Co-funded by the Erasmus+ Programme of the European Union

NanoEl-Asia project 573828

Virtual meeting on 17/06/2021

List of participants

Name	Institution
Danilo Demarchi	Politecnico di Torino
Ramesh Subramaniam Ramesh Kasi	University of Malaya
Rajkumar Durairaj Ezra Morris Abraham Gnanamuthu	University Tunku Abdul Rahman
Yanjie Wang	University of Chinese Academy of Science
Vivek Srivastava	NIIT University
Vijai Mandke	
Varsha Keklar	Mumbai University
Yossi Talyosef	Bar Ilan University
Kristin Imenes	University College of Southeast Norway
Knut Aasmundtveit	
Slavka Tzanova	Technical University of Sofia

The meeting started with information on the situation in each country and at the university from all partners.

Jack Barokas informed the partners that already 14 master classes were delivered live on-line. They are recorded and they are public in YouTube.
He suggested to organise them in one curriculum and to continue teaching even after the project end. In that way we will have very sustainable results. Jack Barokas said that TAU bought a licence for 3 years. So, the NanoEl courses will be free online three years after the project end.
All partners agreed. Yossi Talyosef presented the courses of the new NanoEl course Smart Implants. The following lectures are already recorded as life on-line master classes:

1. Introduction to Nanoelectronics – NIIT
2. Functional nanostructures – UM
3. Introduction to Biosensors - Prof. Yosi Shacham
4. BioElectrochemical Sensors: Potentiometric Sensors, Impedimetric Sensors - Prof. Yosi Shacham
5. Sensor Interface – USN
6. Introduction to BioMolecular Computing - Prof. Danilo Demarchi
7. DNA Computing, Enzymes Systems, Antibodies and cells - Prof. Danilo Demarchi
8. Electronics Dispersion of Graphene – UTARC
9. Characterizations – NCNST

If the consortium finds the topics appropriate, the question is whether we in the group of the 11 universities can deliver the lectures on topics 10-13:

10. 3D Bioprinting of Artificial Tissues: Construction of Biomimetic Microstructures.

11. Tissue Engineering and 3-Dimensional Modeling

12. 3D Bioprinting Technology: Scientific Aspects and Ethical Issues

13. Current advances and future perspectives of 3D printing natural-derived biopolymers.

Danilo Demarchi said that one of his former students is working in USA on bioprinting and he may ask him to provide some course if possible.

There was a proposal to check whether in Israel the last four topics are not delivered by some of the Nanocenters, e.g. by TAU.

Vijay Mandke presented the suggested by NIT University two new courses which are to be developed in close cooperation with the business. The proposed content is as follows:

- New Course 1: Nanoelctronics-Systems-Manufacturing Businesses
- New Course 2: Product IoT System Life Cycle Management (Due to its pedagogy of Project Orientation, described in detail).

1. Detail for New Course 1:
a. It leverages NU Course Module 3 titled “Nanoelectronics Systems: Future Nanoelectronic Devices and Manufacturing processes”
i. Course 3 focuses on nanoelectronics systems: manufacturing processes and applications. By the end of this course, student will be able to appreciate the importance of paradigm shift of science & technology in case of nanoelectronics vis-à-vis the present day VLSI technology, and
b. NU Course 4 is titled “Nanoelectronics Systems: Applications- Quality living with Smart Future, Present to Future Business Systems”.
i. Course 4 mainly concentrates on the changing scenario of business and manufacturing aspects..
Leveraging these and other NanaoEl project courses, following new course can be added:

- New Course 1: Nanoelctronics-Systems-Manufacturing Businesses
o Formation of Business partners:
- Manufacturer of Integrated Device, who designs microchips, markets microchips and operates wafer processing line, (e.g., ST-Microelectronics)
- Vendor, who develops and markets proprietary semiconductor components and who [rather than operating wafer processing line] subcontracts to a silicon foundry (e.g., Nvidia-graphics accelerators)
- Company operating a complete wafer processing line and offering its manufacturing to services to others (e.g., Qualcomm, MediaTek, Intel Corporation, Foxconn, TSMC, UMC, etc.)
- Vendor of Virtual component: Vendor subcontracting wafer processing line to a silicon foundry makes it a business to develop synthesis packages licensing them to others for incorporation into their ICs (e.g., ARM)
o Factors leading to rise of manufacturing subcontracting Business Models:
- VLSI design know-how availability outside IC manufacturing companies,
- In plenty integration densities at low costs.
2. Detail for New Course 2:

a. It leverages NU Course Modul 4 titled “Nanoelectronics Systems: Applications-Quality living with Smart Future, Present to Future Business Systems”, NanoEL courses, and Course Offerings at NU with NanoEPL and ET 401 Learning Technology Project Course to suggest following project-oriented New Course 2: Product IoT System Life Cycle Project Management:

- New Course 2 “Product IoT System Life Cycle Project Management” – Described In Its Three Components; namely, (1) Product-IoT-System-Life-Cycle Project Management, (2) Code Development, and (3) Practical Level Decision Domains - In Research & Discovery Mode

Descriptions of Components:

Component 1: Value stream model (VSM) based Student Work undertaken with reference to Identified User/Customer-Industry’s incumbent Product-IoT-System-Life-Cycle required Value creating Business product/system/process Performance Improvement-Indicators and -processes, therefor.

- VSM based Activities undertaken by student

o Creating student’s business plan Value creating to the identified user/customer-industry and, in turn, its customers,

 Determining Value creation for Customer that Industry Linked Product IoT_SysLC Project Management is expected to deliver:

1. Product IoT System Futures’ delivers enhanced performance.

a. In the Product IoT System Futures’ each of devices, et al. are more integrated.

2. demonstrates enhanced product life cycle.

3. market reach of the Product IoT System Futures’ extended reasonably,

4. efficient control over Roadmap and Business Operations Management (BOM).

5. strong resource ecosystem availability,

6. Support Cost is cut down greatly.

a. Devices, et al. update and manage themselves automatically,

7. proven reliable and secure,

a. Programming language makes devices, et al. and the Product IoT System secure and reliable right from the SIM card to the enterprise data,

o Student defines MVP (Minimum Value Product)

o Student builds and manages SDLC roadmap,

o Defining new features,

o Considering a product line extension,

o Evaluating potential partnerships,

o Analyzing the risks of changing any area of the technology stack

o Student-Demonstrated Learning-Outcomes represented by VSM-based Decision-Areas in respect of/pertaining to/critical to VSM-based Product-IoT-SDLC-Project-Management Decision Frameworks:

 Framework of Decision Area

- Framework User Experience (UX)
- Framework Data
- Framework Business
- Framework Software Technology
- Framework Technology Research & Discovery
- Framework Security

Component 2 Code Development – With Specialization as Java Based Application Development

o Customer - Business Domain _ cum_ Industry Identified, which has existing Product IoT System in use

o Customer – Existing Java Embedded Device used in existing Product IoT system in use by the identified industry in the identified business domain

o Customer Futures'- For the identified Product IoT System, (for delivering a Java Embedded Device Futures' – Web site, App) implementation of the Java based SDLC (Software Development Life Cycle (SDLC), particularly, with reference to following SDLC phases; namely,

o Software Development Stage

- Software development turns your project's requirements and prototypes into working code. it's the earliest phase in which you start to see something that resembles the final product.

Note: The software and tools that will be used to develop greatly depends on the chip you select. However, appreciate there are multiple frameworks that try to support lot of chips.

- By the end of this stage, you will have a working feature to share with customer.
- Developers are the most involved during this phase. They will often need to confirm things with the product owner and the testers.

o Software Testing Stage

- During the software testing phase, testers put the code through its paces (Note: At the IoT Basics level, since project code needs to be compiled specifically for the microcontroller or microprocessor and due to lack of OS like Linux, Windows which abstracts the hardware variations, the software and tools that will be used to develop greatly depends on the chip you select. However, appreciate there are multiple frameworks that try to support a lot of chips.

- Testers check for Code quality:

• that code meets the stated requirements,
• that code is performant,
• Evidence of secure development principles,
• Some teams automate all their testing. Other teams test manually, but most do a combination of the two,
• The output of software testing is a better solution that meets edge cases and user needs. Developers can't code for every eventuality; the fresh perspective that testing brings can help,
• Testers are the main people involved at this stage. They will often seek clarification from developers or product owners,

o Implementation, albeit Deployment, and Integration:

- Implementation phase - also called 'deployment' phase - takes code and puts it somewhere people can use,
- In simple projects, this will be as simple as deploying the code onto a web server,
- In large projects, this could involve integration with many different systems,
- The output from this stage is usable software.
- For some projects, usable software generating phase also encompasses the creation of documentation and marketing material.

Component 3 Practical Level Decision Domains - In Research & Discovery Mode

o Practical knowledge of hardware is often very useful for IoT coders: Growing IoT infrastructure calls for qualified developers to ensure that IoT devices operate effectively, correctly and securely.
o Practice on understanding of sensors and wireless communications. "Beyond computing, IoT will take one into the world of mechanical and civil engineering as sensors gather physics data
o Practice on the Raspberry Pi, STM32 and other microcomputers
o Trends:
- The Internet of Things is developing really rapidly and is actively finding application in new fields.
- Trends Business intelligence and data collection: It is important for developers to understand how companies can use IoT devices to collect data and then analyze it. Depending on the type of device and its sensors, the data may come in very different forms, from geolocation data to heart rate information or food preferences.
- Trends AI
- Trend Machine Learning: Another trend in the near future: Although not all IoT devices use machine learning today, a constantly increasing number will do so as time passes
- Trend Security: IoT security is not new, but it is gaining importance. Since IoT devices are connected to the Internet and form a single network with other devices, they must be secure.

NIIT University is working in close cooperation with the ST Microelectronics and they plan to collaboratively develop the business-related content.

Danilo Demarchi said that these are completely new courses to be developed from scratch and they may be planned for further cooperation.

Slavka discussed the correction in the reporting documents that should be done. TUS has checked all reporting documents and a list of documents with some mistakes or missing information was done for each partner.
The partners are expected to correct their documents and to send all reporting documents until the end of the project.

The next Zoom meeting will be on 1 July 2021 from 08:00 CET:
https://us02web.zoom.us/j/87646434178?pwd=dDhPSmNlTzZQT1RlNHhVRDRsQ1NJZz09