Computer vision and mobile technology could help blind people 'see'

June 25 2015, by Marie Daniels

Computer scientists are developing new adaptive mobile technology which could enable blind and visually-impaired people to 'see' through their smartphone or tablet.

Funded by a Google Faculty Research Award, specialists in computer vision and machine learning based at the University of Lincoln, UK, are aiming to embed a smart vision system in mobile devices to help people with sight problems navigate unfamiliar indoor environments.

Based on preliminary work on assistive technologies done by the Lincoln Centre for Autonomous Systems, the team plans to use colour and depth sensor technology inside new smartphones and tablets, like the recent Project Tango by Google, to enable 3D mapping and localisation,

navigation and object recognition. The team will then develop the best interface to relay that to users – whether that is vibrations, sounds or the spoken word.

Project lead Dr Nicola Bellotto, an expert on machine perception and human-centred robotics from Lincoln's School of Computer Science, said: "This project will build on our previous research to create an interface that can be used to help people with visual impairments.

"There are many visual aids already available, from guide dogs to cameras and wearable sensors. Typical problems with the latter are usability and acceptability. If people were able to use technology embedded in devices such as smartphones, it would not require them to wear extra equipment which could make them feel self-conscious. There are also existing smartphone apps that are able to, for example, recognise an object or speak text to describe places. But the sensors embedded in the device are still not fully exploited. We aim to create a system with 'human-in-the-loop' that provides good localisation relevant to visually impaired users and, most importantly, that understands how people observe and recognise particular features of their environment."

The research team, which includes Dr Oscar Martinez Mozos, a specialist in machine learning and quality of life technologies, and Dr Grzegorz Cielniak, who works in mobile robotics and machine perception, aims to develop a system that will recognise visual clues in the environment. This data would be detected through the device camera and used to identify the type of room as the user moves around the space.

A key aspect of the system will be its capacity to adapt to individual users' experiences, modifying the guidance it provides as the machine 'learns' from its landscape and from the human interaction. So, as the user becomes more accustomed to the technology, the quicker and easier

it would be to identify the environment.

Provided by University of Lincoln