Digital Braille Watch

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Overview

* Problem Statement
* Braille Background
* Current Methods
* Preliminary Designs
* Design Matrix
* Final Design
* Future Work

Braille Background

* Size standards
    * Each character consists of 3x2 grid
    * Dots at least 0.092 in. apart
    * Characters at least 0.245 in. apart
* Four characters needed to display time
* Braille numbers use only top 4 positions

1   2   3   4   5   6   7   8   9   0
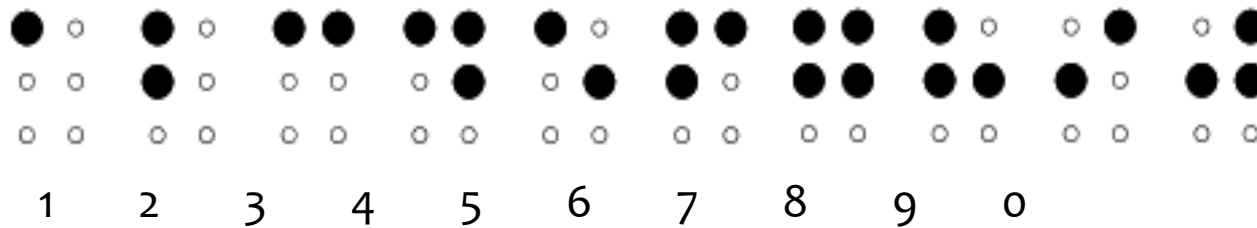
Problem Statement

* Develop a Digital Braille Watch that...
  * Uses the standard Braille number system
  * Self-contained power supply
  * No larger than a standard Smartphone

Current Methods

* Talking Watch
  * Disruptive
* Tactile Watch
  * Fragile
  * Difficult to read
* Haptica Braille watch
  * Idea developed by David Chavez
  * Just a concept, no design

http://watchluxus.com/braille-watches-auguste-reymond
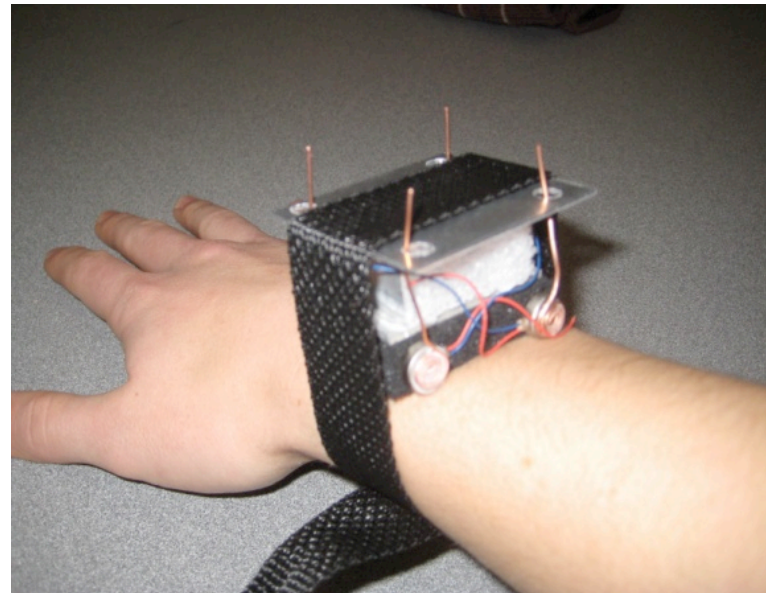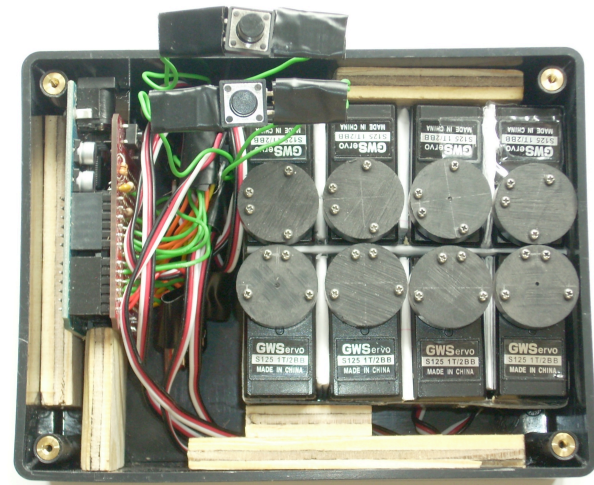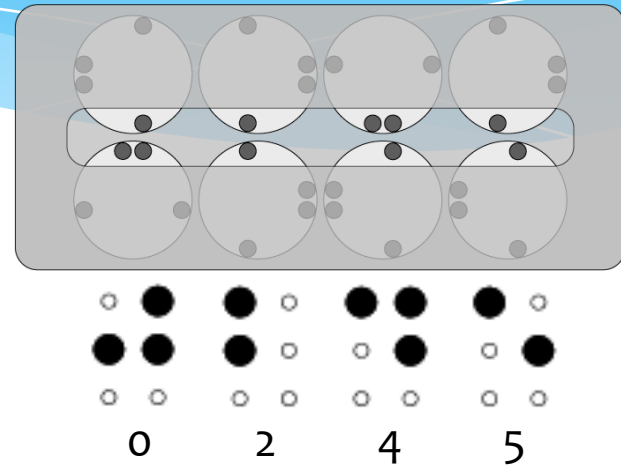
http://www.tuvie.com/haptica-braille-watch-concept/
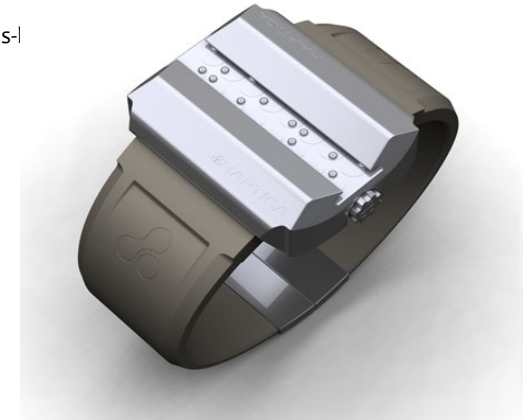
Past Design Projects

* Vibrating dots pulse in sequence to indicate time
* Considerations
    * Not Braille
    * Overstimulation

Past Design Projects (cont'd)

* Eight disks rotate to display the time

* Considerations
  * Met client requirements
  * Multiple functions
  * High power consumption
  * Large size
 * Lacks precision

Design Option 1: Disk and Pins

* Pins are raised and lowered based on position of disk below
* Pros
    * Smaller size
    * No ambiguity in dot placement
    * Multiple functions
* Cons
    * High power consumption
    * Dot spacing
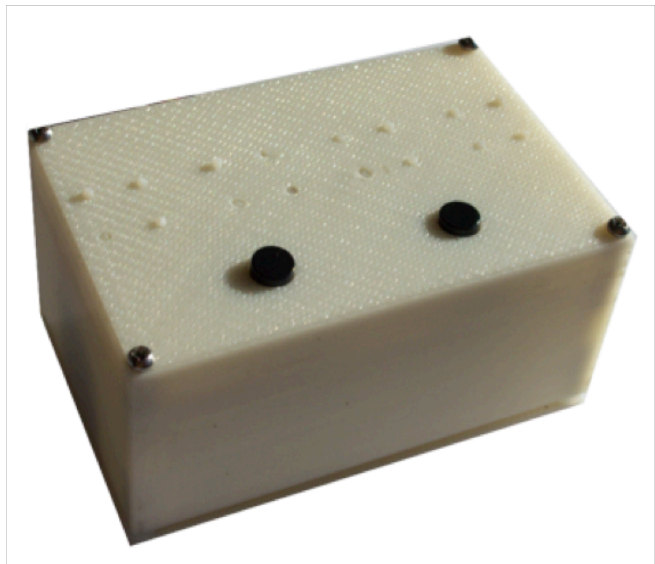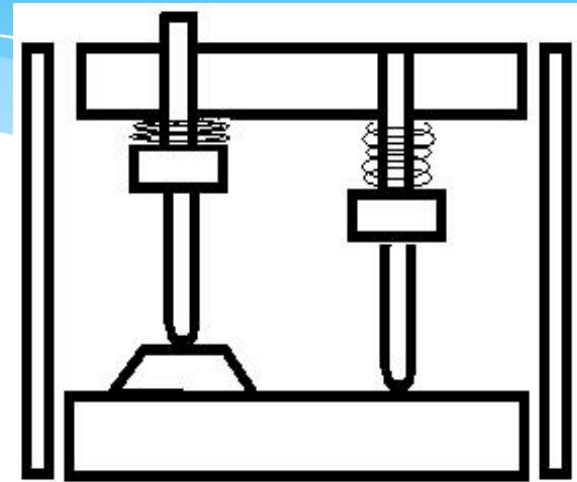
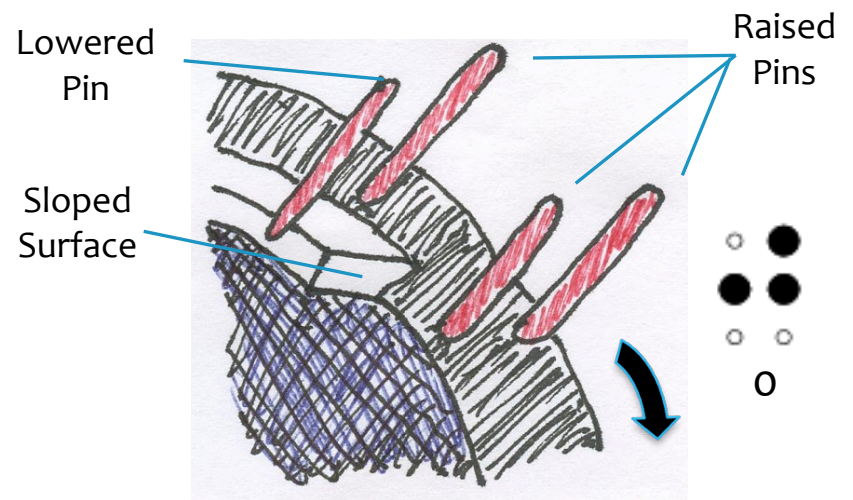# Design Option 2: Odometer Concept

* Create gear system similar to odometer and control pins with elevated and lowered surfaces

http://auto.howstuffworks.com/car-driving-safety/ safety-regulatory-devices/odometer1.htm

* Pros
  * Low power consumption
  * Can achieve standard spacing
* Cons
  * Bulky
  * Lose multifunctionality
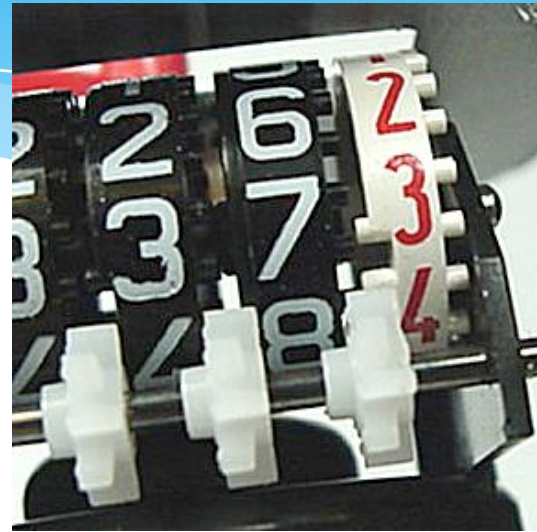
Design Option 3: Gear and Pins
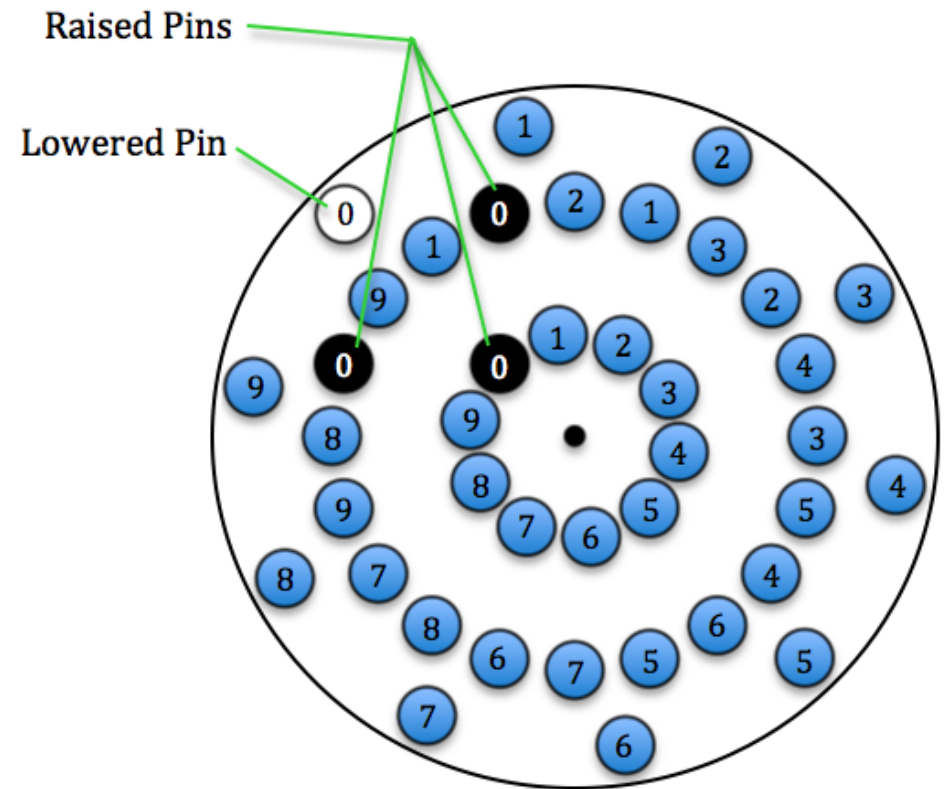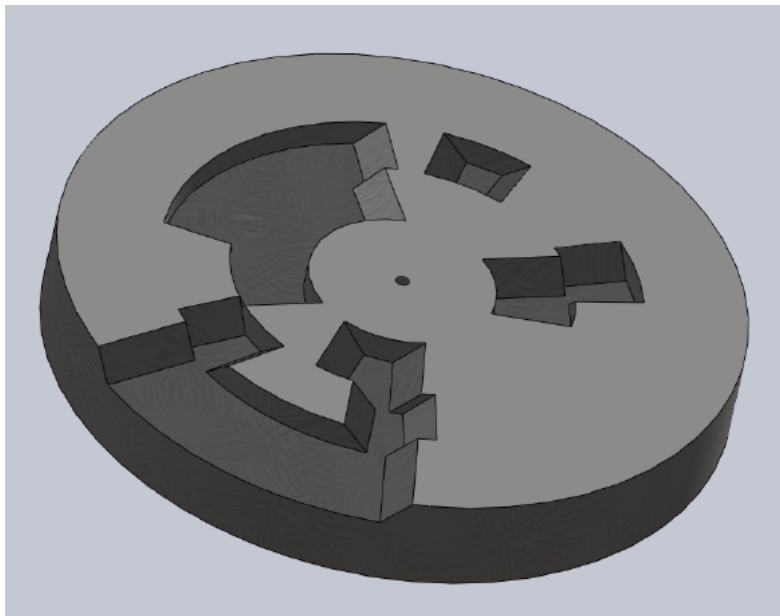
* Pins rest atop a disk with raised and lowered surfaces, which is rotated using a gear mechanism
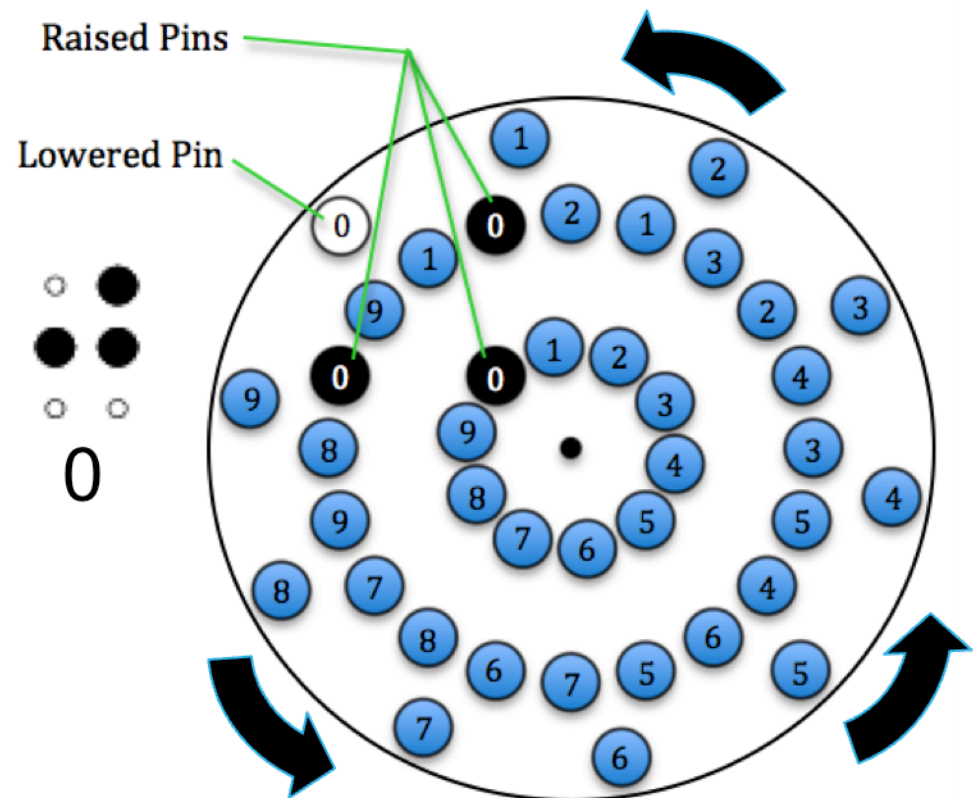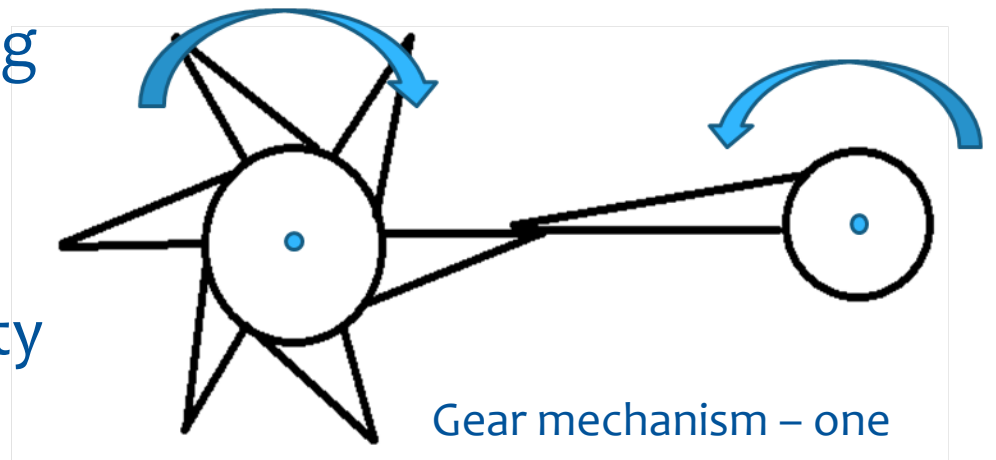
Design Option 3: Gear and Pins

Design Option 3: Gear and Pins

* Pros
  * Low power consumption
  * Standard Braille spacing
  * Small size
* Cons
  * Diminished functionality
 * Less room for error

Gear mechanism – one rotation of one tooth gear corresponds to 60° rotation of multi-tooth gear

Design Matrix

Weight	Design Aspects	Disk and Pins	Odometer Concept	Gear and Pins
0.25	Ergonomics	70	80	**90**
0.15	Aesthetics	60	70	**90**
0.15	Accuracy	90	90	**100**
0.15	Design Simplicity	80	90	**70**
0.1	Scalability	60	80	**80**
0.1	Durability	60	70	**80**
0.05	Safety	80	80	**80**
0.05	Prototype Cost	70	80	**90**
	Total	71.5	80.5	**86**

Future Work

* Finalize design
* Order materials
* Assemble prototype
* Testing and adaptation
* Conduct surveys
* Finish prototype

http://www.klockit.com/depts/
ClockMovementsfeaturingQuartexBrand/
dept-355.html
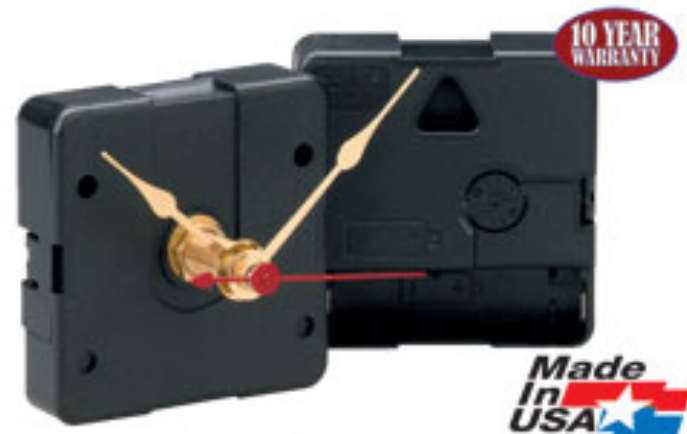
Acknowledgments

* Holly and Colton Albrecht
* John Puccinelli
* Spring 2010 Braille Watch Design Team
* Biomedical Engineering Department

References

* http://www.pharmabraille.co.uk/braille-alphabet.html
* http://watchluxus.com/braille-watches-by-auguste-reymond
* http://www.tuvie.com/haptica-braille-watch-concept/
* http://www.robot-hk.com/products_m18.asp?lang=en
* http://www.robotshop.ca/arduino-mini-microcontroller.html