Situated Display in Hospital Ward

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ABSTRACT

Author Keywords
Guides; instructions; author's kit; conference publications; keywords should be separated by a semi-colon. Mandatory section to be included in your final version.

ACM Classification Keywords
H.5.2. Information Interfaces and Presentation: Input devices and strategies; I.2.6. Artificial Intelligence: Learning

See: `http://www.acm.org/about/class/1998/` for more information and the full list of ACM classifiers and descriptors.

INTRODUCTION
Since the dawn of the computer age modalities have been an important aspect to consider when interfacing with the machines, whether it has been done using keystokes, audio-control or gestures.

It has always been of high relevance to push the limits for how we interact with technology, mainly to empower the individual.

Technology is supposed to make common tasks even easier to achieve. Consider the case of a physically disabled person being empowered by using an alternative modality such as voice control.

In our case the focus is to improve on how people in the healthcare sector interact with technology. In the healthcare sector interaction can actually prove to have negative effects, particularly bacteria can be transferred.

One way to avoid spreading bacteria is by avoiding physical interaction with input devices.

This can result in less time spent scrubbing or rinsing as the likelihood for microbacteria being transfered via input devices is reduced.

Ultimately alternative modalities could provide employees within the sector a way to use native hand gestures to perform tasks such as interacting with x-ray images.

PREVIOUS WORK
There exist alot of prior work within the field of HCI which is relevant to our solution. The papers which influenced this project the most will be mentioned in following section.

Alternative Modalities
Prior work in regards to pattern recognition has been of high relevance to our solution. bla bla bla bla

Smart Machines
Prior work in regards to pattern recognition has been of high relevance to our solution. bla bla bla bla

SYSTEM ARCHITECTURE
The system we have designed consists of two parts, one being a input device and the other being an application able to recognize the patterns from the device and forward predefined commands.

The Input Device
Our motion tracking device has been built in such a fashion that it resembles a wrist watch. This form factor makes it rather compact. Additionally a lot of people wear watches on a daily basis which makes it recognizable and barely noticeable for people.

The specific device contains a list of components, the most important are 6DoF Sensor, Bluetooth and Arduino microcontroller.

6DoF Sensor:
This is the heart of the device. It contains an accelerometer and a gyroscope. This means we can measure movement and rotation of the wrist of anyone wearing the device.

Arduino Pro Mini:
This is the brain of the device, it handles all communication between the 6DoF chip and forwards the data over bluetooth to any consumers of the data.

The others are not that important to spend a lot of time on, they provide means of communicating, charging and toggling the device on and off.

Weka Gesture Recognition System
Since the input device we have built is quite lightweight, data processing needs to be done elsewhere. This provided us with the challenge of transferring data from one bluetooth capable device to another. All the processing and preprocessing of the device's data is performed on a desktop application on a computer connected to the device. Especially challenging

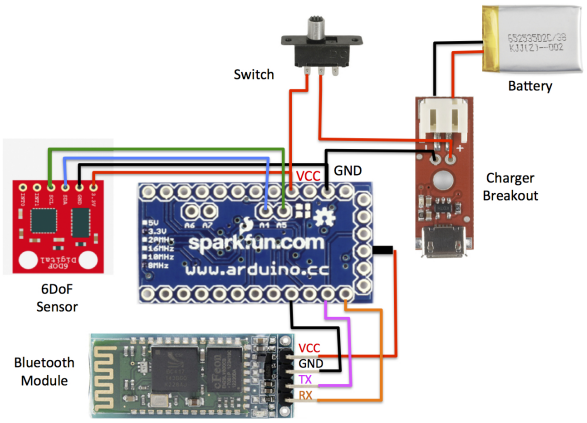

Figure 1. This schematic shows the circuitry on the device.

was to find and use Java libraries that would allow to establish a Bluetooth connection with the device and to exchange data with the desktop application that would process it. For further technical details about the challenges encountered please refer to the Discussion section. add technical details about the rxtx fucking everything up Once the acceleration and rotation data is sent from the device to the computer, the values are smoothed with an average of the 20 previous values in order to avoid and reduce the effect of noise on the sensors. This phase is called preprocessing of the data. This allowed us to have more precise information, and switch from this:

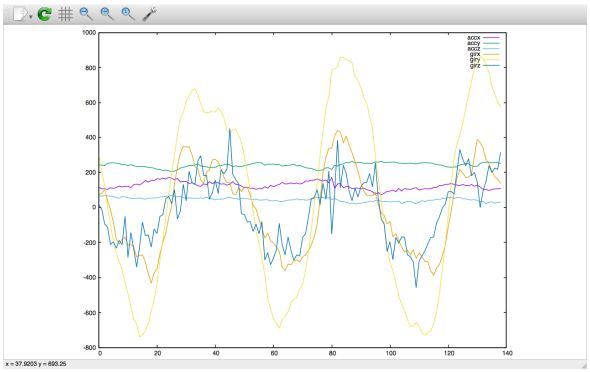

Figure 2. Data from the device before preprocessing.

To this:

For the actual processing and gesture recognition, we organized known gestures in a large training set, each individual gesture stored as a list of 50 * 6 values plus an identifier. We use Weka 3.6 to evaluate newly received data using a BayesNet classifier and comparing it to the training set. The evaluation of the gesture is performed every 10 * 6 new values.

Android Application

Webservice

Pattern Recognition

RESULT

DISCUSSION

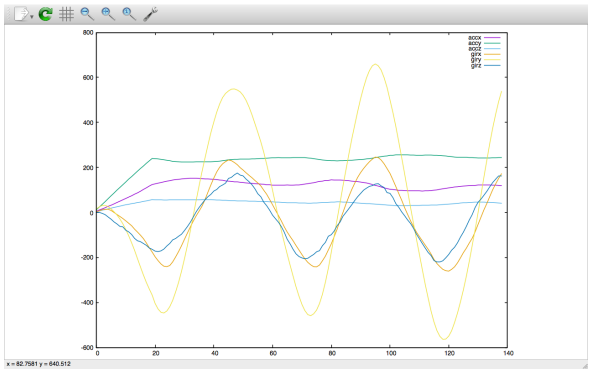

Figure 3. Data from the device after preprocessing.

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