



# Go-Baby-Go Universal Controller

Colter Hooker, Luke Lockard, Taylor Tackett, Alex  
Thomas, Leia Trice, and Clare Willis

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Faculty Mentor: Dr. Maggie Vanderberg  
Technical Mentor: Dr. Kyle Winfree  
Sponsor: Dr. Sarah Oman

# Children with Disabilities - Independent Mobility



# Standard Ride-On Toy Car



# Go-Baby-Go

- International project Led by Dr. Cole Galloway
- Retrofits Ride-On Toy Cars for children disabilities



# Drawbacks to Go-Baby-Go Modifications

The previous Go-Baby-Go retrofit:

- Steering Control
  - PVC piping and pool noodles
- Speed Control
  - Big red button
  - Loses reverse direction
- Parental Control
  - Emergency off switch (physical)
  - Rope attached to back of car to control child



A steering modification



Red Button that is used to replaces gas pedal.



Emergency Shutoff Switch



Ropes used to currently steer the car

# Solution Overview

Steering Control

- New controllers for child



New controllers - mobile phone, keyboard, xbox joystick, and analog joystick



New onboard system - Arduino



Speed Control

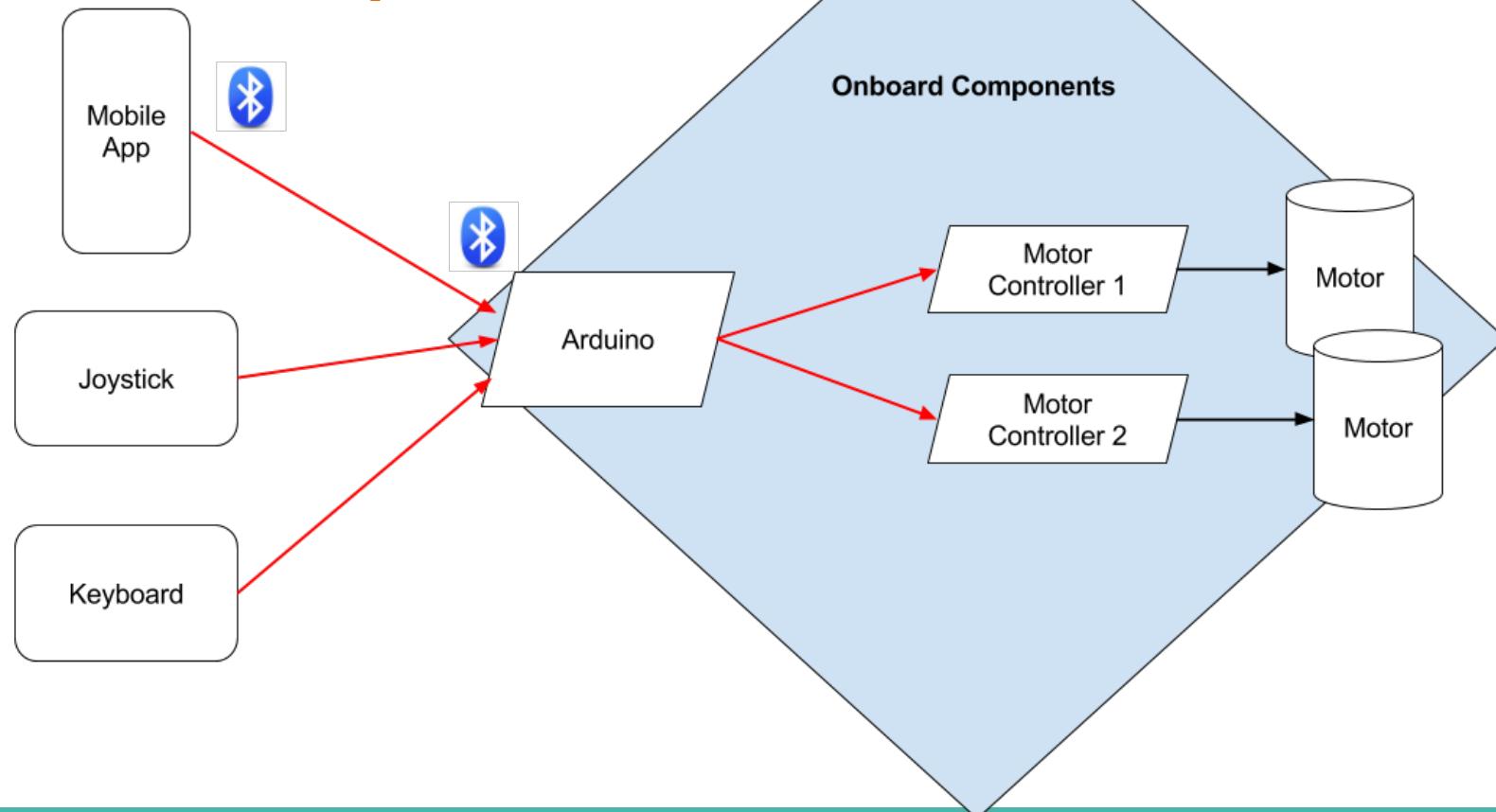
## Inexpensive and easy-to-use

Parental Control

- Mobile App
- Overrides child's controller
- Total control of the vehicle and an Emergency Stop

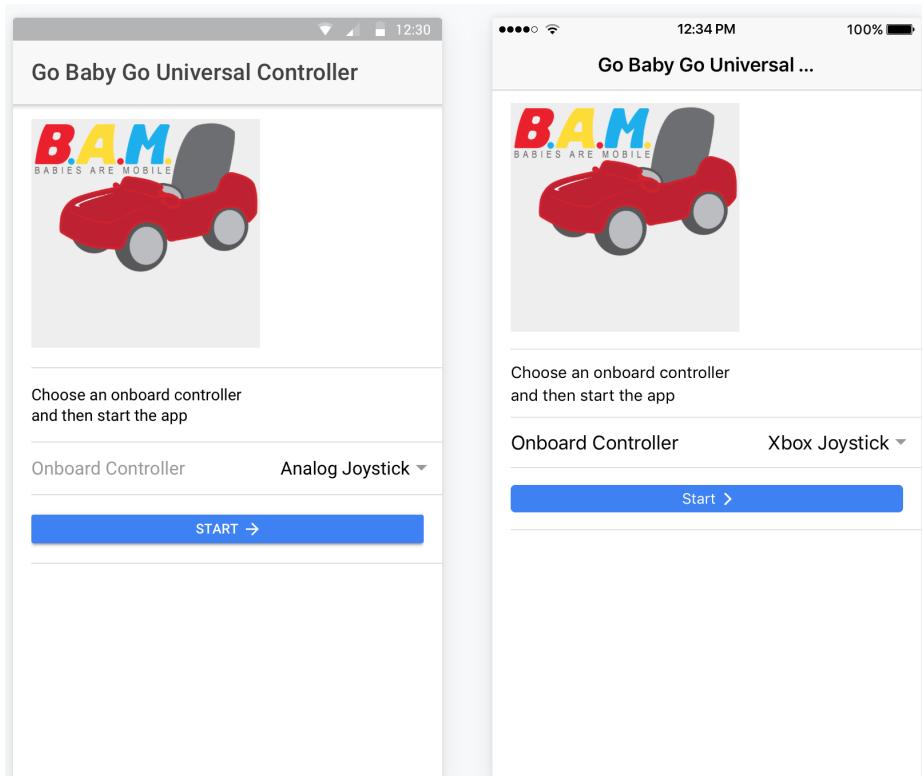


# Architecture - Pipeline



# Implementation - Cross-Platform Mobile App

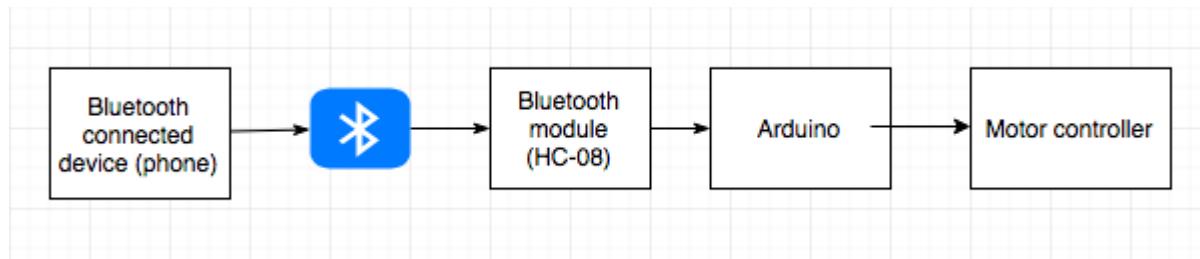
- Built and deployed using Cordova
- Developed using Ionic
- Model-View-Controller Architecture



Our app deployed on Android (left) and iOS (right) using Cordova.

# Implementation - Bluetooth

- Bluetooth Module
- Ionic's Bluetooth Low Energy Library works for iOS and Android phones
- Save the Universally Unique Identifier (UUID) of the Bluetooth Module
- Car goes out of Bluetooth range  Emergency Stop!



Shows pipeline architecture of Bluetooth sending data

# Implementation - Arduino

Arduino Uno acts as onboard processor

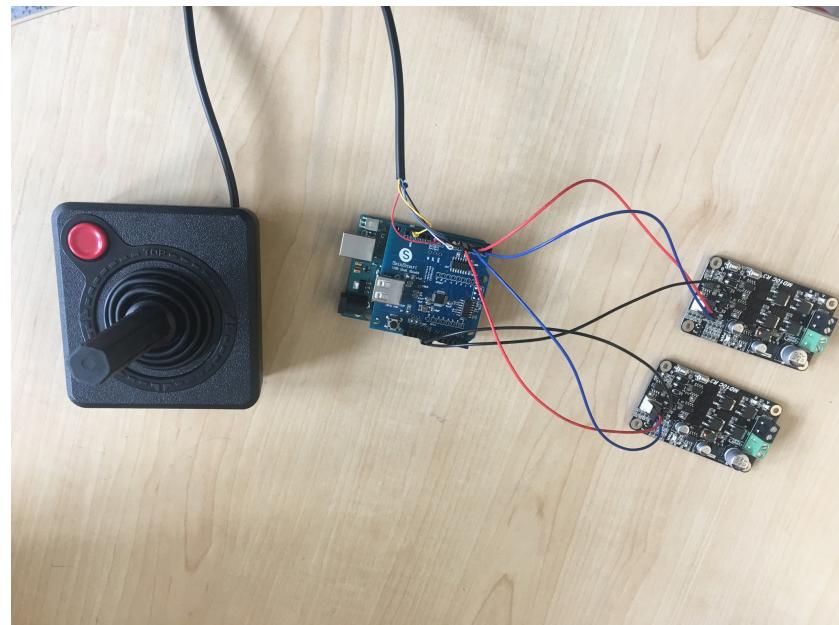
- Accepts input from multiple devices
- Bluetooth connection

Steering Control

- Motor Controllers
- Differential steering

Speed Control

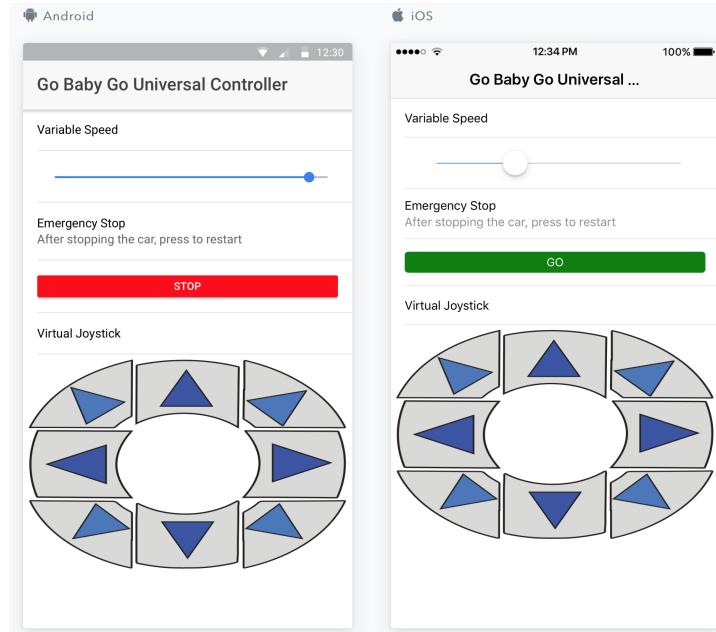
- Gradual Acceleration
- PWM (Pulse Width Modulation)



Showing how the Arduino Uno and motor controllers are connected.

# Car Demo

Embed Video here of mobile app while running car live



# Testing

## Unit Testing

- Testing software functions

## Integration Testing

- Testing input devices
- Testing Bluetooth connection

## Usability Testing

- How-To guide



User testing of the car

# Challenges

## Working with Hardware

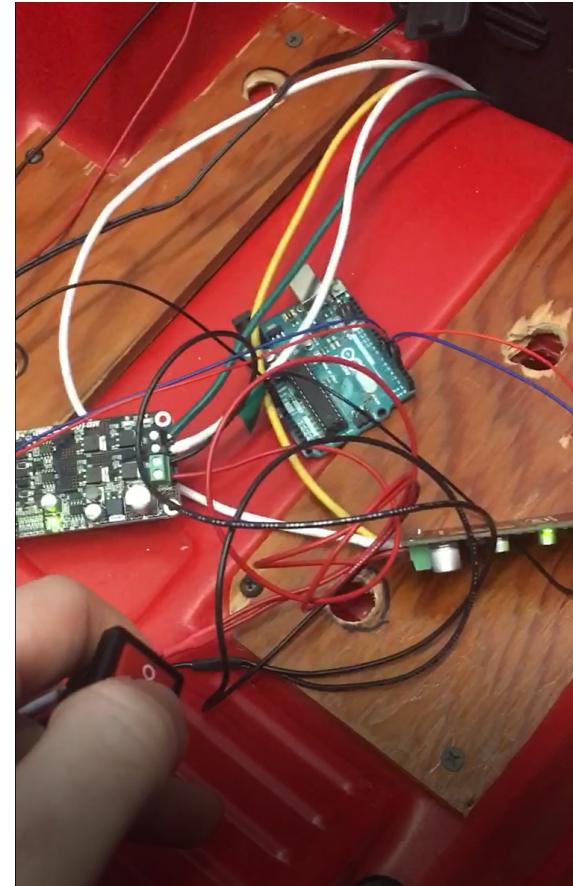
- Wiring
- Software-Hardware compatibility

## Mobile Application

- Ionic library & file structure

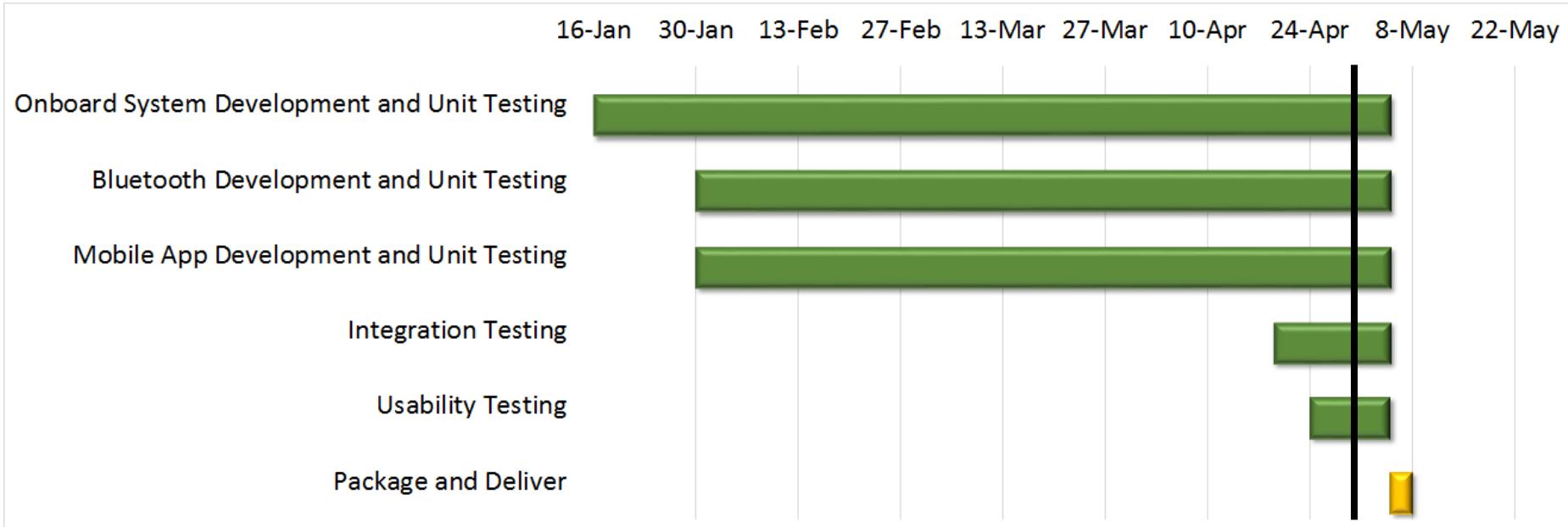
## Bluetooth connection

- Bluetooth Serial vs. BLE (Low Energy)



Section of wiring in the car

# Spring Semester Schedule



**Legend :** In Progress | Future Task

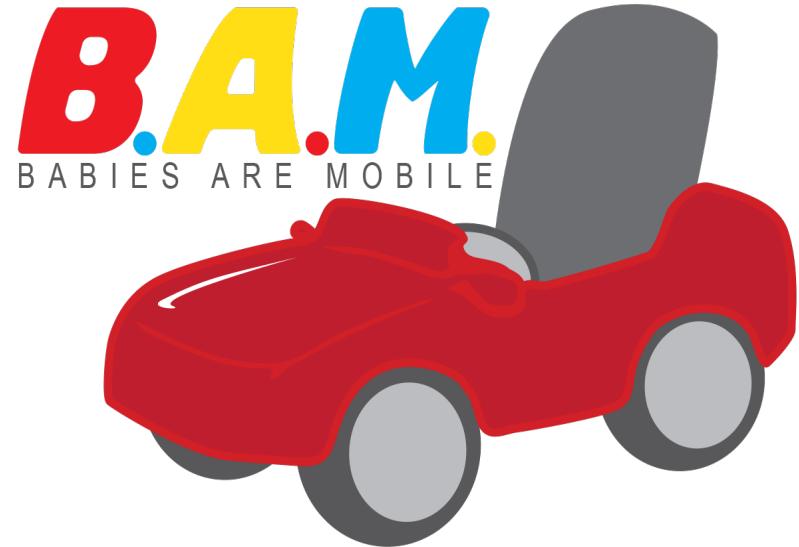
# Conclusion

Problems Addressed:

- Steering Control - Joystick and Keyboard
- Speed Control - smoother acceleration
- Parental Control - mobile application

Our Solution is:

- Inexpensive
- Family-friendly
- How-to guide makes it easy to build



# Questions?

