The T.R.A.V.I.S. Project

(Television Remote and Voice Interpretation System)

Team 9:

Ann Sophie Abrahamsson, Nathan Banner, Lillian Gwendolyn, Katy Johnson, Aidan Martens, Heath Robinson, Kanybek Tashtankulov
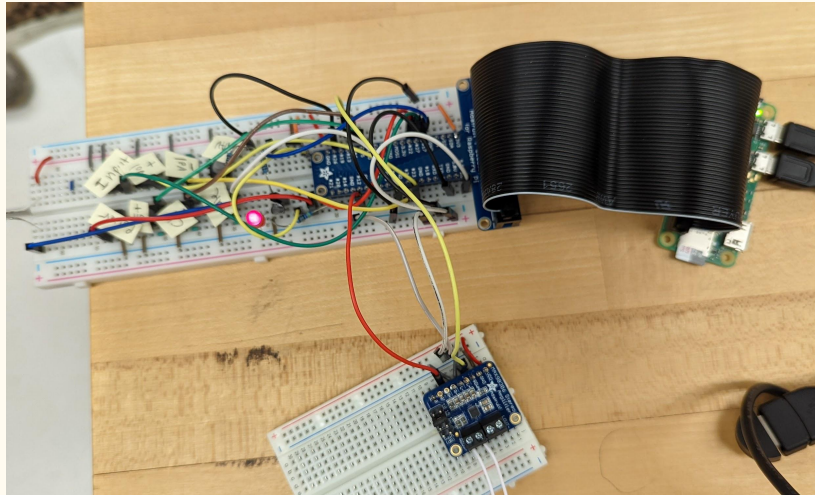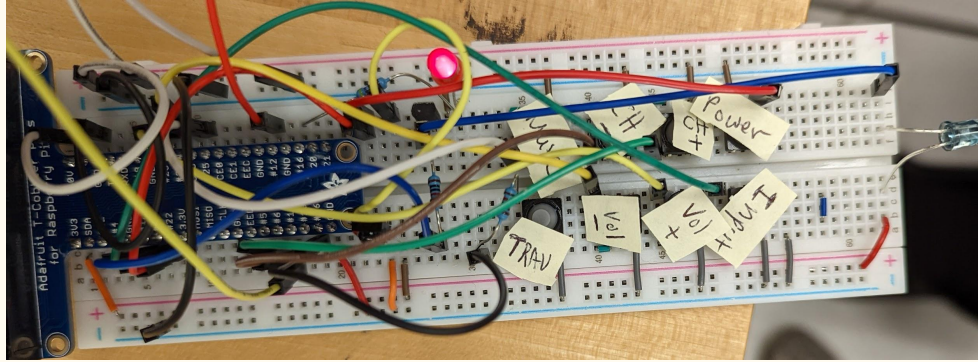
Introduction

Need:

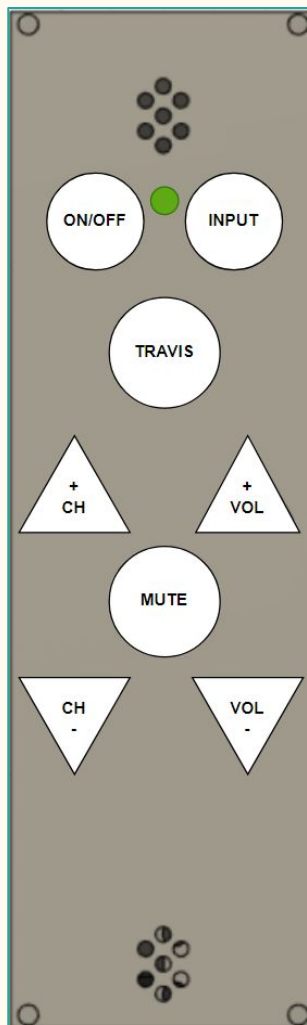Elderly people have a hard time navigating modern entertainment devices.

Goal:

Make it easier for elderly people to navigate modern entertainment devices.

Brief Overview

Demo (black box)

Goals for remote design:
- Intuitive/familiar button layout
- Limited button selection to keep things simple
- Large, easy-to-press buttons

Voice commands:

"TRAVIS, initialize"

"TRAVIS, turn power On/Off"

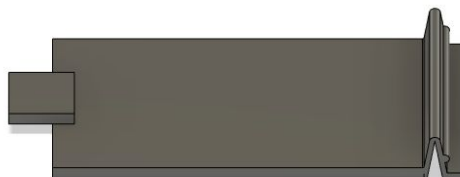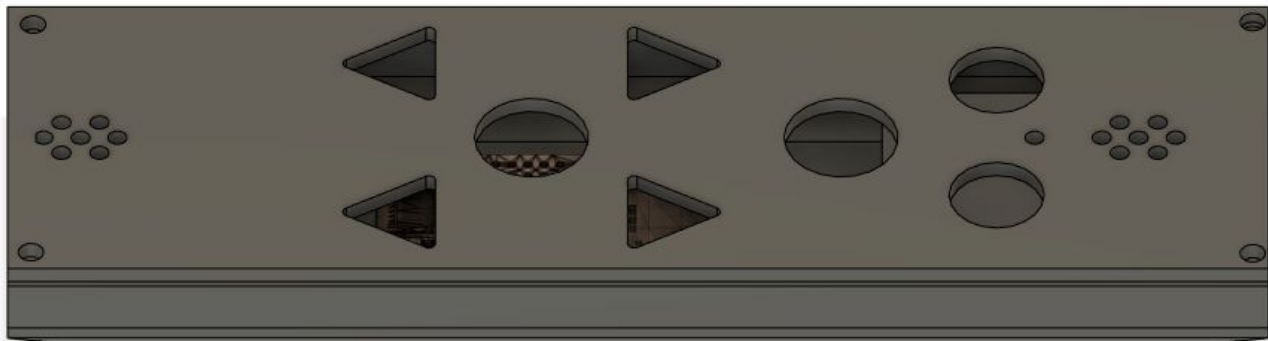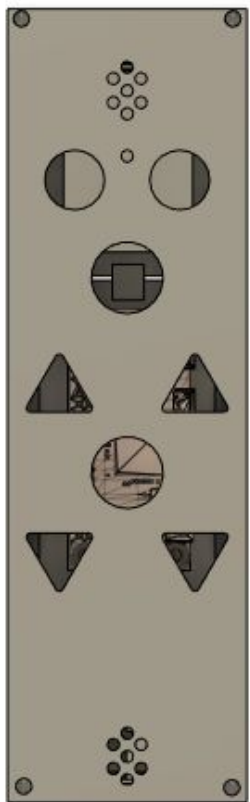"TRAVIS, change input/source…"

"TRAVIS, change channel (to)…"

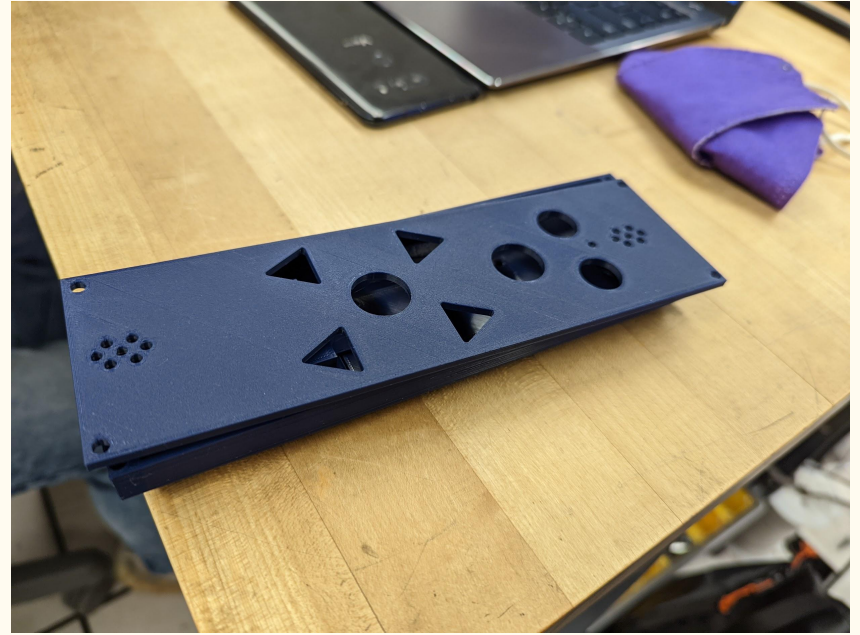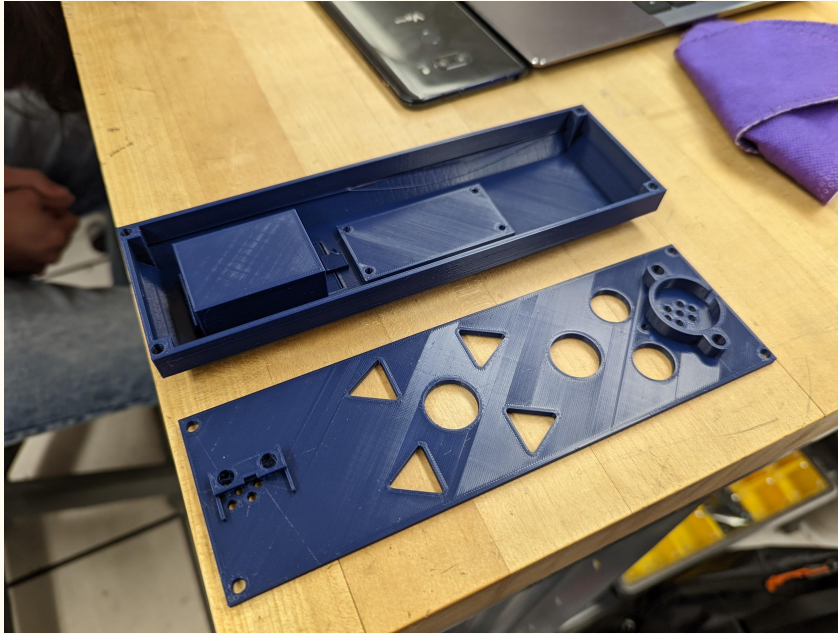"TRAVIS, channel Up/Down"

"TRAVIS, mute"
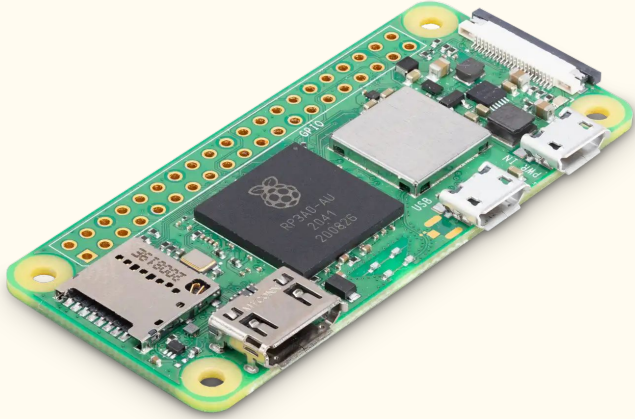
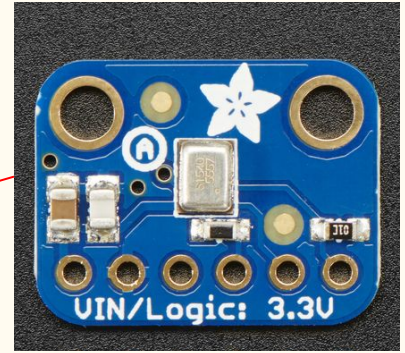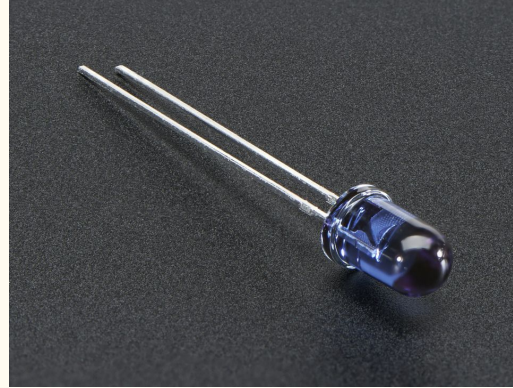"TRAVIS, turn volume Up/Down"

"TRAVIS, assign…"

CAD

Prototype
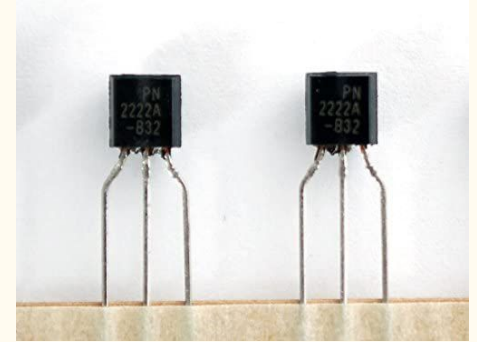
Parts & Hardware P1

Raspberry Pi Zero 2 W
Microcontroller

Yuomi Mini USB Microphone

Adafruit I2S MEMS Microphone
Breakout - SPH0645LM4H

Power Consumption:
Recommended 5V/2.5A
Possible To Lower

Super-bright 5mm IR LED -
940nm IR Transmitter

Adafruit NPN Bipolar Transistors
(PN2222)

Parts & Hardware P2

Soft Tactile Button (8mm)

Powerboost 1000C Power supply

Metal Speaker w/ Wires - 8 ohm $P < 0.5W$

Stereo 3.7W Class D Audio Amplifier - MAX98306

Power Input 9V Battery
Current Cost: ~$35

Buttons to Pi

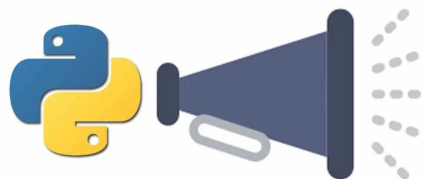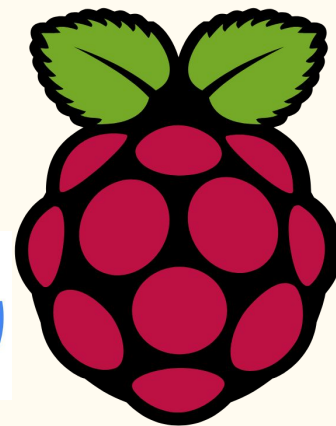| Button	GPIO
Input	GPIO 27
Power On/Off	GPIO 22
Vol+	GPIO 23
Vol-	GPIO 24
Mute	GPIO 25
Channel Up	GPIO 5
Channel Down	GPIO 6
TRAVIS	GPIO 26
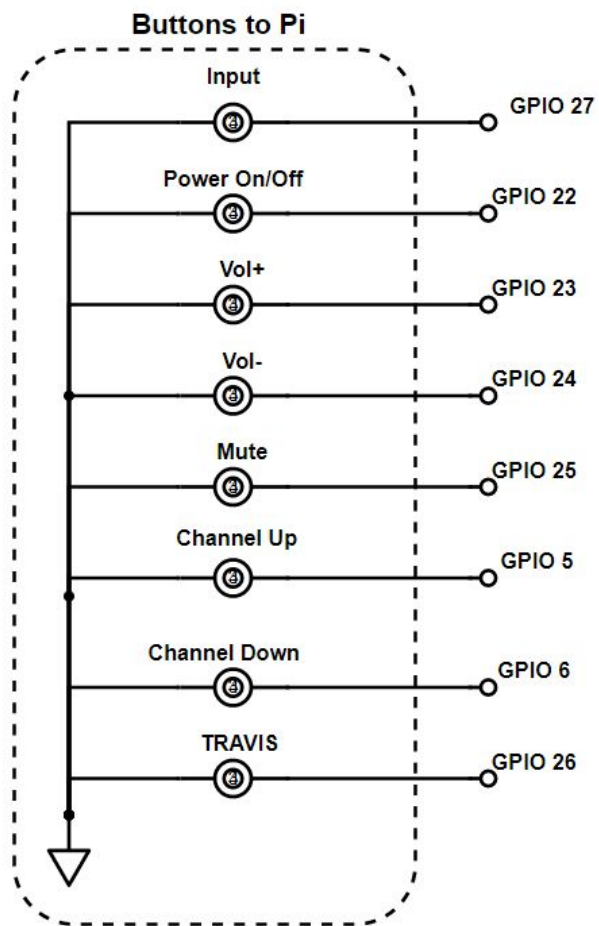
Code overview (white box)

State Machine:
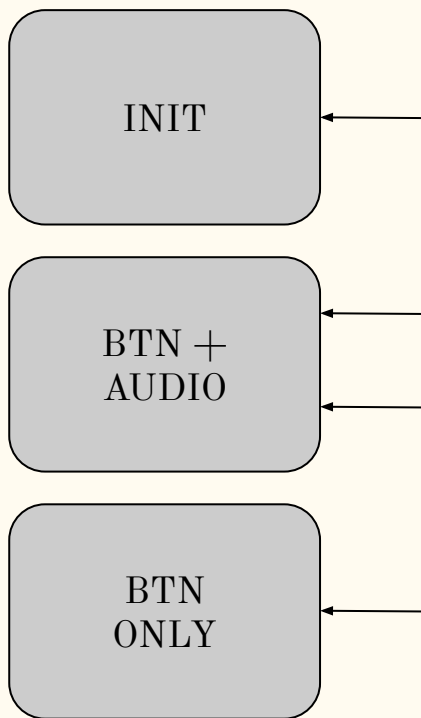
Technologies:

Voice Recognition Alternatives

	Mozilla DeepSpeech	Google	CMUSphinx
Detection Accuracy	++	++	−
Offline Availability	+	−	+
Access To Data	+	−	?
Setup Cost	−−	+	++
Power Consumption	−−	+	−

Outstanding Issues

Raspberry Pi model B+

PiBorg

14 hrs 30 mins on AA batteries

- Battery life is CONCERNING!!

- Sustainability is expensive!
  - Biodegradable 3d printing filament not cheap, maybe better in bulk
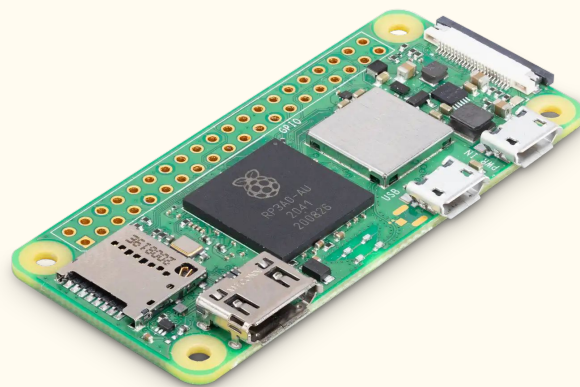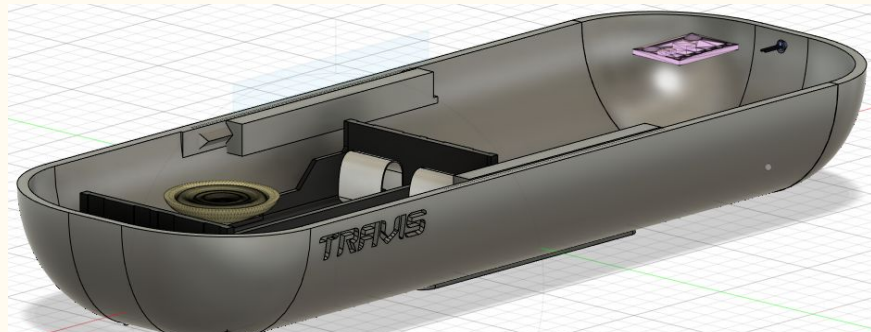 - Rechargeable battery setup would double cost
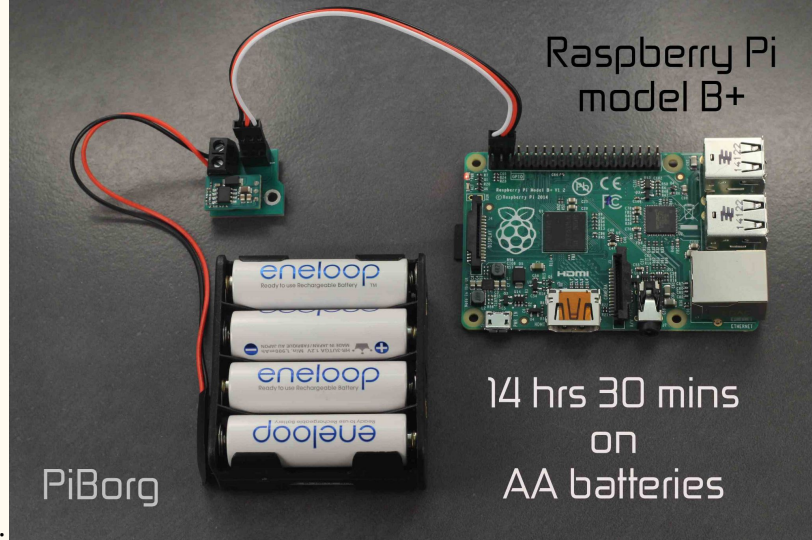
Re: 9v Battery Power

Sun Oct 23, 2011 12:08 am

A quick calculation gives 25 minutes of running time to 6.5V @ 500mA on an Energizer 522, assuming zero internal resistance. Which won't ever happen, so in reality you will get much less. With factory fresh brand name batteries.

Looking Ahead

- Research already done-
  - TV IR communication is easy
  - Voice-activated capability is the big question

- Current status-
  - Programming to begin over spring break
  - CAD already on its way, hard to gauge progress
  - Wiring seems quick w/ RP GPIO

- Ideal demo-
  - Completed shell, wiring, voice interface
  - Buttons, batteries, internals not the main focus

Questions?