Comprehensive Design Review

Team Toccando
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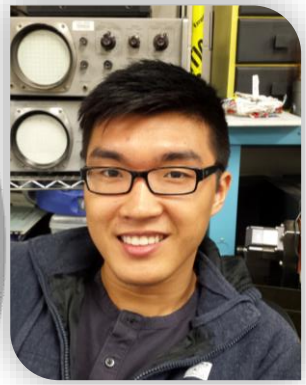
Toccando

Casey Flanagan, EE

Ygorsunny Jean, EE



William Young, CSE

Esther Wolf, CSE

Toccando: A Tactile Feedback System

Problem

- With the invention of touch screens, much of the tactile user interface has been lost

Solution

- Tactile display that provides distinctive haptic feedback to the user

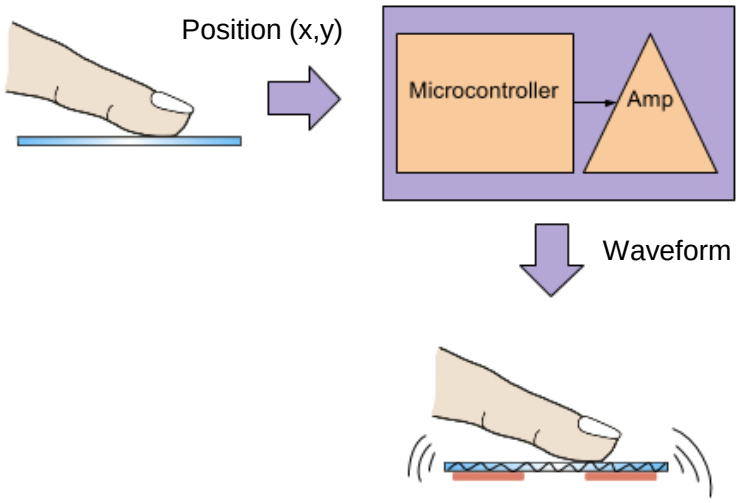
Technology

- Use of vibration to dynamically create low and high friction areas that are experienced as force on the user's finger when the finger is moving.

Design

Four Main Components:

- Android Phone
- Microcontroller
- Amplifier
- Glass with piezos



Why Toccando?

Adding another dimension

- Touch!

Bringing technology closer to reality

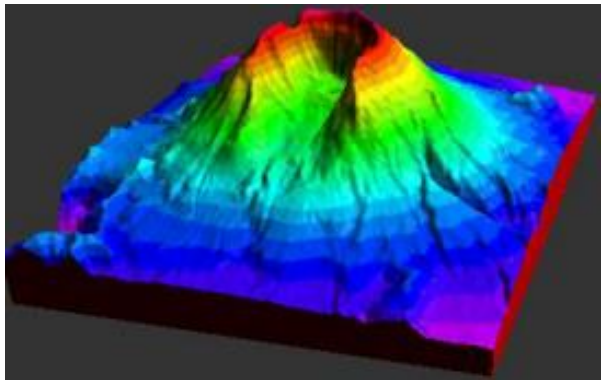
- The shape and texture of objects is important to the way we interact with the physical world

Education

- Allows the development of educational tools such as interactive maps

Marketing

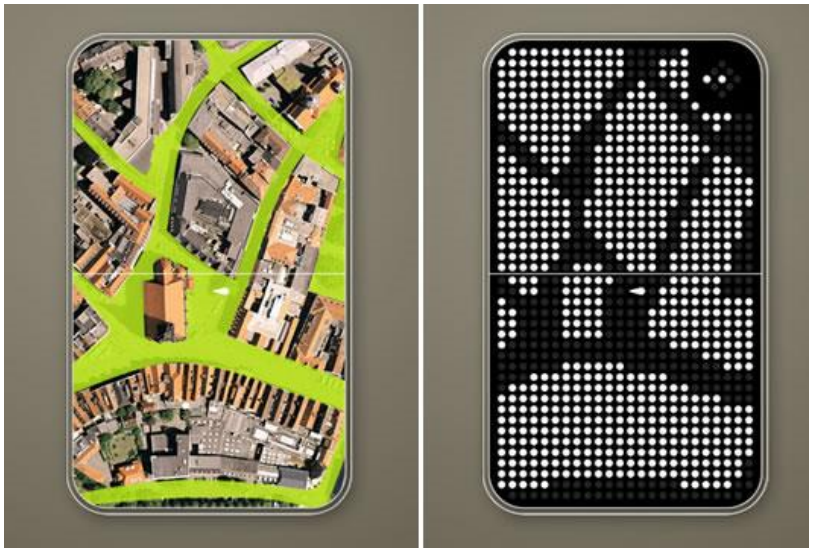
- Clothing texture could be displayed to the consumer



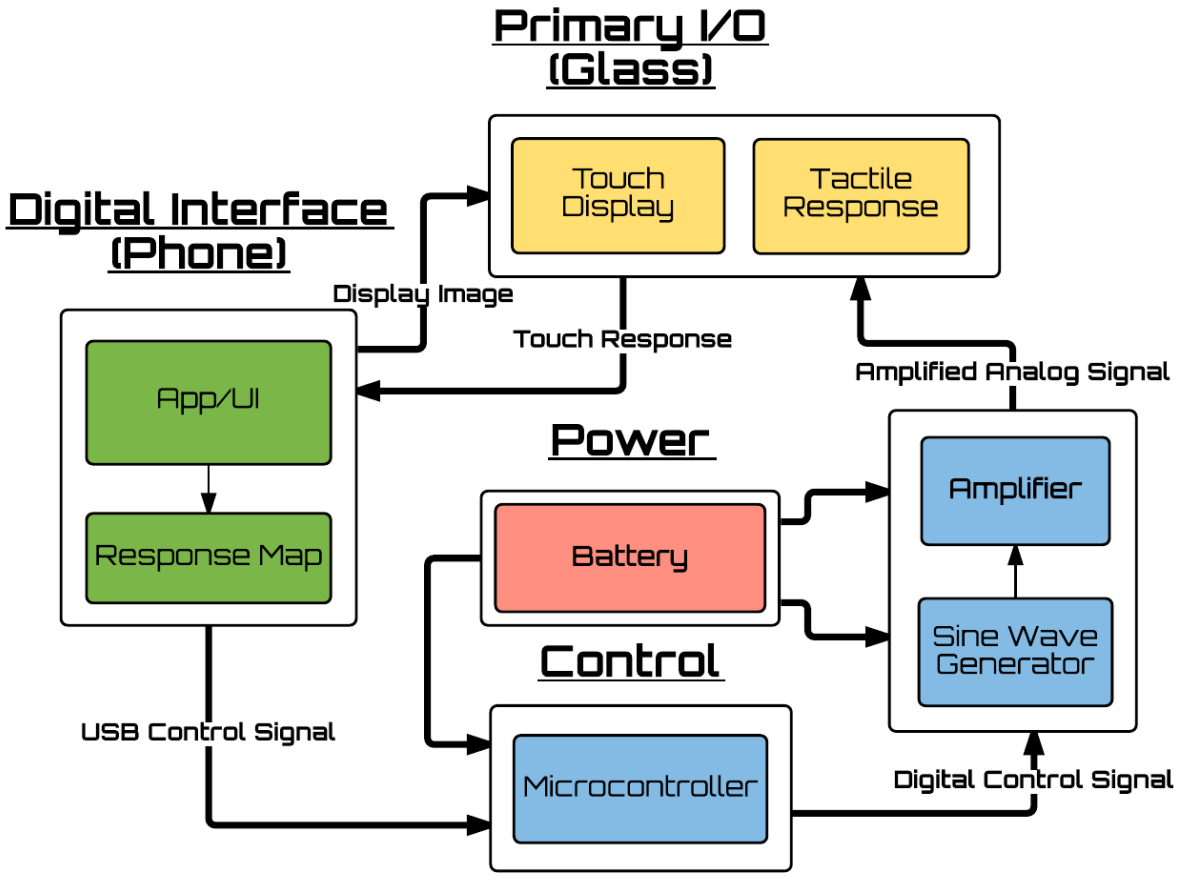
Applications of Tactile Feedback in Maps

Maps

- Dimensionality of a map is modular, 2d or 3d options
- Allows visually impaired to experience electronic maps
- Gives tactile cues when visual cues may be distracting (eg. when driving)
- Could be used to add interactivity to maps used in education, tactile feedback could add more information, like topography



Our Block Diagram



Glass Touch Surface (Primary I/O)

Present Configuration

- 165mm x 130mm x 1.1mm soda lime
- 5 Piezos- 35mm OD x 25mm ID brass backed Murata 7BB-35-3
- Vibrations at low frequencies (50-500 Hz)
- Presently running at 400Hz
- Provides a tactile sensation to the user
- Power output should be ~1W

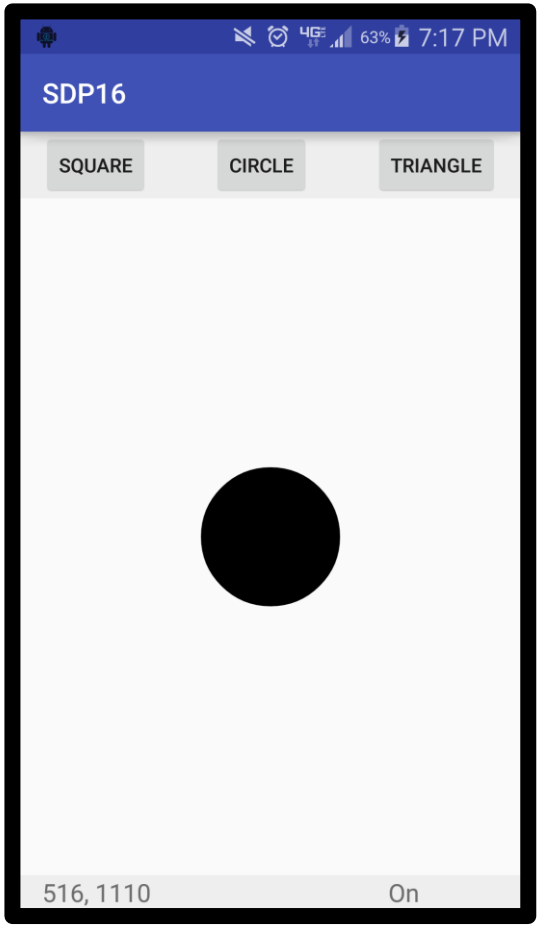
Phone (Digital Interface)

Application/User Interface

- User Interface is able to recognize finger positioning
- Fast and smooth usability
- Multi-threaded socket listening

Response Map

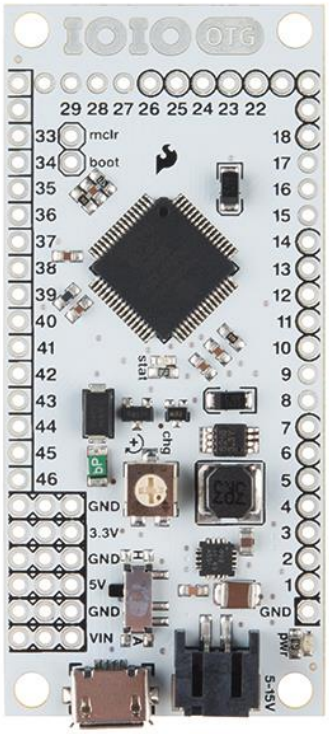
- Rudimentary Geometry (Basic Shapes)



Control (Microcontroller)

IOIO OTG Board

- Operating Voltage Range of 2.2V to 3.6V
- Lightweight
- Energy Efficient
- Capable of both host and accessory modes
- Supports Control, Interrupt, Isochronous and Bulk Transfers



Control

Sine Wave Generator

- 10% Distortion
- 10 Volts peak to peak with a 5V DC offset

Amplifier Circuit

- Prototyping with a transformer to drive the piezos at low frequencies (around 400Hz)

Power

Design Challenges

- 2 devices need power
- 5V input required for microcontroller
- 15V input required for the sine wave generator

Current Implementation

- We have a 5V input, using onboard power supply, to feed microcontroller
- We are currently using an onboard power supply, to supply the 15V input of the sine wave generator.
- We plan on using a 5V battery, in conjunction with a boost converter, to get the full voltage range necessary for the sine wave generator (15V)

FDR Deliverables

Bringing Everything Together

- Increase vibrational feedback
- Meet power requirements
- Build a case to fit all necessary components
- Finish map application
- Fully interface the hardware and top level of the application

Individual Responsibilities

Esther Wolf (Oo)
- Responsible for interfacing the hardware, software and top level of the application

William Young (Oo)
- Responsible for hardware testing and sine wave generator subsystem

Ygorsunny Jean (Oo)
- Responsible for power system, touch display subsystem and web content management

Casey Flanagan (Oo)
- Responsible for hardware testing and amplifier circuit subsystem design

Thank You