



HOON KIM, PH.D. ASSISTANT PROFESSOR OF COMPUTER SCIENCE, AND HIS STUDENTS IN THE ATR LAB @ATR_LAB ASSEMBLING THEIR ROBOT, "TELEBOT-2" IN PREP TO TOKYO.

Advanced Telerobotics Lab Builds "TeleBot-2" for the Plant Disaster Response Challenge at the World Robot Summit in Tokyo

Seven KSU students will join Dr. Jong-Hoon Kim, Ph.D., assistant professor of Computer Science, in Japan

Joined by seven of his Kent State University students, Dr. Jong-Hoon Kim, assistant professor of Computer Science and director of the Advanced Telerobotics Research Laboratory (ATR), in the College of Arts and Sciences, will unveil his group's latest robot, "TeleBot-2" at the World Robot Summit (<http://worldrobotsummit.org/en/>).(<http://worldrobotsummit.org/en/>) in Tokyo this week.

His team, ATR_Kent, which includes 20 students, is one of nine teams (and the only team from the United States) invited to compete in the Plant Disaster Robotics Category of the World Robot Summit. They are also collaborating with a small team at Florida International University (FIU), the SCALE Lab here at Kent State, and the Kent State Fashion School (for the operator suit). This is the first of a three-year competition, concluding in 2020, in which their robot will need to complete a set of tasks based on a plant disaster, like Fukushima Nuclear Power Plant during the 2011 tsunami in Japan. The ATR team's approach is unique in that they are using affordable materials and its operation is based on the gestures of the human operator. Key tasks the robot will be required to complete include inspecting and maintaining infrastructures based on several inspection methods, such as opening and closing valves.

While previously working at FIU, Dr. Kim's team developed its first version of TeleBot-1, labeled by some as a real-life "Robocop". It was designed to allow police officers to remotely control a robot based on their own movements and gestures. The first version garnered the attention of over 500 media outlets around the world, including the Discovery Channel and Fox News. That robot design was intended to allow disabled veterans and police officers to go back to work, but there could be many other uses such as parking lot monitoring or security management.

Telebot-1 was a telepresence humanoid robot with an immersive teleoperations system that provided optimal human robot interactions with a remote environment. It allowed their TeleBot to learn standard tasks and perform them autonomously when a reliable communications channel is unavailable as well as allow an operator to intuitively control the TeleBot via their natural motions as if they were present in the situation. This immersive teleoperations system was enhanced with high-fidelity human-centered interface design for TeleBot-2 along with semi-autonomous features. They redesigned the form factor for a hybrid locomotion system, seamless transition, increased autonomy and immersive teleoperation for more delicate tasks in a disaster scenario for TeleBot-2.

Click the play button below to see the ATR teams introductory video for its TeleBot-2:



The ATR lab focuses on two major components of TeleBot-2. The first one is the overall robot system which includes locomotion control along with occupational control. Secondly, the operator system which relates the interfaces used for motion control, mission control and operator feedback, which includes auditory, visual, and tactile feedback along with telemetry information from Telebot-2. They've integrated a mixture of immersive telepresence technologies along with assistive autonomy to develop a robust humanoid robot for disaster response.

Dr. Kim's collaborative team

Irvin Steve Cardenas is responsible for control management while Do Yeon Kim and Suho Lee handle the teleoperation management. Nate Kanyok, Kody Richardson and Andrew Riedlinger are responsible for the localization. Visualization is managed by Alfred Shaker, Xiangxu Lin, and Sungkwan Kim. Ahmed Baza, Jin Kwon Kim and Hadley Arch handled the robot design and manufacturing while Hyunjae Jeong manages the power and circuits. The controller suit was designed in collaboration with the School of Fashion Design, led by Linda Ohrn, Margarita Benitez, Chanjuan Chen, Kelsey Vitullo and Michelle Park. Anna Levina handles the public relations aspects of the project.

The scalable computer architecture and emerging technologies laboratory or SCALE Lab at Kent State, led by Gokarna Sharma and Pavan Poudel, focuses on sophisticated planning algorithms for manipulation and navigation. They also handle task scheduling and cyber-physical interaction.

The team also collaborated with the Discovery Lab at Florida International University, where Dr. Kim previously worked, on the system management. Led by Nagarazan Prabakar and group members S.S. Iyengar and Subramanian Viswanathan, they focus on developing highly-effective software tools and robust algorithms for system management related to performance and proactive resource monitoring, data management, and authentication services.

To learn more about the Advanced Telerobotics Lab at Kent State, visit: <http://www.atr.cs.kent.edu/> (<http://www.atr.cs.kent.edu/>).

To see the competition live streaming via YouTube, go to: https://www.youtube.com/watch?v=Tbo__mNQvnE&list=PL5Oq_p2DIThHkIaqFgtH5Zhu_Wto6t4Bi (https://www.youtube.com/watch?v=Tbo__mNQvnE&list=PL5Oq_p2DIThHkIaqFgtH5Zhu_Wto6t4Bi).

UPDATE:



Below is the YouTube video recorded on Thursday, 10/20/18 (JST), showing the TeleBot-2 in action at the 1:50 mark and the 6:00 mark.

Plant Disaster Prevention Challenge Day4 (October 20, 2018)/プラント災害予防チャレンジ 4日目



Below is the YouTube video recorded on Thursday, 10/19/18 (JST), showing the TeleBot-2 in action at the 2:40 mark.

Plant Disaster Prevention Challenge Day3 (October 19, 2018)/プラント災害予防チャレンジ 3日目



Below is the YouTube video recorded on Wednesday, 10/18/18 (JST), showing the TeleBot-2 in action at the 1:58 mark and the 6:00 mark.

Plant Disaster Prevention Challenge Day2 (October 18, 2018)/プラント災害予防チャレンジ 2日目



About World Robot Summit:

Hosted by the Ministry of Economy, Trade, and Industry (METI), and New Energy and Industrial Technology Development Organization (NEDO), the five-day World Robot Summit 2018 (WRS 2018) featuring robot competitions and an exposition will be held at Tokyo Big Sight from October 17 (Wed.) to 21 (Sun.), 2018.

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