iași, Romania: Hybrid event*). The conference proved to be a very good tool for PhD candidates given the fact that from October 1, 2018 there are clear criteria for presenting doctoral theses; In addition, starting in 2020, the decision was made to found a bi-annual journal, System Theory Control and Computing Journal (STCCJ), which could take extensions of the best papers presented at the conference, but also others. This journal will incorporate, in a form that is intended to be better, the following scientific journals from the four university centers:

- Annals of The University of Craiova, Series: Automation, Computers, Electronics and Mechatronics, http://ace.ucv.ro/anale/
- Scientific Bulletin of The Politehnica University of Timisoara, Romania, Transactions on Automatic Control and Computer Science, https://bulletin-ac-upt.netlify.app/
- The Annals of University "Dunărea de Jos" of Galati, Fascicle III Electrotechnics, Electronics, Automatic Control and Informatics, http://www.ann.ugal.ro/eeai/index.html
- Bulletin of the Polytechnic Institute of Iasi, Automatic Control and Computer Science Section, http://www.ace.tuiasi.ro/index.php?page=678&lang=en

At the same time, at the level of IOSUD - UCV we can say that there is a coherent strategy of connecting doctoral schools to national research efforts and creating international links. The first national conference of institutions organizing doctoral studies was organized in Craiova, between 21 and 22 September 2017, and its works were attended, along with PhD candidates, rectors, IOSUD directors, directors of doctoral schools from more than 40 universities in the country https://www.ucv.ro/media/det.php?id=1555.

3.6 Volunteering

In addition to the research activity, the PhD candidates also carry out an intense volunteer activity. Among these activities we list:

- The Robotics and Mechatronics Club

  (http://www.ace.ucv.ro/comunitate/studenti/cluburi.php)

Development: throughout the school year, every Saturday, between 10 am and 12 noon, except for holidays, Room 203, INCESA headquarters.

Description: addressed to students from Craiova colleges (C. N. Elena Cuza, C. N. Frații Buzești, C. N. Carol I). It is in its 3rd edition, in 2018-2019 it hosts the 9th and 10th grade students from CN Carol I. It consists of activities to familiarize students with the components of mobile robot kits, with visual programming environments, introduction of the Java language, participation in a mobile robot competition.

Coordinators: PhD Candidate Eng. Băzăvan Lidia-Cristina, PhD Candidate Eng. Besnea Florina, PhD Eng. Manta Florin, Lect. PhD Eng. Cristina Pană

- **RaSky Robotics - The robotics team of the "Elena Cuza" National College, Craiova (**https://www.facebook.com/RaSky.Robotics)

The RaSky team was founded in 2018 when it began to participate in the largest international robotics competition for high school students "First Tech Challenge". In the 2018/2019 competition season, the team managed to get the third prize for the "Inspire" award and thus qualified for the national stage.

In the 2019/2020 competition season, the team was part of the finalist alliance of the regional qualifying stage and was awarded the "Finalist Alliance" and "Design Award" - 1st place. The team also qualified for the national stage.

Starting with 2018, Drd. Roibu Horațiu is the technical mentor of the RaSky team.

- **Coder Dojo Tech Academy**

Development: INCESA headquarters, bimonthly, November 2019 - March 2020

Description: Free programming workshops for children and students have the opportunity to experiment with various programming techniques on educational platforms designed especially for them. The project is part of the "Another Future" program, an educational project developed and developed by the Bucharest School of Values and CoderDojo and financially supported by Microsoft Romania.

Mentors: PhD Candidate Eng. Besnea (Petcu) Florina, PhD Candidate Eng. Stefan Cismaru (Annex_3.6.a, Annex_3.6.b)

4. OTHER ADDITIONAL INFORMATION RELEVANT TO THE FIELD OF UNIVERSITY DOCTORAL STUDIES

4.1 SWOT analysis for the doctoral field Mechatronics and Robotics

Strengths:

- Carrying out a pioneering activity at the University of Craiova, Faculty of Automatics, Computers and Electronics, by developing in the '90s the Robotics option within the Automatics program. Subsequently, this program formed the basis of the bachelor's, master's and doctoral programs in the new field, to the promotion of which the team led by Professor Mircea Ivănescu made a remarkable contribution. This field is the only one in the country developed within a Faculty of Automation, Computers and Electronics
- The operation of the first and so far, the only doctoral school in Romania in the field of Mechatronics and Robotics, at IOSUD - University of Craiova, "Constantin Belea" Doctoral School of the Faculty of Automation, Computers and Electronics
- The representativeness of the team that supports the field is remarkable at the level of the university management, but also at the level of the national academic bodies.
- International relations developed through partnerships in research projects, with a extended potential for collaboration;

- The experience of doctoral supervisors, relevant to the field of study;
- The material basis that allows the development of teaching and research activity accordingly assumed objectives;
- Existence at the University of Craiova of the line of complete education license-master-doctorate in the field of MR;
- The evaluation and quality assurance system implemented at IOSUD - University of Craiova, which offers guarantees regarding the achievement of the expected results.

Weaknesses:

- The unequal involvement of all doctoral supervisors, in relation to the diversity of teaching, scientific and administrative tasks lead to the limitation of the results that can be obtained in certain fields and in certain periods of time.
- The need for more frequent renewal of research laboratories.
- The need to involve PhD candidates in several Erasmus mobility activities
- Lack of coordination of doctoral theses in international co-supervision

Opportunities:

- The outstanding development of the field at international level also has a strong impact at national level.
- The attractiveness of robotic applications for the new generations has particularly increased.
- International academic cooperation and the use of scientific and technical information sources support the imposition of the organization and structuring of similar fields in countries with an indisputable tradition to the detriment of questionable variants that still operate at the national level.
- Increasing openness to the economic environment, through partnerships and collaboration of doctoral supervisors and PhD candidates with specialists from companies
- Carrying out research projects which offers a guarantee of the development of skills both in the scientific research of PhD candidates and graduates
- Existence of a research infrastructure within INCESA

Threats:

- Difficult definition of the identity of the field of Mechatronics and Robotics at national level due to the limiting association, within local development strategies specific to different universities and faculties, with different programs in other fields (mechanics or industrial engineering).

- The economic-industrial context at regional and national level which is based on the import of "turnkey" technological solutions and less on the activities of technological development by own forces.
- Migration of potential PhD candidates and graduates of doctoral studies in the field to private companies and their low interest for the third cycle of university studies
- The exodus of young people attracted by high-tech fields and specialists in the field to more developed countries in the EU and USA.

4.2 Conclusions

Two characteristics are absolutely relevant for the field of doctoral studies Mechatronics and Robotics at SDCB. This field is now the only field in Romania, with good chances of expansion in the near future at the "Transilvania" University of Brasov. The field is integrated in a doctoral school with the fields of Systems Engineering and respectively with Computers and Information Technology.

Given the content of this internal evaluation report, the existing resources as well as the internal and external context in which the PhD field of Mechatronics and Robotics takes place, it can be concluded that it has all the necessary conditions to carry out activities in an economic, legislative and socially favorable at both national and European level. The field offers a high level of training that meets scientific requirements and ensures the successful integration of graduates in university education and the labor market, in activities of conception, design, development, implementation, operation, monitoring, maintenance and troubleshooting of biomedical products and systems, as well as in scientific research activities.

Field responsible:
Prof. Dr. Eng. Dorian COJOCARU [redacted]

Phd. Candidate Eng. Florina Luminița Petcu [redacted]