GUI for Waveform Generation and Bluetooth Integration for Wrist Pulse Simulator

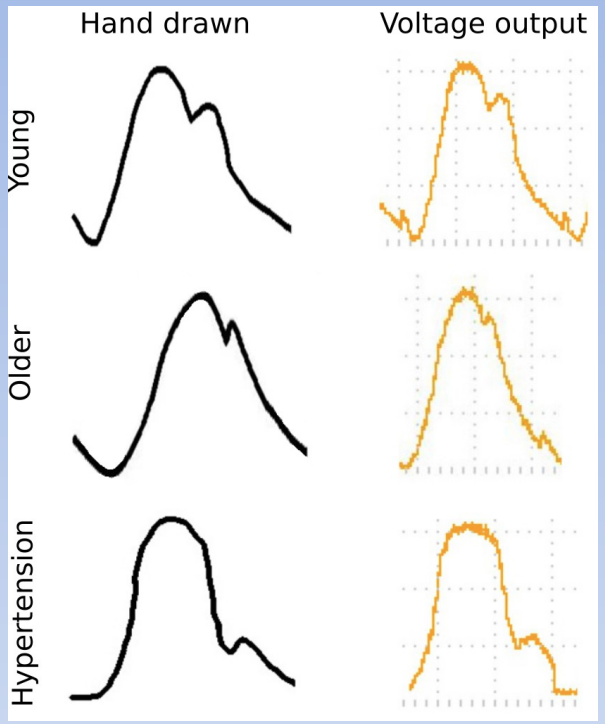


Fig. 1. Hand-drawn wrist pulse waveforms (left) and the corresponding simulator waveforms outputted by the digital-to-analog converters (right).

TCM Pulse Diagnosis:

- Used to diagnose patient illnesses and conditions
- Three-finger palpation of radial artery at three pressure levels
- GUI traces and scales user defined pulse waveforms for the wrist pulse simulator

Thinning algorithm:

- 4-neighbor connectivity filter
- Median filter
- *GUI allows user to draw image on Android device and send send to PIC via Bluetooth wireless link.*

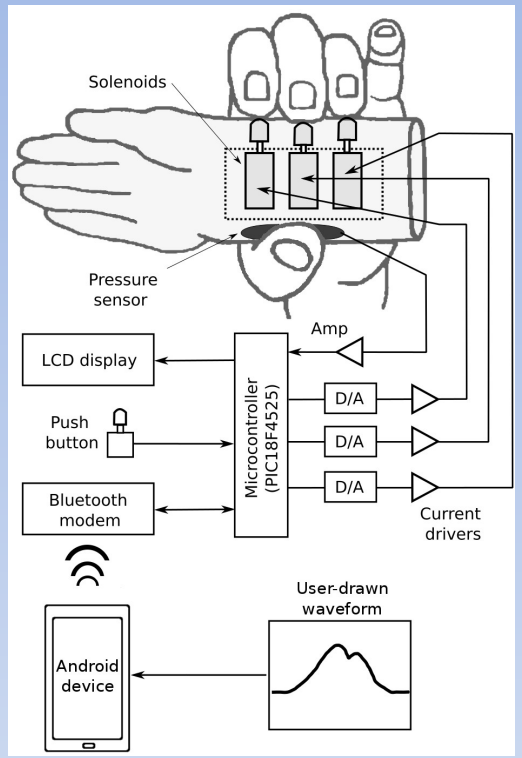


Fig. 2. Schematic diagram of the pulse simulator that uses 3 solenoids to produce the wrist pulse pressure waveforms.

Results:

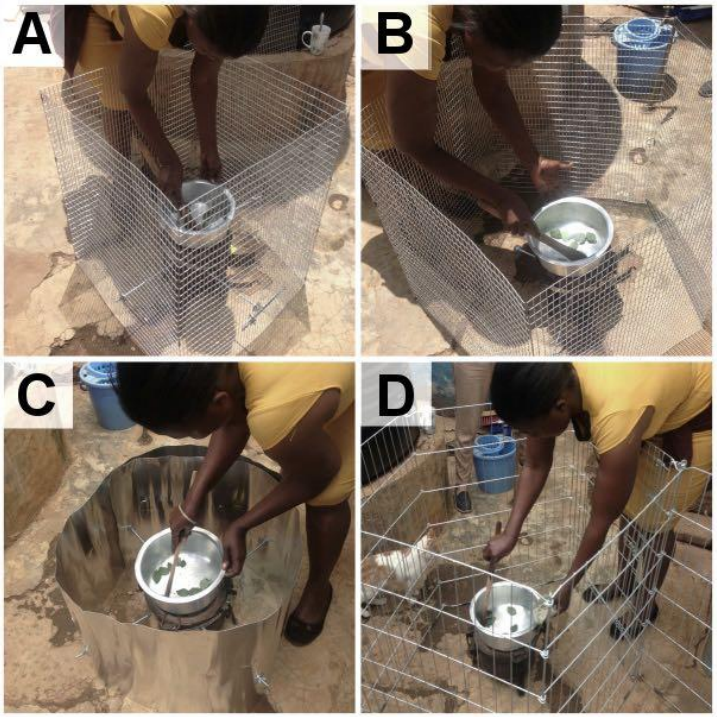
Completion of pulse simulator and development of GUI on Android device; waveforms successfully transferred via Bluetooth and outputted to solenoids.

Pulse Simulator fulfills needs of TCM education specialists in providing an innovative method to teach TCM students various pulse patterns not traditionally encountered in a clinical setting.

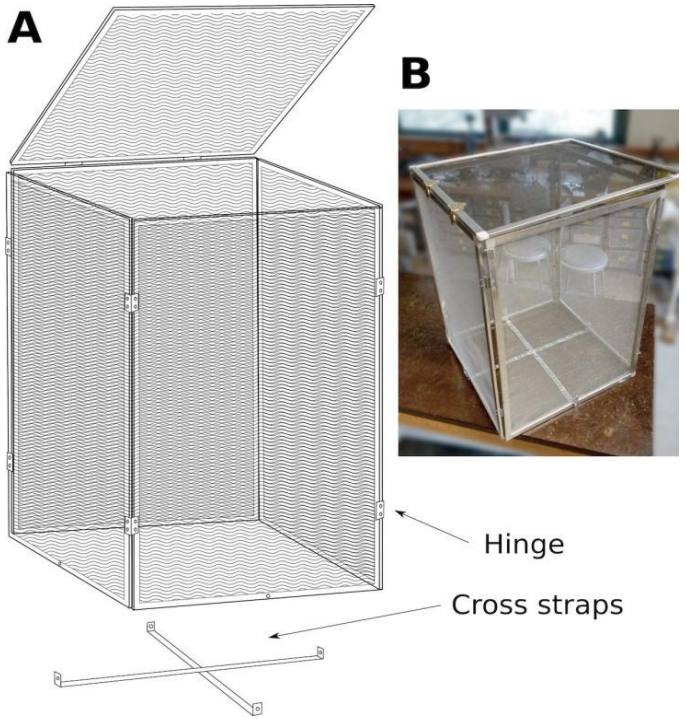
Stove Barrier for Burn Prevention in Kenya

By Robert Valenti, Tracy Waweru, Sakoun Phommavongsa

Mission: To create an effective stove barrier model that aids in the prevention of children in the slums of Kenya from getting burnt

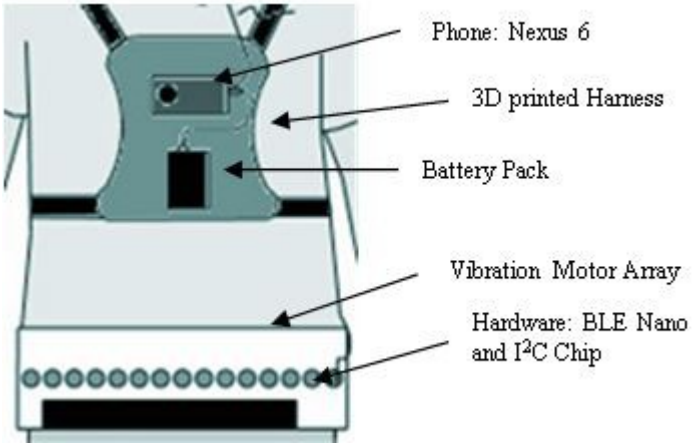


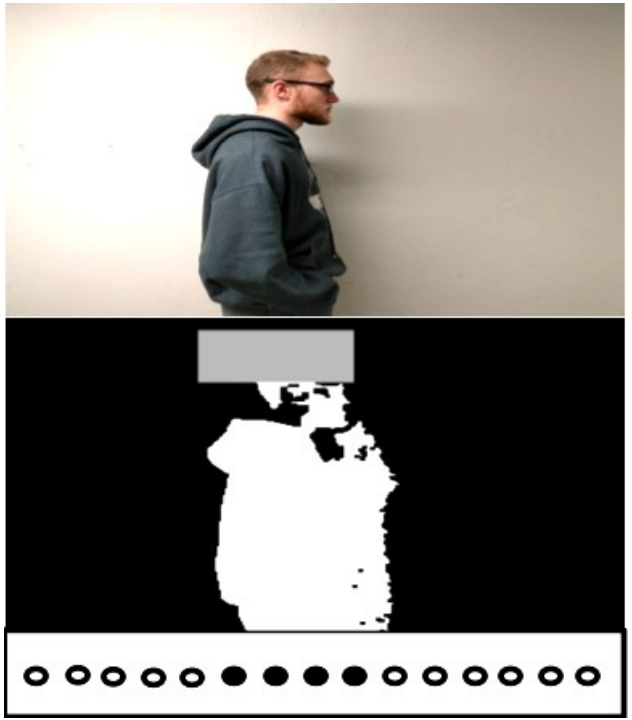
Initial prototypes of the stove barrier for burn prevention using foldable hardware cloth panels of a 4-panel design (A) and a 5-panel design (B), a circular aluminum fence with struts connected to the stove (C), and a re-purposed dog cage (D).



(A) The design that meets almost all the required consists of 4 side panels with aluminum mesh, a top panel, and cross straps at the bottom. (B) A picture of the prototype.

VisualSub

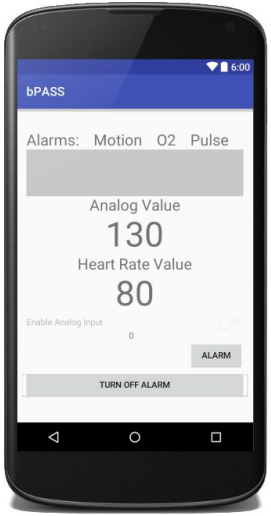

Phone: Nexus 6
3D printed Harness
Battery Pack
Vibration Motor Array
Hardware: BLE Nano and I²C Chip



bPASS

Alarm Detection

- 30 seconds of no movement
- Cardiac or Respiratory compromise

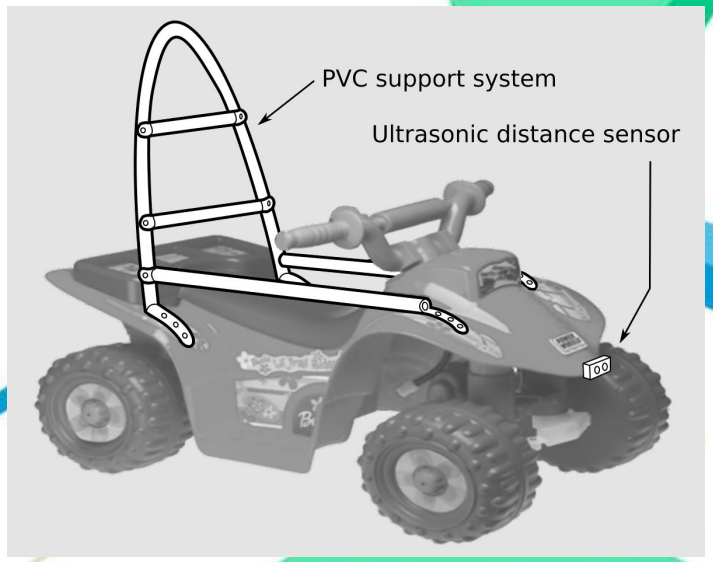


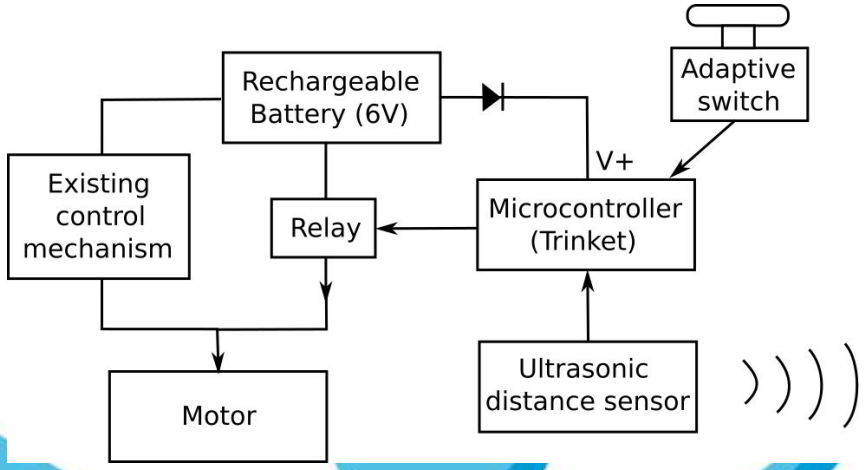
Firefighter Down

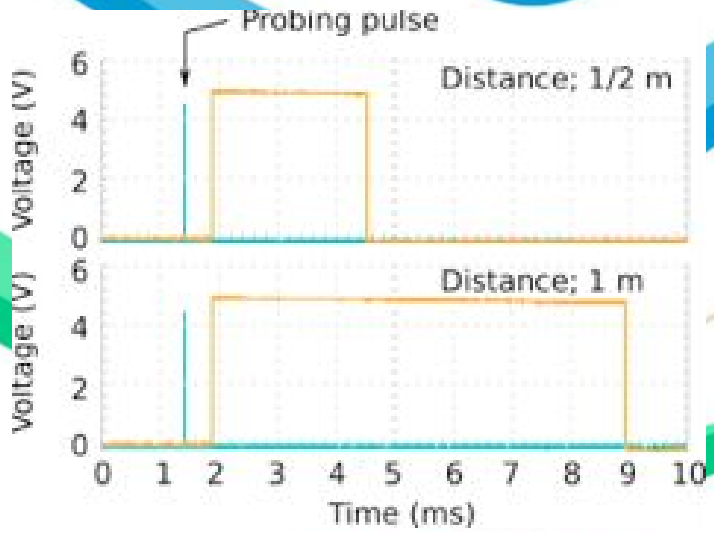
Response

Alarm Triggered

- Audible Alarm
- Transmit Alarm and Vital Signs







Katie Brown
Zach Campo
Cara Nunez

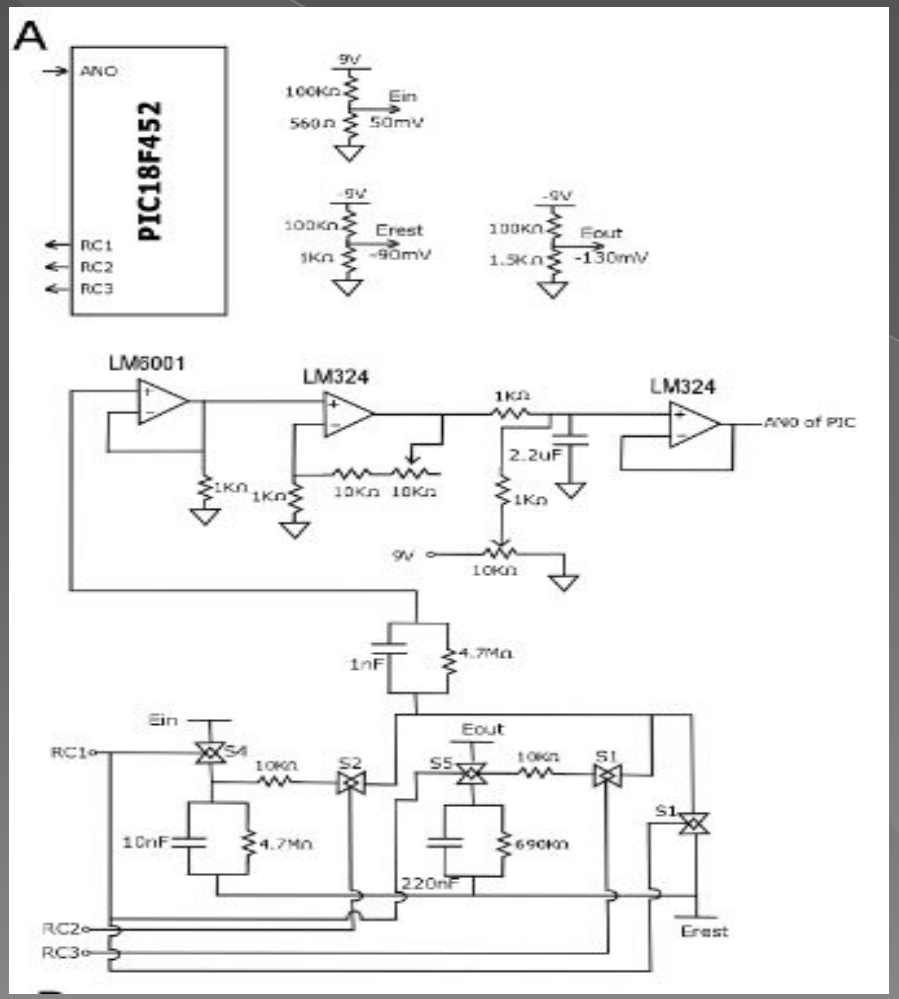
Cars are adapted via PVC/harness supports and collision avoidance system for children with mobility impairments in order to have fun in their ride-on car while still being safe.

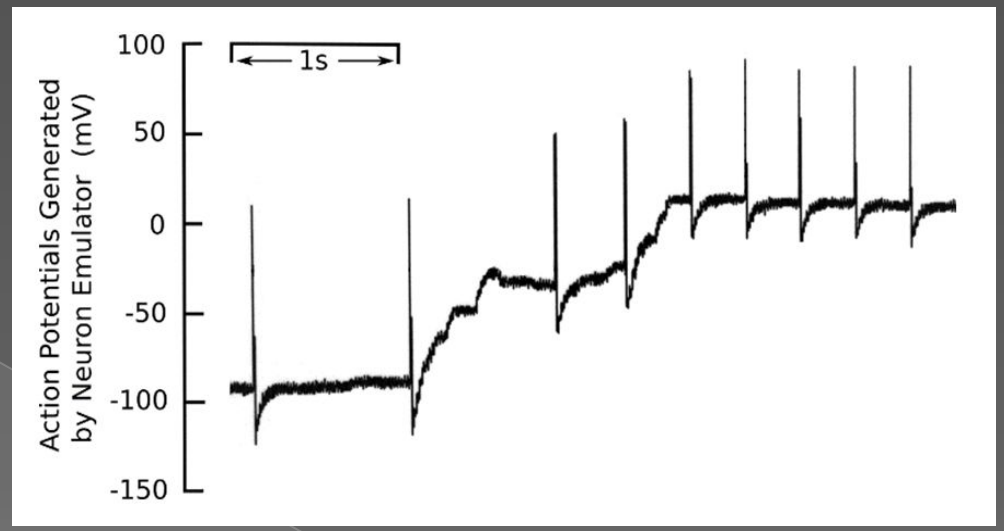
LIL' RHODY RIDERS

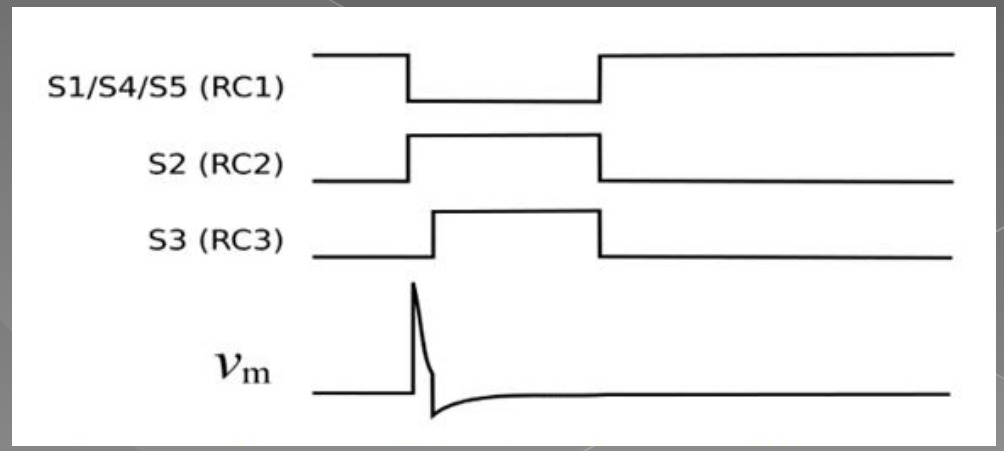
An Electronic Neuron Emulator With Inward and Outward Currents

Kimberly Hoffman, Vi Tran & Jessica Blandin

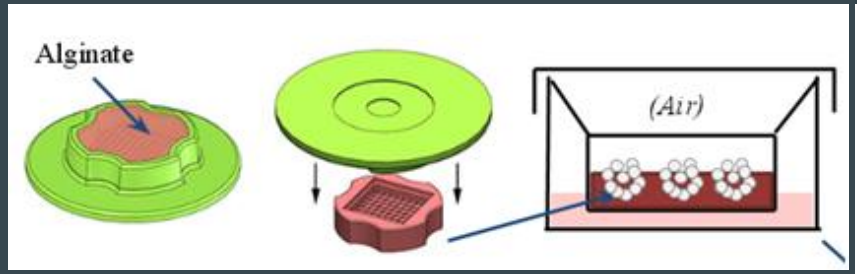
- Designed a neuron emulator that has rate responsive action potentials with both inward and outward currents

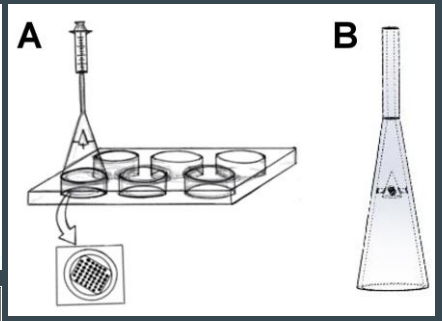


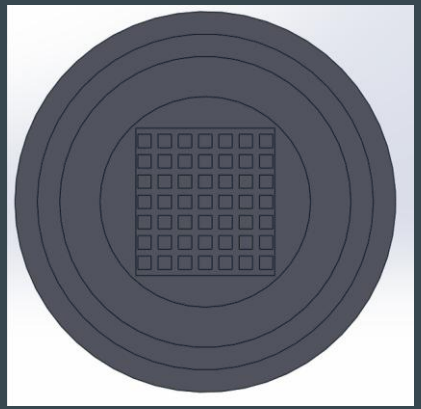


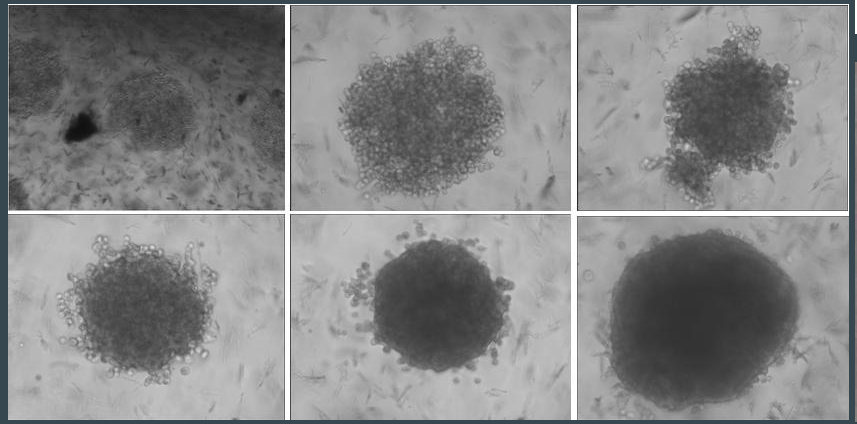


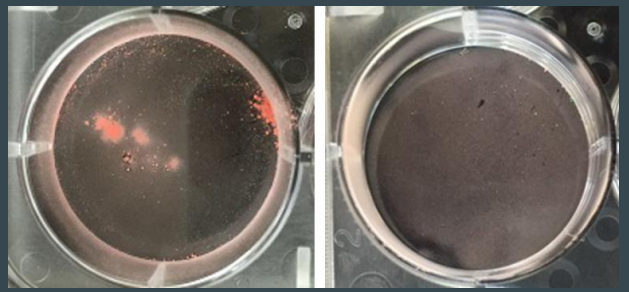
Design of a 3D Aerophilic Tissue Culture System with an Aerosolized Powder Insufflator











Analicia Behnke, Katherine Noonan, Nastasja Rittling

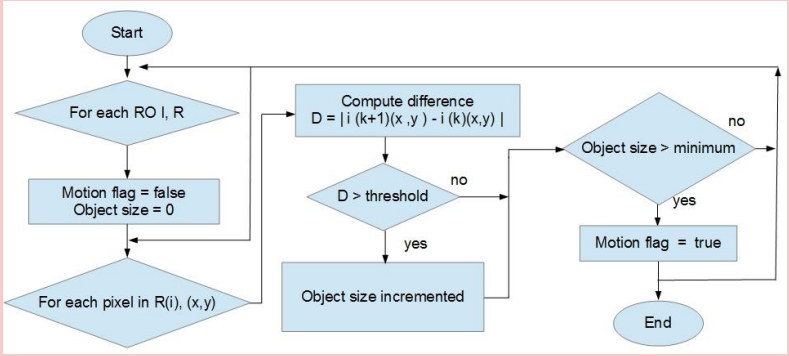
Activity Analysis System for Elders Based on Standalone Embedded Image Platform

Jesse McVaney, Victoria Danielson, Shane Ramos, Dr. Jiang Wu, Dr. Ying Sun
Department of Computer, Electrical and Biomedical Engineering
The University of Rhode Island, Kingston, Rhode Island

Abstract

Activity analysis through video capture and analysis. Motion detection in a specified region of interest can identify certain activities such as sleep length and quality, medication/food intake times, inactivity analysis and more. All processing is done locally on an embedded system without third party observation or input.

Methods

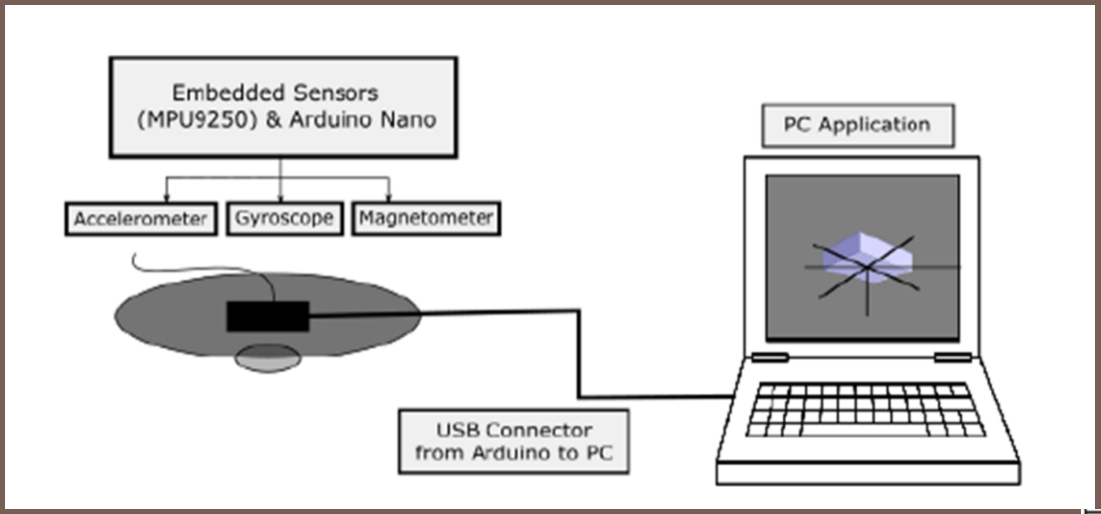


Results

Discussion

Currently, we are writing a ROI class to allow for multiple ROI objects with special behaviors. The class will simplify the addition of multiple ROIs in one frame and also let the user specify what type of action should be taken when the ROI flag is thrown. These behaviors might include data log to SD, alert sending, and inactivity monitor. Further development of frame rate improvements and fall detection will be explored in the future.

IWOBBLE: BALANCE BOARD WITH EMBEDDED SENSORS FOR THE REHABILITATION OF ANKLE INJURIES



Direction (deg)	Negative rotation		Positive rotation	
	μ	σ	μ	σ
45 (X-axis)	45.102	0.516	46.732	0.223
45 (Y-axis)	43.899	0.542	43.989	2.012
45 (Z-axis)	39.727	1.372	39.008	2.739
14 (X-axis)	13.354	0.202	13.141	0.307
14 (Y-axis)	13.693	0.216	12.525	0.217
14 (Z-axis)	11.055	0.801	10.646	0.495

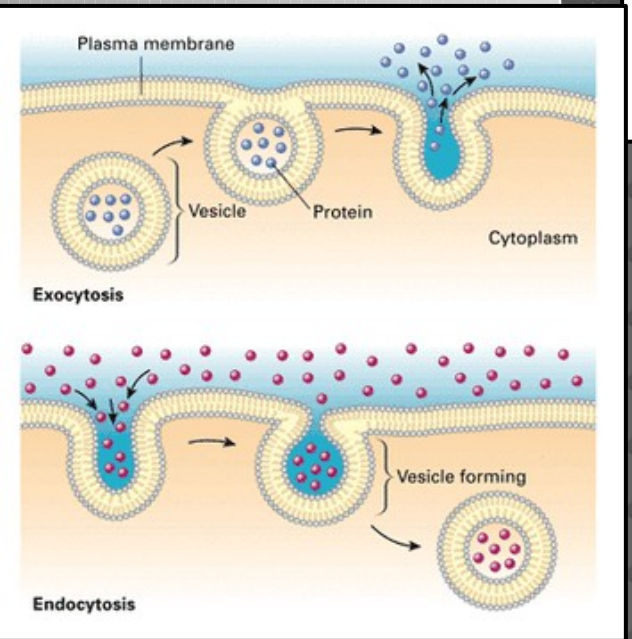
Brett Kotowski, Matthew Barbin, Corey Gomes and co-supervised by Craig Simpson

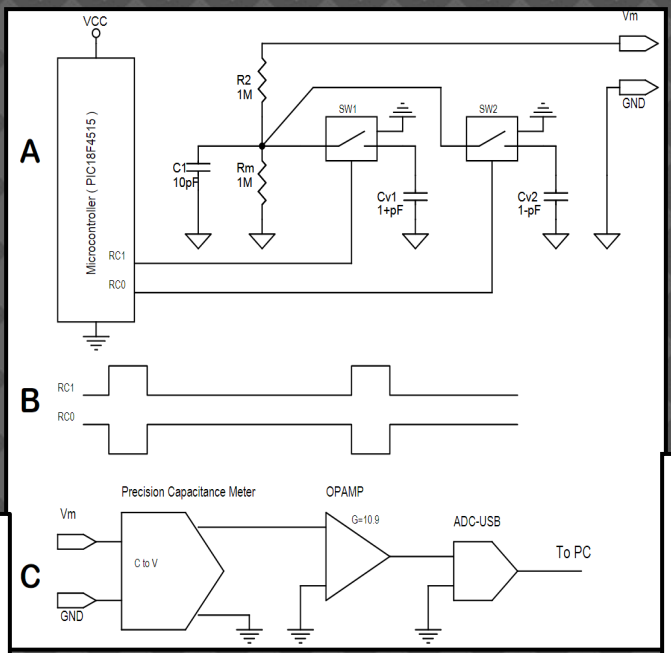
Keywords—*capacitance measurement; electronic model; vesicle capacitance; cell membrane capacitance*

An Electronic Model for Vesicle Induced Cell Membrane Capacitance Changes

Lisa Rosenberg and Morgan Hammick

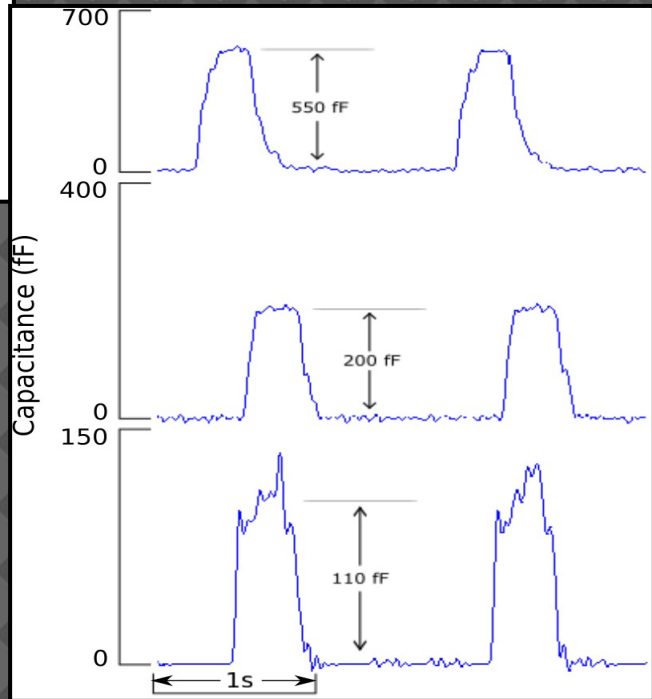
This project aimed to develop an electronic model for simulating the dynamic changes of cell membrane capacitance due to vesicle transportations





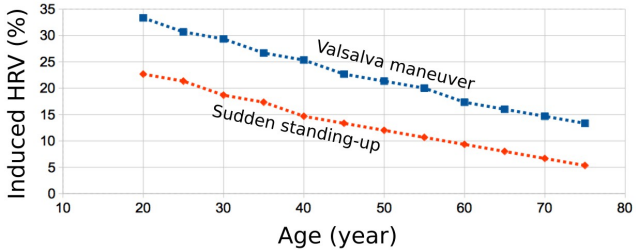
Vesicle capacitances were simulated by switching between two carefully calibrated branches of series-connected capacitors

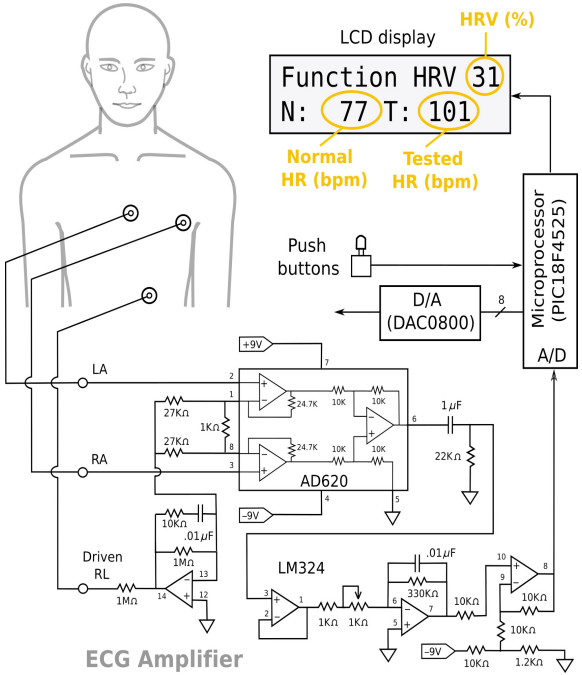
This real-time testing platform should be useful for developing more advanced algorithms and instrumentations capable of monitoring the vesicle activities during exocytosis and endocytosis



HRAge - Age Prediction from HRV

- The Concept: Build a device which can quickly and accurately predict the age of an individual based on heart rate variability (HRV).
- The Project: Build an ECG device to display heart rate and variation, program a PIC with ECG code, and conduct a human study.
  - Human study: An IRB approved a series of tests on a group of volunteers. The tests involved measuring the heart rate of an individual 3 times: at rest, after standing quickly from a seated position, and after forced exhalation (Valsalva maneuver).





- Data Outcome: Based on a previous study, two correlation curves between age and HRV were plotted; given any value of HRV from a user, their age can be predicted.
- Our Data: Although more tests need to be conducted, the preliminary results show a higher trend in HR age, which may be due to our current prediction equations, and the data from the previous study. As our data grows, a more accurate prediction equation should be developed.

TABLE 1. Preliminary results for HRAge Estimation.

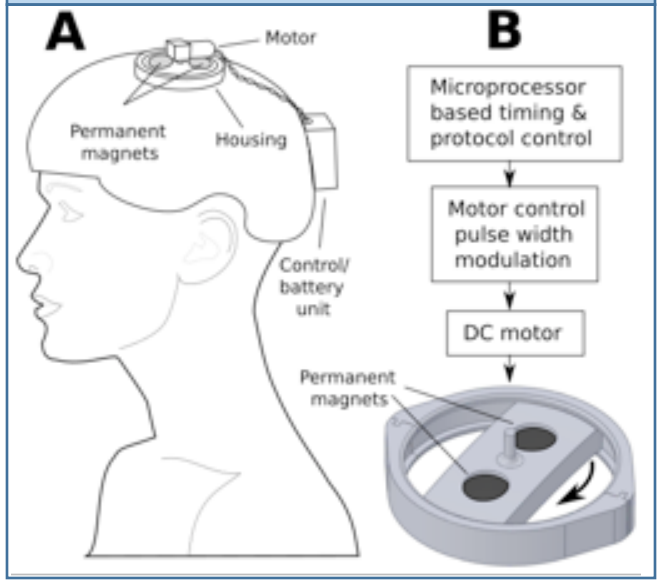
Subject Number	Sex	Age Range	HRV (Valsalva)	HRV (standing)	HRAge (Valsalva)	HRAge (standing)
1	F	22	22%	18%	49	32
2	F	22	20%	8%	55	63
3	M	60	18%	11%	60	54
4	F	58	20%	12%	55	51
5	M	63	15%	18%	69	32

MagnetPeutics

Jessica Havas, Mosa Alzowelei, Michael Congdon

Objective:

The development of a wearable transcranial magnetic therapeutic device that employs a mechanism of rotating permanent magnets intended for the enhancement of brain injury rehabilitation.



Methods:

Mounting Mechanism for Disc Permanent Magnets-

- Designed with SolidWorks and 3D-printed
- Permanent magnet was a N52 neodymium disc of 1” in diameter and 1/4” in thickness.
- The holder was continuously rotated by use of a 12V DC motor with a rated torque of 4 Kg•cm, a gear-down ratio of 330:1, and a maximum no-load speed of 24 rpm.

Control Unit-

- Developed around PIC18F4525 microprocessor by using an ICD3
- Powered by a 9V battery

Results:

- Developed a proof-of-concept prototype.
- For future work, the prototype will be further improved to be used in clinical studies on the effectiveness of the transcranial magnet therapy for long-term rehabilitation of brain injuries.