

Session mechatronics and Artificial Intelligence

1. Participants

Ralf Roskopf	GJU, Vice President	Monica Heitz	PO Magdeburg Stendal
Safwan Alterazi	GJU, Dean	Nawar Farah	HS Heilbronn
Dr. Sahar Qadan	GJU, exchange coordinator	Mine Altunkas	HS Heilbronn
Dr. Hisham ElMoaqet	GJU, head of department	Stefanie Petrick	HS Heilbronn
Dr. Hani Muhsen	GJU, professor	Manfred Lohofener	HS Merseburg
Dr. Mariam Wajdi Ibrahim	GJU, professor	Ralph Lindken	HS Bochum
Iris Wildfeuer	GJU, IO network coordinator	Rolf Biesenbach	HS Bochum
		Ansgar Eckert	FH Würzburg-Schweinfurt
		Christian Klöffler	HS Offenburg
		Martin Löffler-Mang	HTW Saarland
		Ansgar Meroth	HS Heilbronn
		Martin Gartzke	HS Jena
		Peter König	HS Trier
		Rainer Eber	HS Aalen

Agenda

TOP 1	Updates from GJU: faculty and staff exchange, statistics and research interests <i>Dr. Sahar Qadan (exchange coordinator) (15 min)</i>
TOP 2	New directions in Curricula development Digitalization, Online-Teaching , E-Learning tools <i>Dr. Mutaz M. Ryalat (vice dean SATS) (10 min)</i>
TOP 3	New study plans -Artificial intelligence added to the mechatronics engineering (<i>Dr. Sahar Qadan</i>) (10 min)

	-Focus on industry 4.0 and IOT (in addition to AI) and the new labs that we plan to build: Microcontroller and IOT and The Industry 4.0 Labs <i>Dr. Hisham ElMoaqet (head of Mechatronics Department)</i> (10 min)
TOP 4	Nano research lab and externally funded research projects (Erasmus+ and RAENG) <i>Dr. Hani Mushen</i> (10 min)
TOP 5	Accreditation <u>Dr. Mariam Wajdi Ibrahim</u> (10 min)
TOP 6	Alumni student presentation <i>Ahmad Nadi and Abdullah Al-Hatem</i> (10 min)
TOP 7	Open discussion on joint future projects

Dr. Sahar Qadan, exchange coordinator for the department, started with a general overview of department updates.

First she took a minute to introduce the colleagues from the mechatronics department, starting with the head of department Dr. Hisham and other member of the team and exchange officer Halla.

She then talked the network through the agenda for the session quickly and continued to present GJU in general once more. She presented which faculties exist and then turned focus towards SATS and more specifically the department of mechatronics. She explained which BA degrees and modules (mandatory and electives) exist and how many credit points are needed and what the requirements are.

She gave also an overview of the labs. New labs are continuously being established such as the nano lab on which there would be a brief presentation later in the meeting.

Dr. Qadan then went on to share some statistics about research and publications from the department and the journals they were published in. Continuing on the line of statistics then information was shared about the student exchange and German year. She also explained the conversion of the course between credit hours and ECTS. There is a possibility for the students to do the graduation project in Germany as well.

Moving on she shared a list of all partner universities where the students can do their German Year. In the upcoming semester there are 18 students leaving for Germany. Then she also shared a list of companies where students did their graduation projects in Germany. She is happy to report that this even happened in 2020 during the pandemic. Statistics showing that the department number are increasing was the next point Dr. Qadan mentioned.

Flying Faculty was successful even in the pandemic though online teaching and she shared a list of names of professors who took on courses in the department. She summed up the cooperation opportunities as the following, Flying Faculty, Train the Trainer, European Projects and bidirectional student exchange.

Dr Qadan ended her presentation and gave the word to Dr. Hisham to speak about the research interests at the department.

Dr. Hisham again mentioned that the department has grown and that there has been more collaboration in terms of graduation projects as well as many successful case studies. He himself supervised on student at BOSCH and they even won a price for the Arab world (industry 4.0).

Other research is also done in area of machine learning intelligence control and cyber security amongst others. Research collaboration also exists with German partners, specifically good collaboration with Furtwangen where a data fusion and machine intelligence project was carried out. Another collaboration exists with FHWS on robotics. There are many achievements to come.

The question was raised by Mr Meroth (HS Heilbronn) regarding students from their side who could go to GJU, if classes at GJU were held in English, which was confirmed..

Moving on to TOP 2 Dr. Sahar Qadan took over the presentation of Dr. Muattaz (head of department) who could unfortunately not join the network.

For the last two semesters all classes were online. Many tools were utilized at the department, similar to what happened in Germany, there were recorded classes and live classes, via teams and web.ex . Some professors uploaded the videos on YouTube later for their students.

With MS teams it was also possible to have virtual office hours and live discussions and follow ups. Materials were uploaded on my GJU, study plans, syllabus and lecture notes, everything was digital for the students. Discussion between students was also possible on MS Teams.

Some Flying Faculty also did classes online and it worked very well and students benefitted a lot from this format.

Exams were usually multiple choice or quizzes, oral or written and of course homework. Even after the pandemic courses will continue as blended.

Mr. Meroth asked about the remote exams, they also did it and they asked the students to sign a declaration of honor not to cheat. But they cheated anyway

The exchange coordinator responded that at GJU they used a live stream, but in some of the exams students were not monitored but got given short amount of time, or sequential order of questions where they could not return to a question once answered. However all these tactics also were not a guarantee to prevent cheating 100%.

Vice president of GJU Dr. Ralf Roskopf asked if anyone of the partners has a blueprint in how to eliminate cheating completely would be wonderful, as so far all that has been achieved is to try to diminish it.

Next point on the agenda were study plans. Dr. Hisham explained that according to national regulations the curriculum needs to be updated every 5 years. The last update was 2014/15. Now they need to be updated again and it the idea is to catch up with technical advancements in the field of mechatronics. As everyone knows focus in the field has been increasingly on software rather than hardware. Germany is focusing on industry 4.0, combining everything in one platform. Aligning with this GJU introduced new classes, instead of one introduction class there now are two as well as an industry 4,0 class complimenting the planned 4.0 lab for students to work on. The aim to also built an

industry 4,0 center to help the industry in Jordan with the experience gained from Germany. The idea is to increase students skills so that they can compete on the labor market locally and internationally.

Dr. Meroth commented on the movement from “mecha” to “dronics”, which is a general trend, also at his university. Many of the mechatronics programs arose from a mechanical program but this is changing.

Sahar Qadan added that mechatronics is a combination of the disciplines which requires a need to be more flexible. Especially when moving into the digitalization area and dealing with big amount of data. Talking for example control algorithms we can take this further, moving towards to machine intelligence, concentrating on output. This is also what the new study plan is about, adapting to the German system, going more into programming. This will also open up fields in Germany for the students to work on an courses they can take in Germany.

Mr. Biesenbach mentioned a quote- “all the innovative scientists gather around the themes and the issues of their time” now at this time the issue is informatics and software engineering, if we want to stay attractive for mechatronic students, the focus needs to be the less mechanics, more electronics and much more software engineering. He therefore sees the direction GJU is taking as the right path.

Sahar Qadan added that this direction was also taken from the feedback from the students who return from Germany. When they come back the mention that the programming courses at GJU should be before the German year. This will be compensated in the new study plans.

Mr. Meroth seconded the importance of this as he has had many GJU students in his classes, which are in big parts hands on classes which require that students come with programming skills. GJU students know the theory but can’t translate an algorithm to a code. So he encourages practical programming courses even in the first two years before the German Year.

Mr. Biesenbach mentioned for him informatics is much more than coding as it included all the mathematic theory. In his opinion both should be in the study plan. He had the impression that some students chose informatics and did not expect all the mathematic theory in there. Once they had practical training in a company before starting studies in Bochum they knew more what to expect in the programming courses. In his opinion the field needs to stand on two feet- programming feet of coding and the mathematic theory foot for the rest. When you have the mathematics on the table you then need the code still to bring it to life.

Sahar Qadan spoke of her own experience when she was in Germany doing her master, she also had the problem between theory and practical parts but the internships really helped her. Enriching the knowledge and then using it I practice. This is what they are now trying to do, incorporating the feedback form the students.

Dr. Hani Muhsen continued with his talk about the research labs belonging to the mechatronics department. He also mentioned the projects that are currently being carried out at the mentioned labs. There are many projects currently at the nano lab and the time did not allow to introduce them all.

The other lab is the smart grid lab which was created as a result of one of the projects, a capacity building project sponsored by Erasmus +- aimed to train staff and engineers on smart grid and integration of renewable resources. This allowed the purchase a test bench that did not before exist in the middle east. The project will end in July and lead to other projects sponsored by the royal

academy of engineering using the same test bench. The test bench gives the capacities to make microgrid modelling with several distributed energy parameters and checks many different factors. Here is also a real time simulator.

Dr. Lindken thanked him for the presentation and commented on the remarkable international research and asks if the students are included in this. Dr. Hani answered that students are mainly integrated for their graduation projects but there are also some classes and training sessions on different levels.

Dr. Meroth, suggested that students work with PDMS copies, this is an appropriate student level and less costly, to which Mr. Lindken agreed. Dr. Hani thanked them for their feedback added it depends on the project, and on funding of course. Maybe the results of the projects can be used for experiments by the students.

Ahmad, GJU alumni, added he did his Bachelor's thesis in the nano lap and he used several of the technologies mentioned. He continued as a research assistant and participated in papers and feels lucky to have worked on this topic- he is now doing a master in Deggendorf and his thesis with BSH. His BA in nano technology opened positions for him everywhere. The nano lap of GJU is great, unfortunately yes, it is expensive. Also shipping PDMS to Jordan is hard due to do customs and permits.

Dr. Mariam Wajdi Ibrahim then moved on with the topic of the German accreditation. The SATS went through the first German Accreditation, of course they already possessed the Jordanian accreditation after the study plan had been updated in 2020. Achieving the German accreditation is in line with the focus on the German Dimension at GJU and will facilitate the exchange between countries through the unified system of ECTS which 46 countries world-wide use. The system is part of the Bologna convention and its focus is highly on learning outcomes. She then showed the learning outcomes for the mechatronics department. These outcomes will be evaluated on a point to point base, meaning each individual module will be assessed in these terms. All modules can be taught in one or two semesters. The study plan has 10 semesters with two of them taking place in Germany. A total of 300 ECTS, was assigned to these 10 semesters. The ECTS were assigned to the modules, depending on the workload of the module. Electives for example were assigned 3 ECTS due to their lower workload. All standard technical modules got 5 ECTS. 30 ECTS were assigned for the internship in Germany, while 20 ECTS were given to the study semester in Germany. Graduation projects received 6 ECTS.

Alumni report *Ahmad Nadi*

Ahmad did his exchange in Heilbronn where studied with Professor Meroth. In Germany he took courses in German and English and was able to carry out his internship at the university.

He decided to go back to Germany for his Master Degree after the great experience he had had. He will finish his master in August 2021 and will start looking for jobs and opportunities. He would like to stay in Germany for some years because he likes the working environments. He enjoys the international environment as well.

Alumni report Abdullah Al-Hatem

He is originally from Iraq and had started his higher education there as a pharmacy student and then switched to engineering. He then found the GJU and the transeducational aspect of it attracted him. He did his German Year at HS Bochum, with Professor Biesenbach and was able to do his internship and graduation project at BOSCH. He had already good experience at GJU.

After graduation he is now working for startup in the UK, online, also started his masters in Germany in TUM in robotics.

VP of GJU Ralf Posskopf asked both alumni what their suggestions would be for GJU students regarding the language acquisition.

Abdullah had learned German before he joined GJU, at school and visited Germany during school, so the culture shock happened earlier for him. Ahmad recommended that students should speak more and make more friends.

Sahar Qadan asked the former students about the difference in the work field of engineering between Germany and Jordan. Ahmad replied that he did an internship in Jordan before and then in Germany. Most Engineering jobs in Jordan are in his experience start ups and not bigger companies are more service oriented and not very technical. In Germany he enjoys that big companies have technical jobs like Bosch. Things are more organized. What he enjoyed in Jordan that you could interact with everyone and everyone tried to do everything. In Germany it is more specialized.

At the end of the meeting for the Mechatronics department the date was set for the next meeting for the 30th of June, 1st of July 2022. Hope was expressed from all participants that this meeting would once again be in person.