AS SEEN IN:
INNOVATIE NU | SEPTEMBER 2021

HACKING FOR THE FUTURE

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ADVANCED
MANUFACTURING
CENTER

ISSN 2772-428X

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The core of Fraunhofer Project Center Expertise Student Team (FEST) is innovation and personal motivation to learn, grow and develop. But where do ideas come from? One important aspect is indeed enthusiastic individuals. How do we gather and work together with such enthusiastic individuals? One interesting and unconventional way for this is a hackathon!

Traditionally, a hackathon is a physical event where programmers and software developers come together to find solution for a problem in a short timeframe. What this event is can be easily explained using the two words which came together to make the word hackathon: 'hack' and 'marathon'. 'Hack' represents the creative problem-solving aspect of the event; after all, the main goal of the event is to solve a problem. Marathon, on the other hand, represents the restricted time frame of the event, which requires the participants to work in a continuous stretch until the solution is found, sometimes even through sleepless nights!

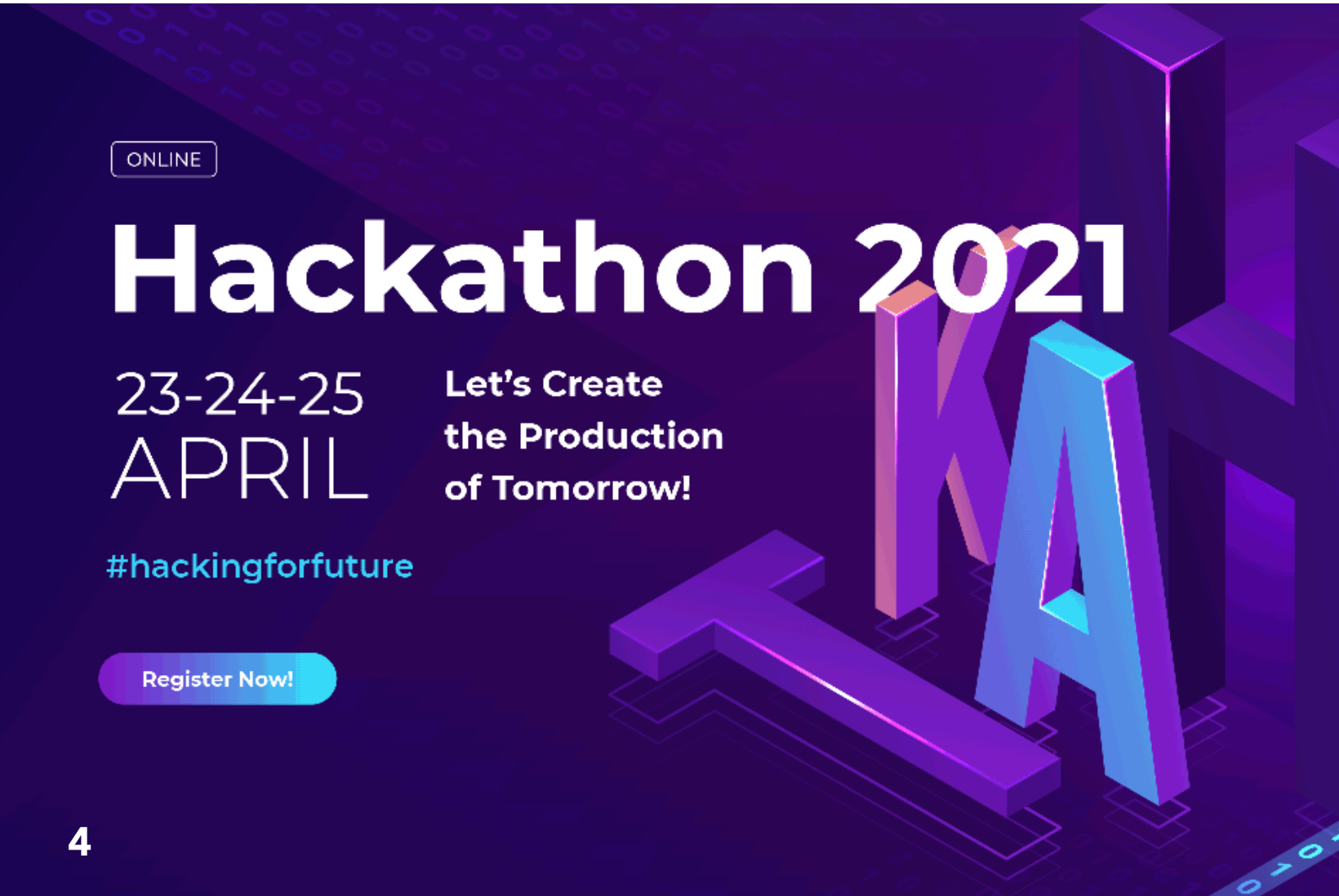
Together with the ICNAP community of Fraunhofer IPT, the Fraunhofer Project Center organised and hosted the 'hacking for future' online hackathon on April 22-24, 2021. The goal of the event was to bring together enthusiastic students from Germany and the Netherlands to solve cases of ICNAP's partner companies, thus sparking ideas and innovation within the community. With the pandemic situation, organising a physical hackathon was neither possible nor responsible. Thus, the decision was made to make the event completely virtual. 40 students from Germany and the Netherlands, split into 11 diverse teams worked virtually on one of the three challenges provided by the partner companies of ICNAP over 35 hours. The amazing challenges and the crisp virtual environment created by us resulted in a fun and insightful weekend for the students and the ICNAP community.

What were the challenges?

The first challenge of the hackathon was Machine Learning (ML) model interpretation from IconPro. IconPro uses ML models for preventive maintenance. However, since ML models are often considered as a black box, the models should be fair and reliable for them to be used in an industrial setting. Model fairness and interpretability are critical for production engineers to explain their models and to understand the accuracy of their findings. There lies the goal of this challenge. The objective put forward was to interpret a trained ML-model using CXPlain and SHAP library and compare results from both libraries qualitatively. Through this, IconPro could get insights into which model interpretation library they should use in their processes to understand and explain their ML-models most accurately.

The second challenge by Leadec was related to Dynamic anomaly detection of vibration data. The objective of this task was to develop an auto-threshold configuration algorithm for vibration sensors. Vibration sensors are frequently used in smart factory applications and the standard threshold for alarms are usually configured using ISO standards. This however does not reflect real life sensor applications and installations because of various factors. The task therefore was to develop, verify and deploy an algorithm, that can individually generate thresholds through learning data from the first vibrations after the installation of the machine, and is able to continuously retrain itself with the incoming data.

The third challenge jointly from Oculavis and Philips and was about Automatic 3D model creation for industrial Augmented Reality (AR)/ Mixed Reality (MR) applications. With the increasing spread and utilisation of AR and MR applications in manufacturing, creation of 3D models which accurately depict the characteristics of real-life objects can have numerous advantages. If, for instance, assembly instructions for an engine are to be provided



to assembly workers, a precise model of the engine might be useful to visualise assembly steps with a high accuracy. Automation of this process would add significant value to otherwise time-consuming task of designing a 3D model. Thus, the objective of this task was to find a way to automate the creation of a 3D model of a real reference object.

The event in a virtual world

Now the challenge for us as organisers was to create a virtual environment which can facilitate creative problem solving during the hackathon. The physical venue of the hackathon plays a key role in stimulating the flow of ideas. It was necessary to provide an environment closer to that in the virtual world to help the participants survive the marathon. After lots of deliberation and brainstorming, we created a flawless virtual environment which provided the participants with everything they needed to take them through the fast-paced weekend with sleepless night(s). A communication platform was set up for teams to work together and to find all the information needed for their respective challenge in one place. Aside of that, a 'virtual space' was set up which allowed participants to move around, meet new people and network with the ICNAP community. The exciting part of a hackathon is also meeting new people from different backgrounds. To provide this, we opted for a platform that allowed people to virtually 'wander' in an open space, bump into each other during their wandering and start one on one or group conversations. To make it a bit more realistic, we created rooms in the virtual space, which corresponded to a 'coffee room' or 'dinner table' of a physical hackathon, so that participants can run into each other when they are taking a coffee or dinner break, just as in real life. We also hosted virtual workshops in which experts from the industry provided tips and tricks for the participants to hack their challenges.

The result was an amazing weekend and a happy bunch of participants. Three or four teams worked on each challenge, most of them pulling out not one but two sleepless nights and delivered amazing results and ideas for the companies. "How the event was set-up, especially this virtual space, really helped us to work from our home comfortably", said Djamila Barbara Zimmermann, which was the general feeling across the camp. The students had an amazing experience, which was very evident in the impressive solutions for each challenge; choosing winners was a difficult task for the jury. The solutions perhaps even caught the jury by surprise, which resulted in them declaring shared winners for two of the three tasks. And of course, we never allow hard works to go unrewarded. The participants were rewarded with amazing vouchers for their excellent efforts over the weekend; happy students, overjoyed hosts and delighted ICNAP members!

Such remarkable ideas and solutions which came to light from the extraordinarily agile brains of young budding professionals through a diverse multidisciplinary collaboration can indeed become the spark we need to light the future of advanced manufacturing.

Event advertising