Viano

Chitula Chipimo
CSE

Christopher Cunniff
CSE

Kelly Kennedy
EE

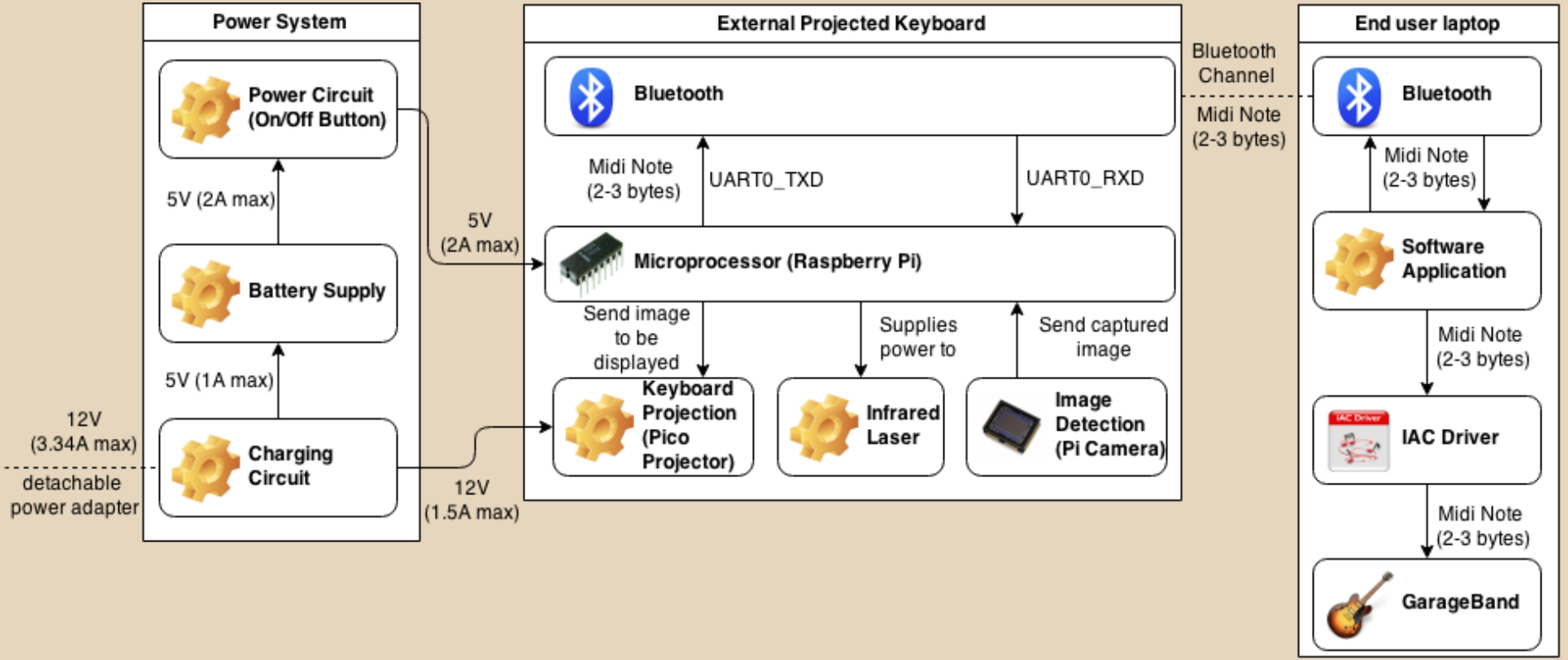
Anna Wildman
EE

Advisor: Professor Anderson

Agenda

- Review of Project
- FPR Deliverables
- Demo

Block Diagram



Pico-Projected Midi Controller

Specification	Goal	Actual
Lightweight	<5 lbs	3.2lbs
Portable	Pocket-size	Small bag-size
Dimensionally Correct Keys	White: 23.5mm Black: 13.7mm	22.2mm 12.7mm
Number of Octaves	2	2: always displayed 8: using buttons
Integration with GarageBand	Seamless	Seamless

Promised FPR Deliverables

Kelly
Have housing printed and implemented for Viano.

Correct dimensions of piano keyboard.

Anna
Design and order a battery charging PCB.

Design a safe shutdown mechanism for Raspberry Pi 2

Chi

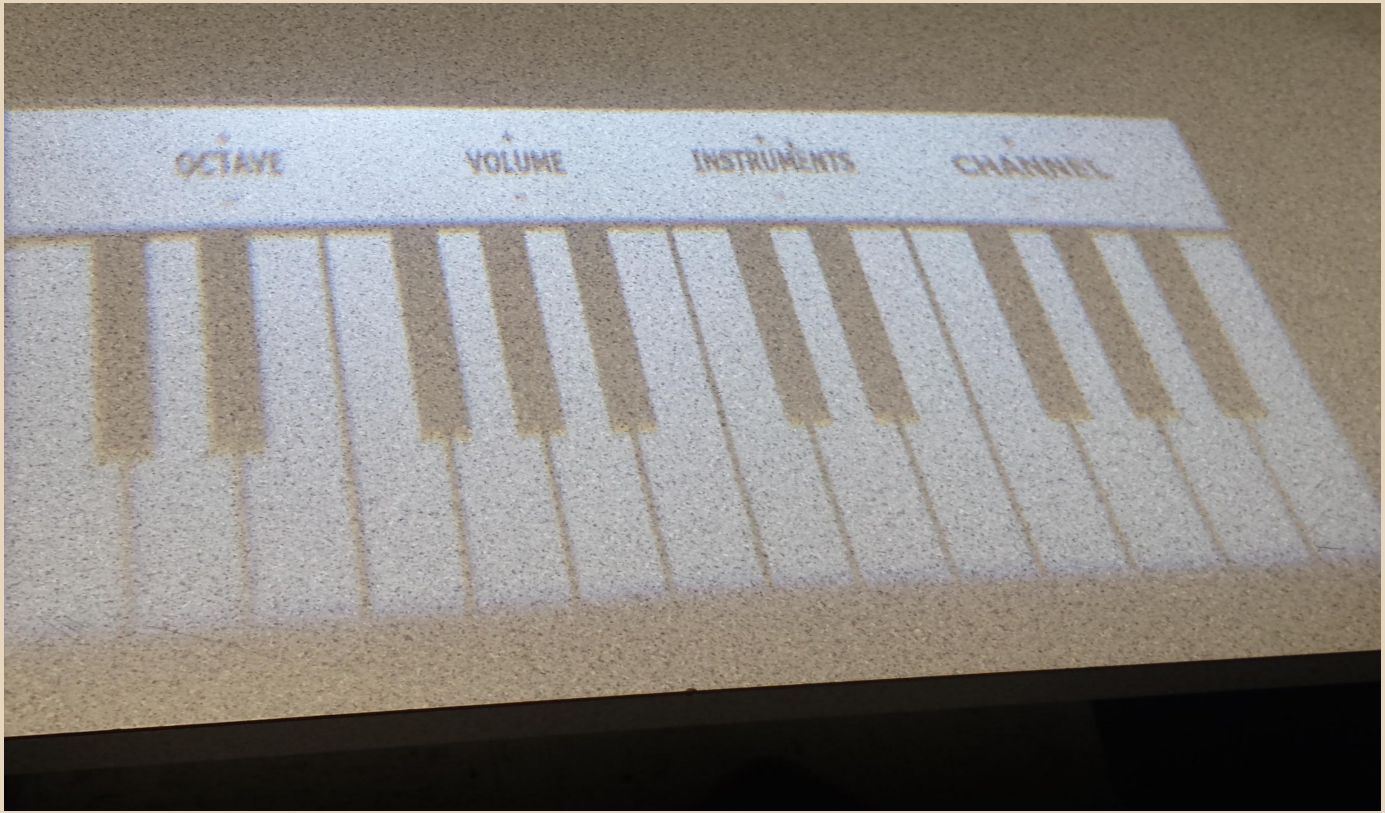
Add control keys to keyboard for changing instrument.

Chris
Integrate pthreads into code base to utilize quad core on Raspberry Pi 2.
Maintain frame rate when increase image resolution.

Housing

- Using SolidWorks implemented housing for Viano
- 5 interconnecting pieces allows for flexibility
- Correct angle to project piano keyboard accurately
- Inside the housing: Power button, RaspberryPi, PiCamera, Picoprojector, circuits, ir laser, and battery pack

Projection of Piano

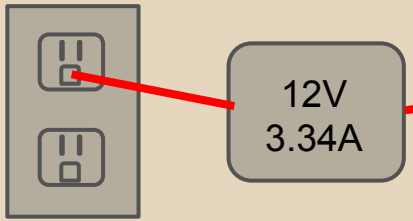


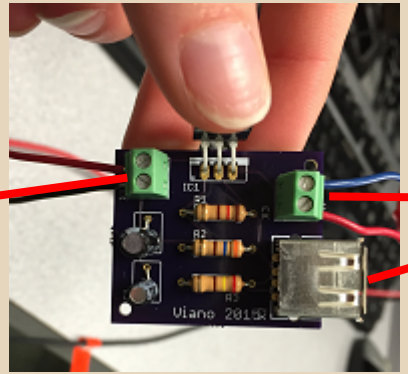
- Designed and implemented 2-octave piano keyboard that syncs with the software
- Perspective Re-imaging via Photoshop
- Projecting dimensionally correct 2-octave keyboard with new Head Panel

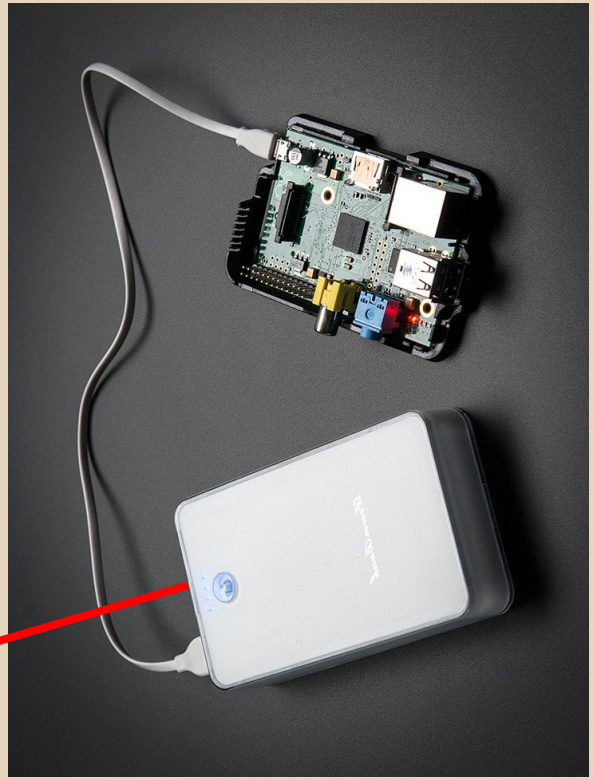
Charging PCB

- Able to design PCB using Cadsoft Eagle Software
- Ordered through OshPark
- Due to errors on board and 14 day turnaround, forced to implement protoboard

Charging PCB







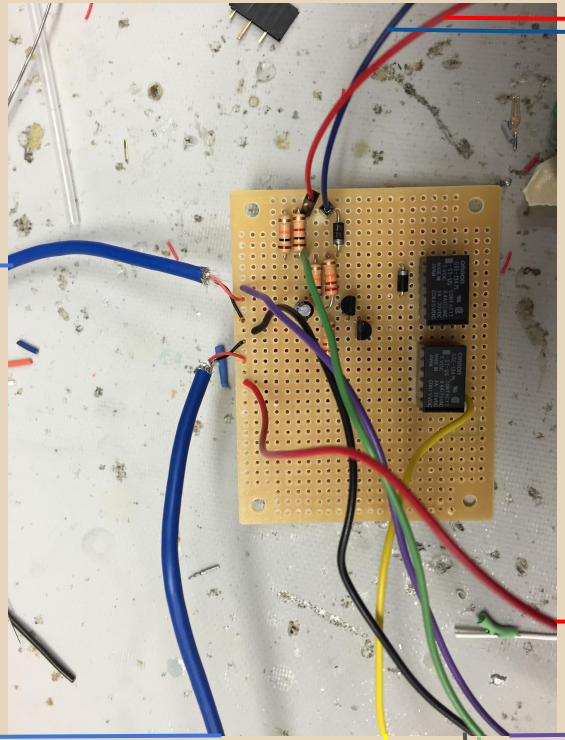
Raspberry Pi Safe Shutdown

- OS:
  - Can get corrupted if power is cut from R.Pi before executing software shutdown procedure
- On/Off button:
  - Script running on Raspberry Pi listens active low signal from the off button
  - The RPi will execute safe shutdown
  - Power is cut to RPi upon completion

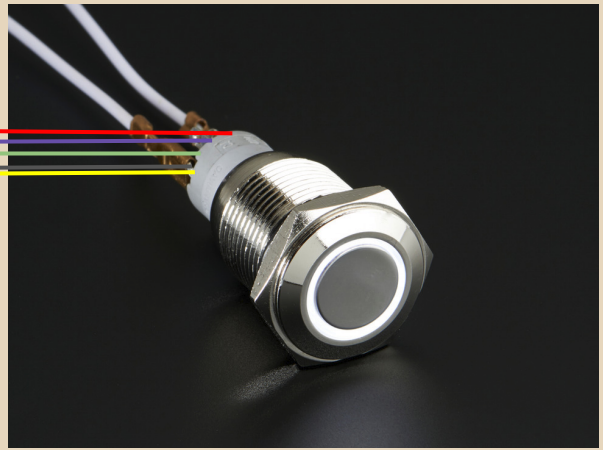
On/Off Button Protoboard

R. Pi Input
5V, ~1.5A

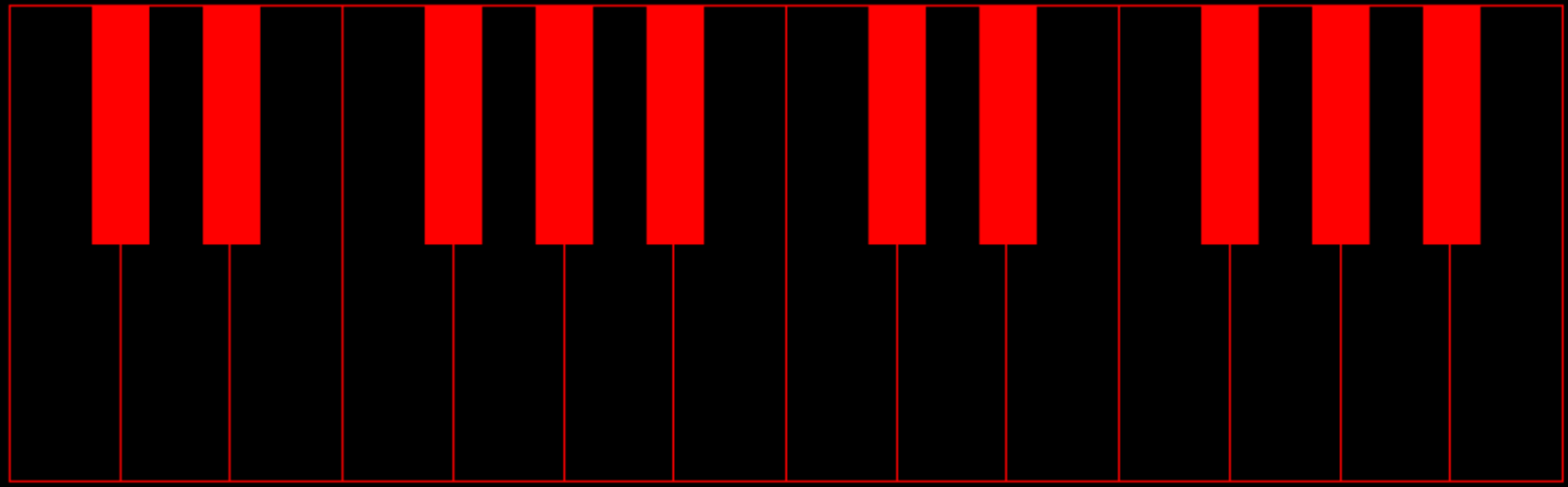
Battery Pack Output
5V, 2A



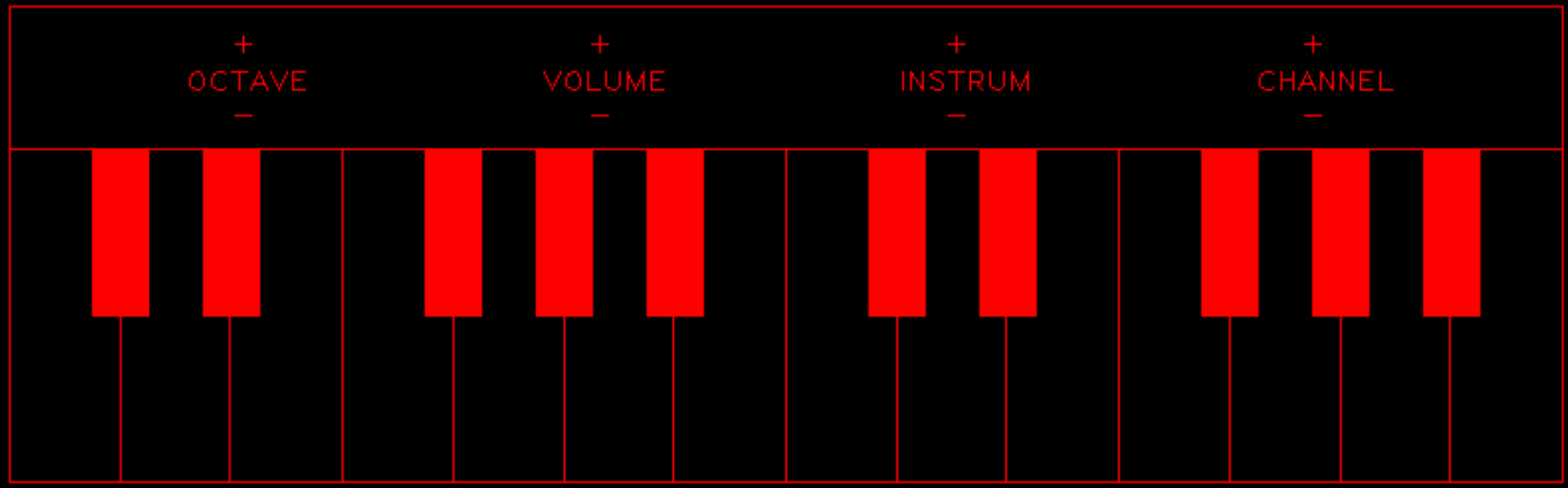
R. Pi GPIO pins
7 & 18



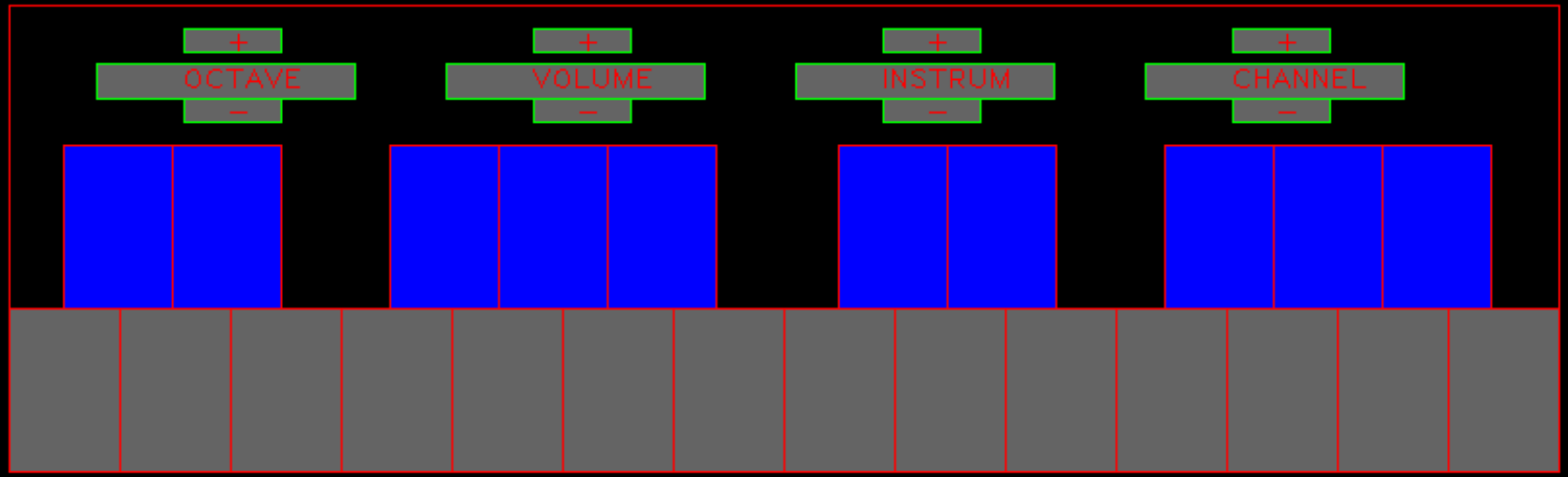
Software Keyboard



Software Keyboard: Control Keys



Software Keyboard: Invisible Keys



Multithreading the Image Processing

- Recompiled image processing libraries
  - add support for Threading Building Blocks (TBB)
  - takes advantage of the multi core CPU on RPi
- Improved the frame rate/resolution of image processing

No Threading Support	Threading Enabled
30fps at 320x240	30fps at 320x240
15fps at 640x480	30fps at 640x480
4fps at 1280x960	15fps at 1280x960

For the Future...

Integrated Themes!

Night mode featured