Proposal for Workshop at IEEE CASE 2021

Goal:
The goal of this workshop is to introduce and demonstrate the LEGO© Smart Factory as a modern teaching and research laboratory in the digital transformation era. The LEGO Smart Factory allows students and researchers hands-on experiences engaging them in all the aspects concerning digitization of manufacturing systems, from sensors to actuators. The workshop will discuss the main advantages and limitations of LEGO Smart Factory on teaching effectiveness at high level engineering education as well as on smart manufacturing research laboratories.

Title: **Smart LEGO Factories for Engineering Education**

Organizers: [Andrea Matta], [Professor]
[Politecnico di Milano]
E-mail: [andrea.matta@polimi.it]
Phone: +[39] – [0223998530]

[Young Jae Jang], [Associate Professor]
[Automation Engineering Laboratory, Department of Industrial and Systems Engineering, Korea Advanced Institute of Science and Technology]
E-mail: yjang@kaist.ac.kr
Phone: +[82] – [042-350-3130]

[Baris Tan], [Professor]
[Koc University]
E-mail: [btan@ku.edu.tr]
Phone: +[90] – [212-338-1459]
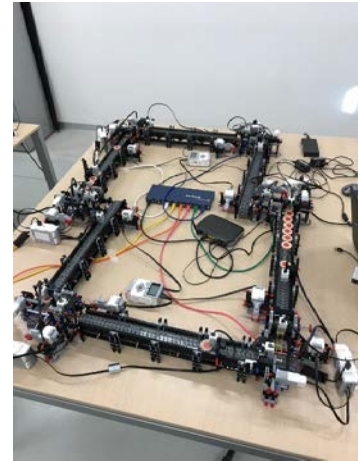
Time: August 23, 2021

Abstract:
The digital transformation in the manufacturing systems demands the education and research to be revolutionized. It is not sufficient to teach manufacturing systems and recent technology such as Artificial Intelligence or sensor data separately. Teaching smart factories must incorporate the domain knowledge of the manufacturing itself and how technology influences the behavior of the system. The teaching instructor needs to understand how to establish communication, problem-solving, and critical thinking skills on top of the complex smart factories. This workshop will demonstrate the new education platform using LEGO Smart Factory systems which were designed to embody the core principle of the manufacturing system. The platform combines several automated stations and robots to form a functional manufacturing system. It has been tested for a few years and returned good feedback from the students. How Smart Factory systems are used in high level education engineering will be also subject of the workshop, pointing out the added value to the teaching activities and its limitations. The use of Smart LEGO factories for research will be another point of discussion in the workshop.

Descriptions: The following talks are planned:
- Smart LEGO Factories in high level engineering education
- Platform description: stations, robots, conveyors, sensors, IoT
- Use of Smart LEGO Factories in Engineering courses
- Use of Smart LEGO Factories in research
- Conclusion and outlook

Format: Half day; presentation