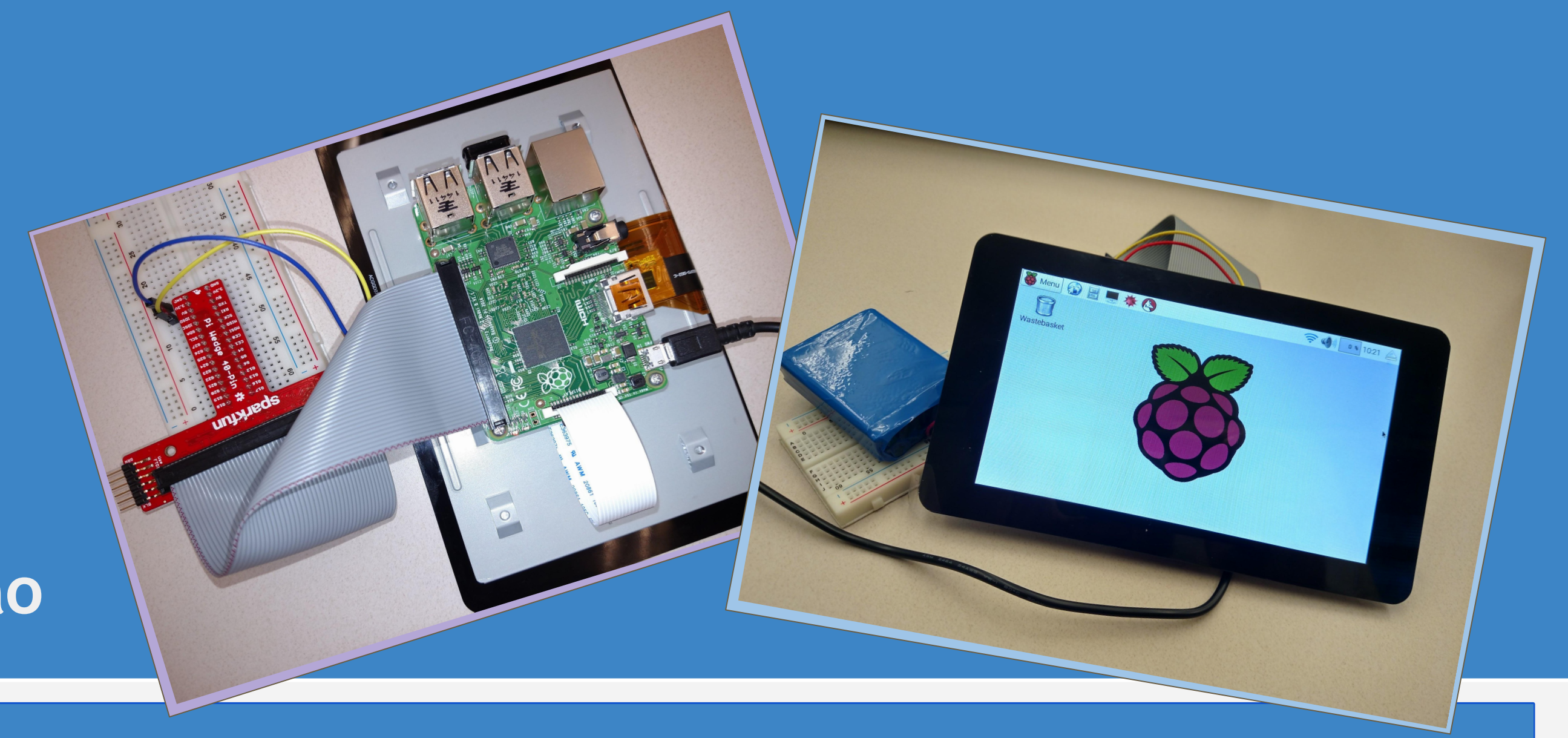# Dec1606 *A Voice For Autism*

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Client: Micron Technology, Inc - Josh Abbott

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Introduction

An augmentative and alternative communication (AAC) device helps its user communicate with the outside world. Typical users of these devices are those with autism. Currently, there is not an AAC device on the market that is both budget-friendly and technologically advanced. Ideally, our device will fill a gap in this marketplace. Users would be provided with a budget-friendly device that also uses a touchscreen and has an interface that will grow with the user as he or she ages. Our solution is build an application and device separately so that users have a choice to run the app on their own Android device, or purchase our custom device.
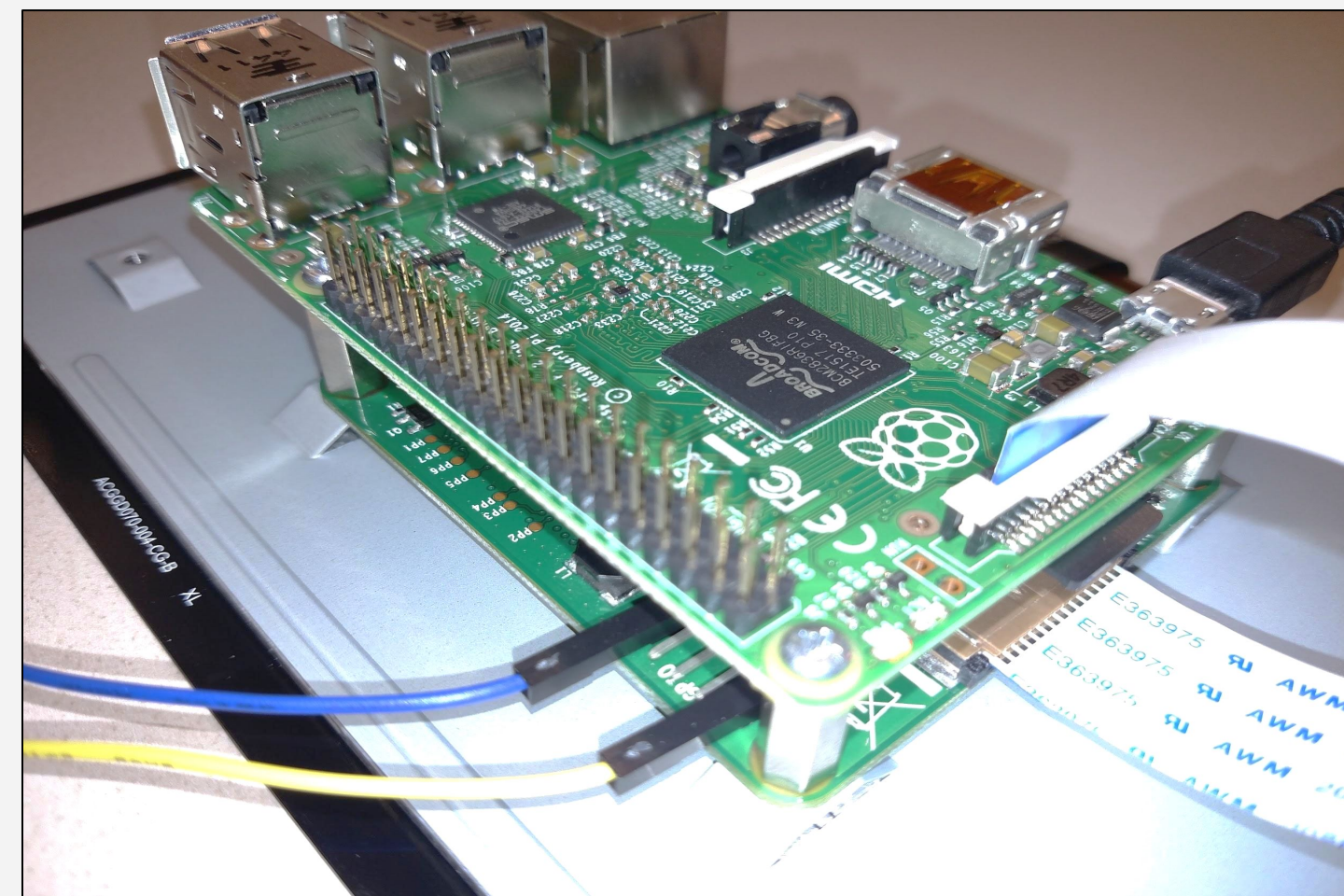
Design Requirements

Functional

Application
- Customizable
- Easy-readable text

Device
- Durable, handle rigors of daily use
- 8+ hr Battery Life
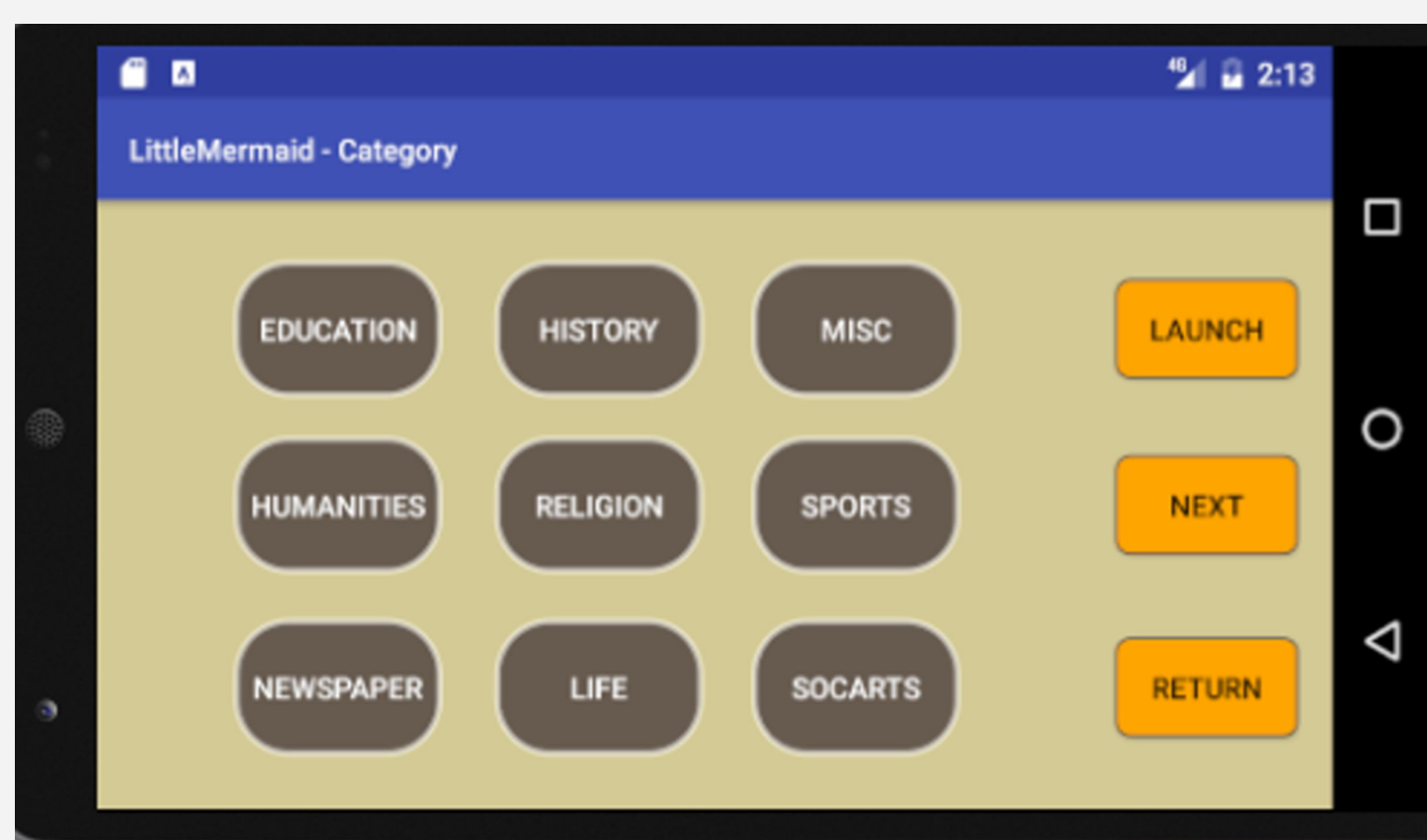- Touchscreen
- Audio in/out

Non-Functional

Application
- Fast in performance
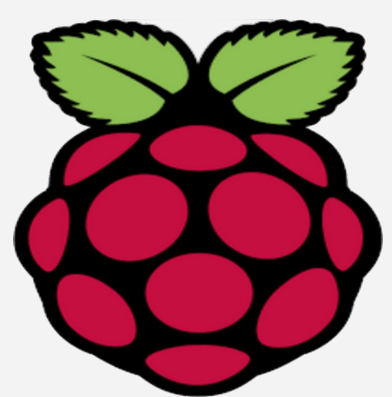- Small computation power

Device
- Manufactured for less than $200
- Aesthetically pleasing

Technology

Hardware Use
- Raspberry Pi
- 3.5in X 6in Touch Screen
- Li-Ion Battery

Software Use
- WordNet - Dictionary
- Api.AI - Speech recognition
- Firebase - Cloud storage

Testing

- **M to M**
  - Two machines that have the app talk to each other, to see whether machine can make a conversation or not.
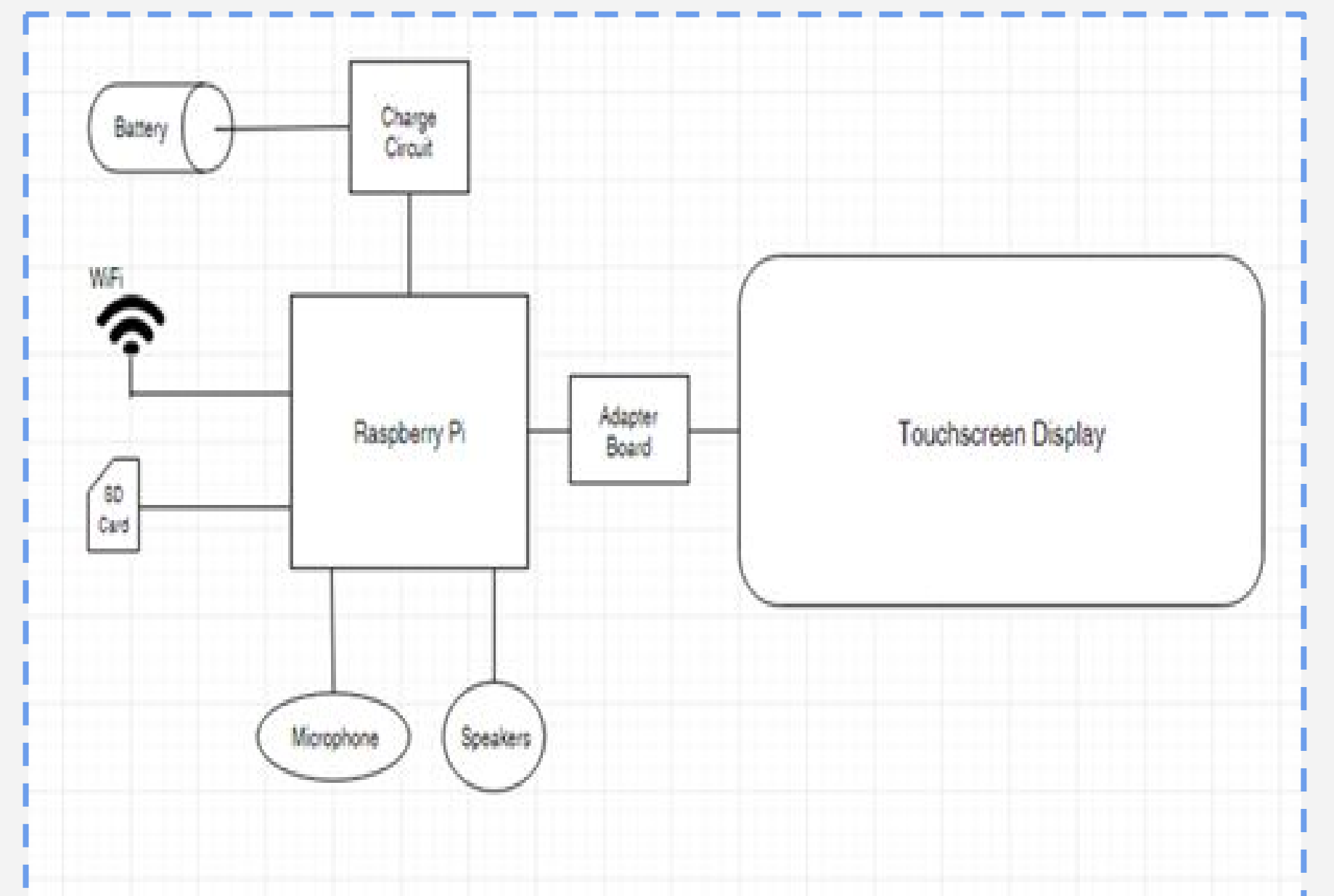- **M to H**
  - A person speaks to the machine and sees if the machine can recognize voice and generate the right word set.

Design Approach
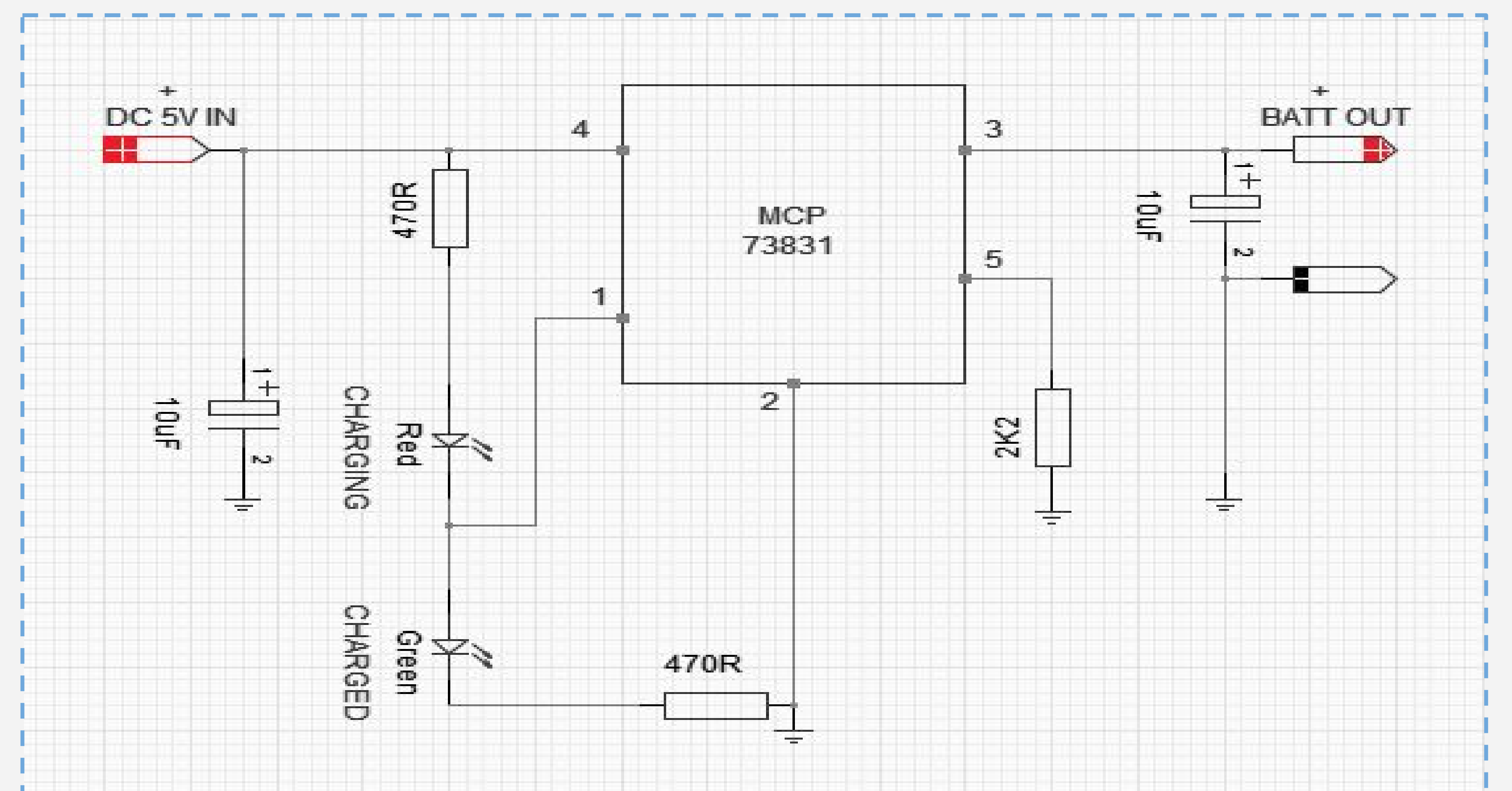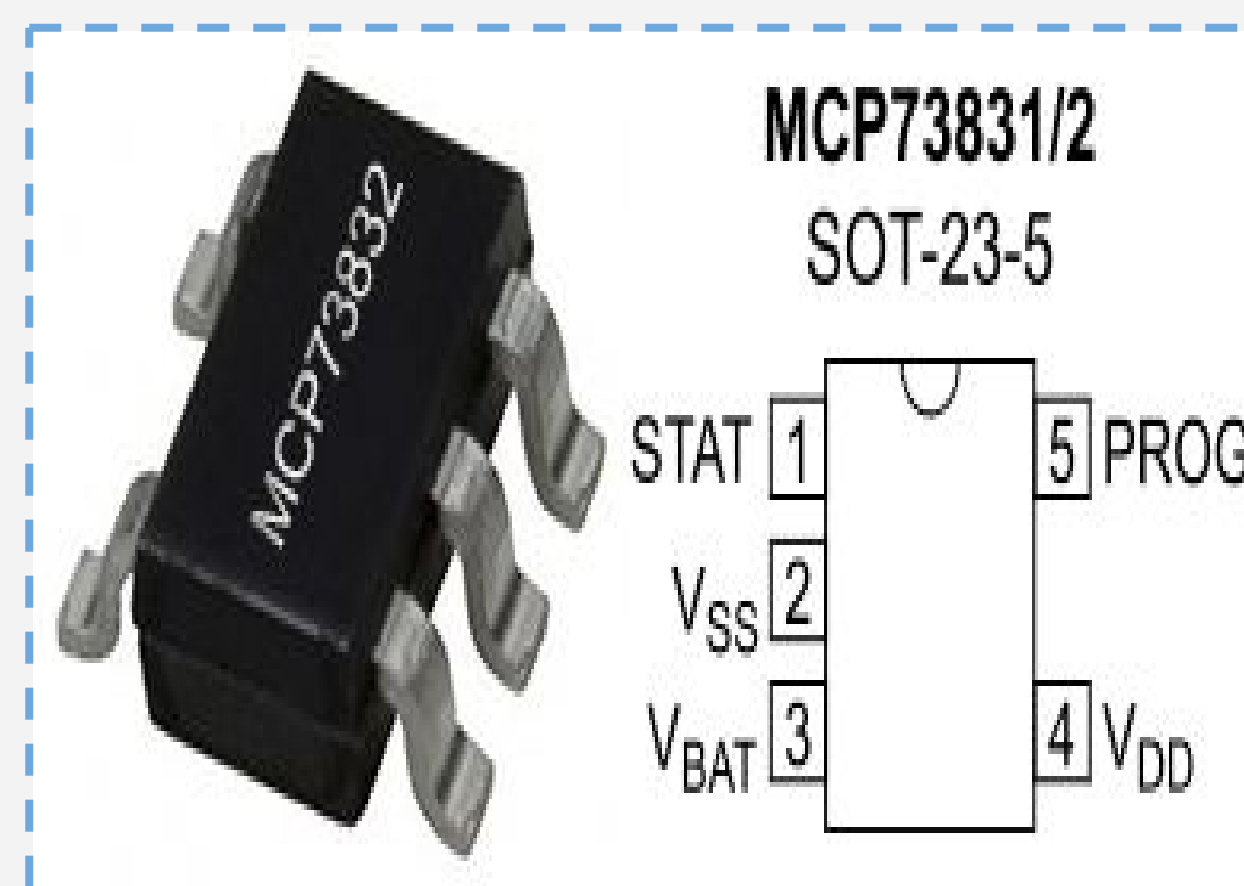
Hardware

System Design
- Use Raspberry Pi and connect peripherals
- 6 Ah Lithium Ion battery
- Microphone, Speaker

Battery

Charging Design
- IC makes circuit simpler
- Constant current, constant voltage
- Needs to carefully charge lithium ion batteries

Software

Words suggestion
- Heuristic prediction function: $e^{(-0.25x)}$
- Lexicon/Category Ranking
- N-gram Ranking

Speech Recognition
- Entity Analysis
- Data training

Function for weighting effects of category and N-gram to form a sentence