



kikowear.com

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## Background



One in 20 Canadians (Statistics Canada, 2006) has a hearing limitation. Most emergency alarms and sirens are purely auditory, which puts hearing impaired people at increased risk. There are many other everyday sounds inaccessible to people who cannot perceive auditory cues. For example, car horns, telephones and knocking.

## Our Solution

KIKO Glasses are an Augmented Reality (AR) headset that provides sound identification and localization services to its users. It displays the information to the user in a simple and easy to understand format.

It does this by using a microphone array mounted on the glasses to record sound, and uses those recordings to calculate the direction sound is coming from. After calculating the direction, it determines what kind of sound it is (e.g. speech, car horn, knock). If appropriate, it analyzes speech and recognizes sentences spoken.

The results are displayed via an intuitive interface on the Glasses in the user's field of view.

## Localization

KIKO Glasses calculate the direction sound is coming from in the same way natural hearing does: by observing audio signal time differences.



## Classification

The Classification module uses Machine Learning to classify every sound KIKO hears. It makes predictions based on previously seen data, and grows smarter the more audio it hears!



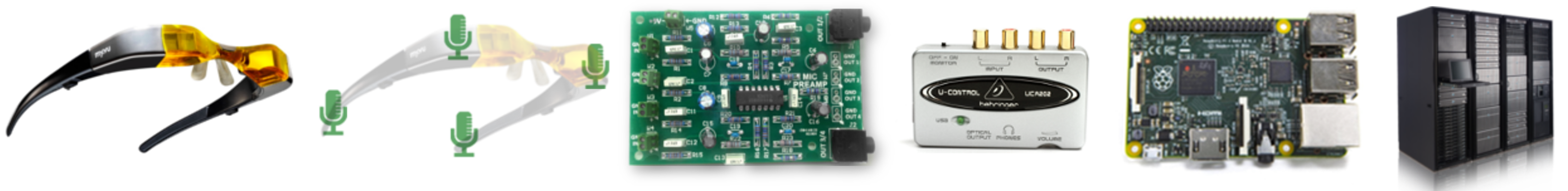
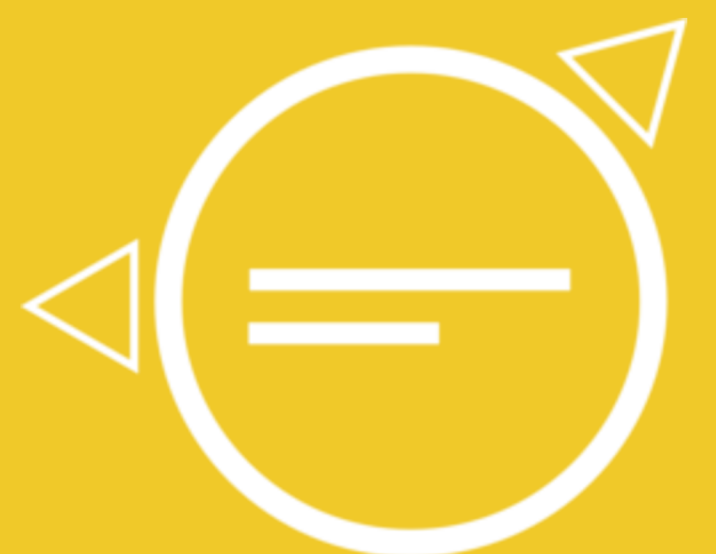
## Speech Recognition

Speech Recognition uses IBM's Watson Speech Engine. Once KIKO decides that a sound is speech, it asks the Watson server to interpret it, and displays the results to the user.



## Graphical User Interface

The User Interface is based on HTML5 and JavaScript. It draws the results of all KIKO computations on the Glasses.



## MyVu Glasses

An optical prism directs and focuses light from a built in LCD to the viewer's eye.

## Preamp

Microphones feed into a custom four channel preamplifier that amplifies microphone output to usable voltage levels.

## Raspberry Pi 2 B

The "brains" of KIKO Glasses have a quad-core processor and 1 GB of RAM.

## Microphone Array

Four electret microphones are positioned around the glass frame to pick up sounds coming from any direction.

## Audio Interfaces

Two Behringer UCA202 audio interfaces convert the raw analog voltages of the preamp to digital signals.

## Web Server

IBM's powerful Watson Speech Engine interprets speech for KIKO.