MICHIGAN STATE
U N I V E R S I T Y

Project Plan
Rumble Test Suite

The Capstone Experience

Team Vectorform

Anna Quenon
Andreas Frame
Hyeungsuk Kim
Reis Wiedemann

Department of Computer Science and Engineering
Michigan State University

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From Students…
…to Professionals

Functional Specifications

- Develop an algorithm that communicates with the Rumble device in order to detect when a wash cycle has started/completed

- Make an app that connects the Rumble device to available Wi-Fi networks and allows for recalibration

- Send a push notification when the wash cycle has ended

- Retrofitting of older washing machines to allow for better user experience

Design Specifications

- The Web Application will display cycle information in a user-friendly, organized manner

- iOS app will be one screen that shows the available Wi-Fi networks as well as a 'Recalibrate' button for the rumble sensor

- The algorithm will allow a push notification to be sent when the wash cycle stops
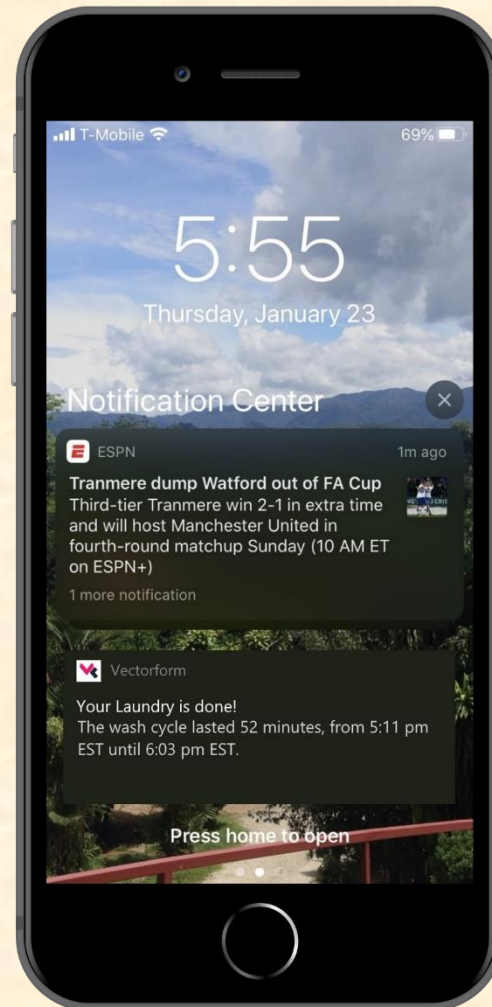
Screen Mockup: iOS App

Screen Mockup: iOS Recalibrate

Team Vectorform Project Plan Presentation

Screen Mockup: iOS Push Notification

Screen Mockup: Web Application

Technical Specifications

- The ESP32 Microcontroller will be connected to the internet through a Bluetooth connection with an iOS device application

- The ESP32 Microcontroller uses an onboard accelerometer to detect vibrations from the washing machine

- The vibration data is processed by the algorithm and sent to the MQTT Server. On completion the cycle's data is sent to the server.

- Data is visualized through the Web Application, which pulls from the MySQL database

System Architecture
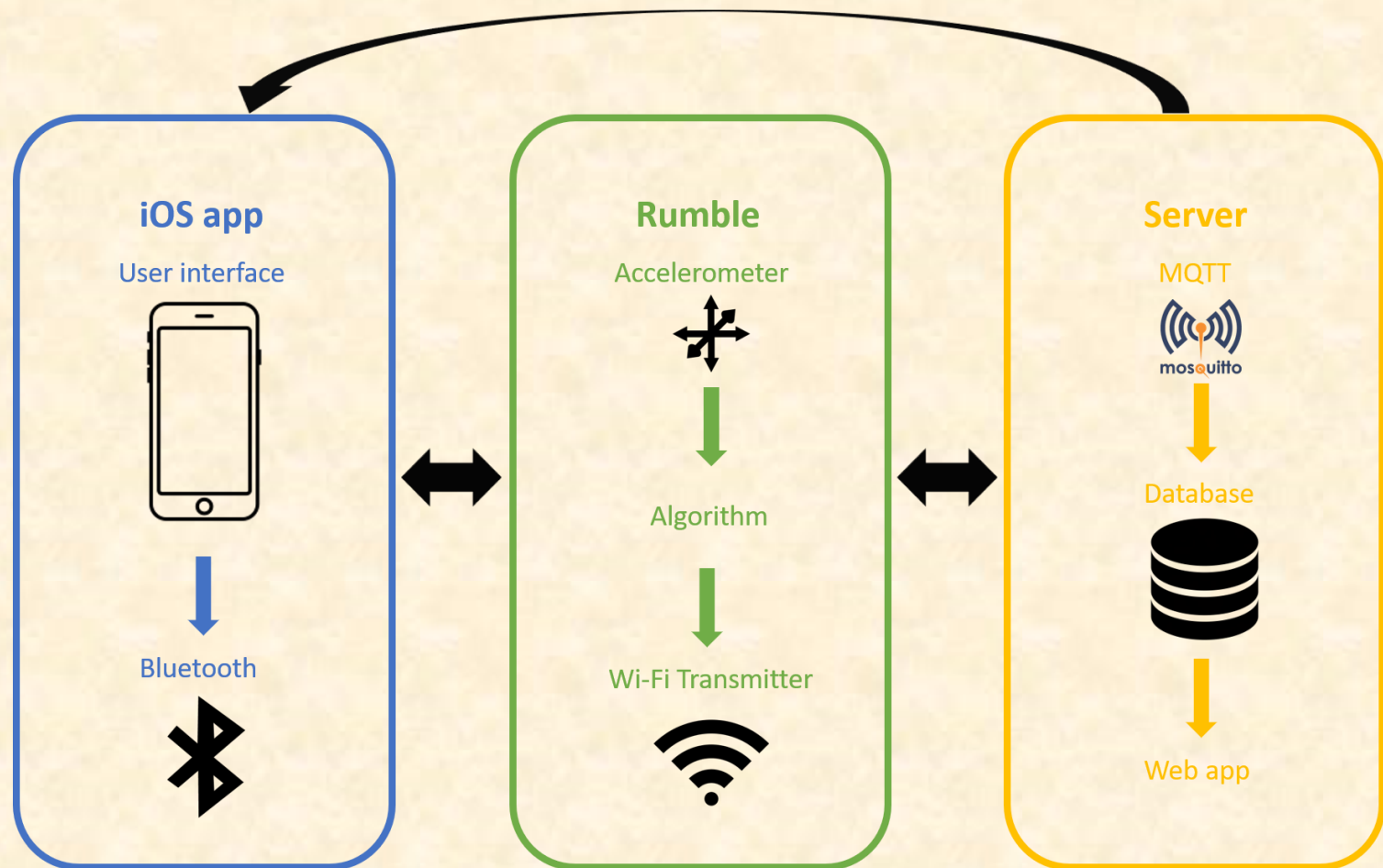
System Components

- Hardware Platforms
  - ESP-32 Microcontroller (Rumble Device)
  - iOS Device
  - Ubuntu Server
- Software Platforms / Technologies
  - Node.js
  - Python
  - C++
  - Arduino
  - Swift
  - MySQL
  - MQTT
  - PHP/HTML/CSS
  - TensorFlow

Risks

- Accuracy
  - Ensuring the algorithms accuracy for a wide variety of cycle types and washing machines
  - Test in a variety of environments
- Hardware Constraints
  - Being able to fit a deep-learning algorithm on the ESP-32 along with support for connecting to mobile device
  - Consider using less spatially intensive algorithms
- Recalibration
  - Identifying when the Rumble device needs to be recalibrated
  - Get a base reading for the accelerometer when the device is initialized
- Improvements
  - Improving upon the previous group's uncommented code
  - Comment existing code and contact previous members

Questions?