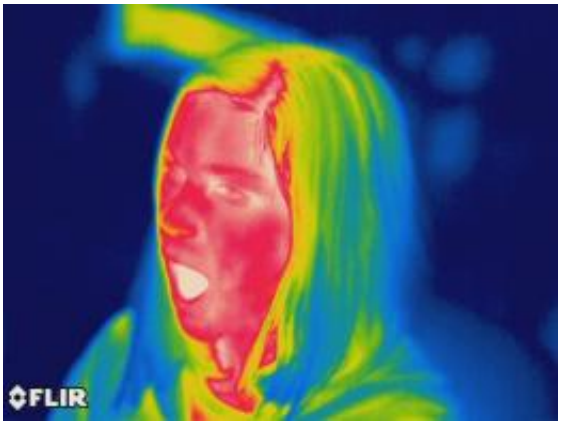
Infrared technology aids motor-impaired people

August 31 2009, By Anjum Nayyar



A University of Toronto professor has found a way for people with severe motor impairments to communicate with the use of an infrared camera.

Professor Tom Chau, director of the clinical engineering program and senior scientist and theme leader (innovation and development) at Bloorview Research Institute, says infrared thermography can be used as a non-invasive and non-contact access pathway by which individuals with disabilities can interact and perhaps eventually communicate.

Infrared thermography refers to the measurement of the radiation emitted by the surface of an object in the infrared range of the

electromagnetic spectrum. Infrared cameras use specialized lenses manufactured to focus this thermal radiation onto a focal plane of infrared detectors.

Chau's research involves exploiting the local temperature changes associated with the mouth opening and closing.

"The human body is an emitter of radiation and the radiation that's emitted can be measured," Chau said. "In the face there's a complex network of blood vessels. When you experience different emotions there's different flow of blood through the face and this causes temperature changes we canmeasure non-invasively using a thermal camera."

He first came up with the idea while working with a patient in his 20s who wasn't able to speak.

"One thing [the patient] could do reliably was open and close hismouth and that's a very tricky thing to capture," said Chau. "We came up with the idea that a person is warmer when they open their mouth. As long as there's heat there, the camera can pick it up. We are looking for a temperature change and motion when a person opens and closes hismouth. If you're just moving your head, it doesn't work because there is no temperature change.

"The mouth opening/closing just acts as a switch. That switch can be used to select letters of the alphabet from an on-screen keyboard or images in a picture communication board. That's how someone can use the one action (mouth opening/closing) tomake choices. Now this individual is able to type on a computer using the thermal camera switch."

In the lab, the camera is pointed at himwhile he sits in front of the

computer and every time he indicates a letter he wants, he opens his mouth and the camera captures it.

Chau said the technology has made all the difference for his patient.

"A couple of weeks ago, the individual said his first word in his life, in his 26 years. This was in the lab and his mother was there. He was typing letter by letter [using his mouth as a switch]. He typed m-u-t-h-e-r. His mom realized he was saying mother and she just broke down in tears. It was a dramatic moment. It has become such a liberating technology for this individual."

Chau and his team are the first in the world to use infrared thermography for this purpose and the first to publish on the thermographic technology.

Provided by University of Toronto (news : web)