KEYSIGHT TECHNOLOGIES

IoT INNOVATION CHALLENGE

2019 SMART LAND FINALIST

Malaria Detection Using Foldscope

Students of India's Institute of Engineering & Management develop IoT-powered, origami-based microscope to detect malaria

In 2017, there were 219 million malaria cases worldwide, according to the World Health Organization. Approximately 70% of the world's malaria burden is concentrated in 10 countries in Africa, along with India. Detecting the right parasite species, or strains, that cause malaria in humans remains particularly difficult. To add insult to injury, most countries with many malaria cases have a weak surveillance system or no system at all.

A team of students from India's Institute of Engineering & Management—Gaurav Barua, Harsh Prasad and Kishore Chan—hopes to change this. They developed a sensor network concept called Malaria Detection Using Foldscope to help better detect malaria around the world. Their innovation landed them a spot as the Smart Land finalist for the EMEAI region in the Keysight IoT Innovation Challenge.

The device relies on an origami-based microscope called Foldscope, developed by professor Manu Prakash at Stanford University, that identifies microscopic objects like malaria parasites. The team redesigned Foldscope and integrated it with the Internet of Things and the Raspberry Pi so that any health volunteer in a small village could take a blood sample and detect the malaria parasite without any medical background or knowledge.

Maleria Detection
From left to right: Kishore Charan, Gaurav Barua and Harsh Prasad, from Institute of Engineering & Management in India, are the EMEAI finalists for the Smart Land track for their entry, Malaria Detection Using Foldscope.

The team plans to integrate servo motors with the existing design of Foldscope for automatic focusing and panning. Then, a Raspberry Pi would be connected to the camera module to take pictures of microscopic specimen and upload it to the cloud. This can be done through a regular mobile network or through LoRa, which could be beneficial in remote areas where connectivity is an issue.

Detection of malaria marks just the tip of what's possible with this innovation. The team envisions a world where a blood sample taken from a small village in Africa could be sent to the cloud and examined in the U.S. in real-time. Images of the blood sample can then be viewed by researchers around the globe, allowing for the quick implementation of safety measures.

"Our aim is to reach remote parts of the world which doesn't have effective medical infrastructure and provide cost-effective medical devices to help billions of people," said IEM student Gaurav Barua. They'd also like their device to provide a database of regions most impacted by malaria and to expand to detect other diseases from blood samples.

In the future, the team hopes to collaborate with a company or organization to continue their research and to expand on the scope of the project. "After completion of this product, we will be deploying it for testing phase," Barua said.

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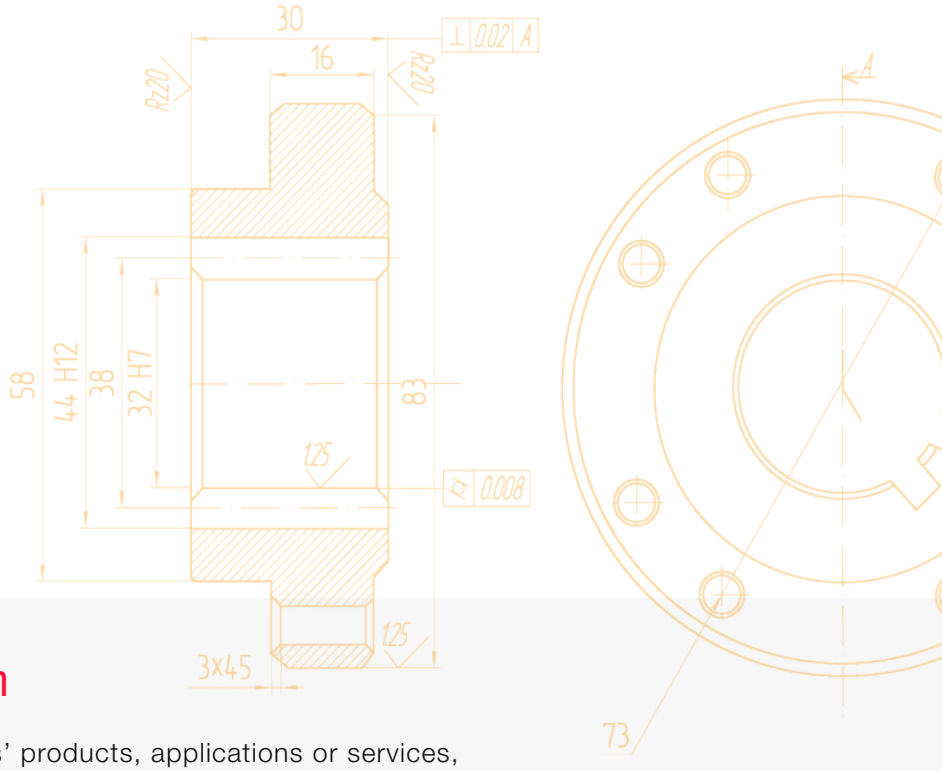

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