Endowing Ability in Computers and Classes

Katy Smith
UA Foundation

Planetary exploration and medical diagnostics might seem like topics for researchers in two different fields. But for Wolfgang Fink, the connection between the two is about equipping machines to make judgments normally entrusted to people.

“You can’t take the experts everywhere,” Fink says.

Consider extreme space environments, where it’s dangerous and costly to send astronauts. Conventional rovers are

controlled from Earth, but the distance delays commands by hours. To advance the science, Fink is developing robots to react with excitement and curiosity to objects that differ from their typical surroundings. Working with other instruments in space, such as blimps, next-generation rovers will independently prioritize what to investigate further.

“These next-generation robotic missions will simultaneously explore distant locales at several levels — from orbit, from the air, and on the ground — to home in on important geology, hydrology, climate, and possibly astrobiology on distant worlds,” Fink says.

Fink instills artificial intelligence in robotic agents using intelligent algorithms, which he says provide real value in another one of his projects — a device that detects potentially blinding diseases early. It gives health care providers the knowledge needed to proceed with triage or referral.

In rural areas where doctors and hospitals are in short supply, health care workers can attach a “smart ophthalmoscope” to a smartphone and photograph the interior of a patient’s eyes. A custom app sends the images to a remote “expert system” that suggests diagnoses, much like an ophthalmologist.

“It brings quality health care to the patient rather than the patient to the health care,” Fink says.

Fink expects the smart ophthalmoscopes, partially funded by a grant from the National Science Foundation, to become available commercially within two years.

Biomedical engineering has long been a focus area for Fink because advances can quickly improve the health and lives of millions. Fink also finds working with students rewarding. In addition to classroom instruction, he engages student research assistants in his lab and mentors high school interns completing senior research projects at BASIS schools in Tucson.

He is the official faculty adviser of the UA chapter of the National Society of Black Engineers, which won a national robotics competition in 2014 under his mentorship.

“It’s an important part of my role: to pass on knowledge and experience and especially to motivate students,” he says.

Fink joined the UA faculty in 2009 as the inaugural Keonjian Endowed Chair in Microelectronics, made possible by an endowed gift from Maria and the late Edward Keonjian. Previous to that, Fink was a senior researcher at NASA’s Jet Propulsion Laboratory and director of the Visual and Autonomous Exploration Systems Research Laboratory (http://autonomy.arizona.edu/) at the California Institute of Technology. He established a similar lab at the UA.

“The University of Arizona was the right place to pursue my research agenda, and the endowed professorship was the icing on the cake,” Fink says.

Related Articles

Gifting the UA's Place in History (/article/place-history)

Positioning Arizona for Skin Cancer Breakthroughs (/article/positioning-arizona-skin-cancer-breakthroughs)

Managing Change on the Range (/article/managing-change-range)