AR Monitoring System

By: Arbaaz, Sam, Patrick, Nipun, Dheeraj, Ben

Group: Dec1714

Client: Andrew Guillemette

Project Statement

- AR monitoring solution to remotely track and monitor worksite vehicles
- View a worksite and current vehicle operations
- Personal identification for vehicle usage
- Updated from last semester's design

Technology

- **Raspberry Pi**- A low cost, mini computer that uses a standard keyboard and mouse.

- **HoloLens-** The first self-contained, holographic computer, engage with your digital content and interact with holograms in the world around you.

- **AR** - Augmented reality (AR) technologies are used to create a blend of virtual and real environments.

3
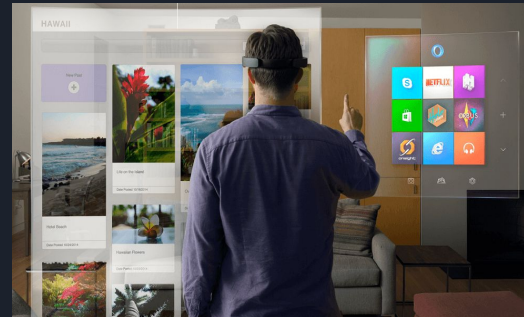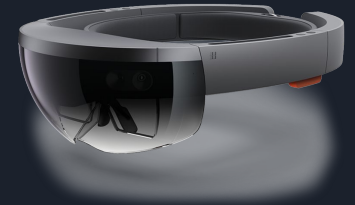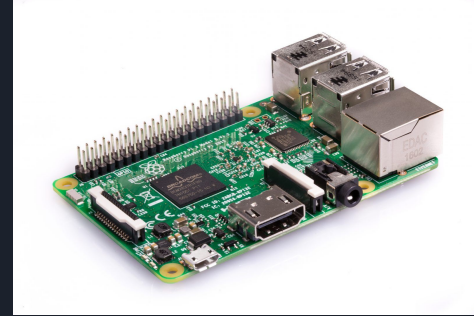
Team Roles & Responsibilities

- Arbaaz: Team Leader
- Patrick: Web Manager
- Pi/CAN/GPS
  - Arbaaz
  - Ben
  - Sam
- HoloLens
  - Dheeraj
  - Patrick
  - Nipun
- Server
  - Nipun
  - Dheeraj

4
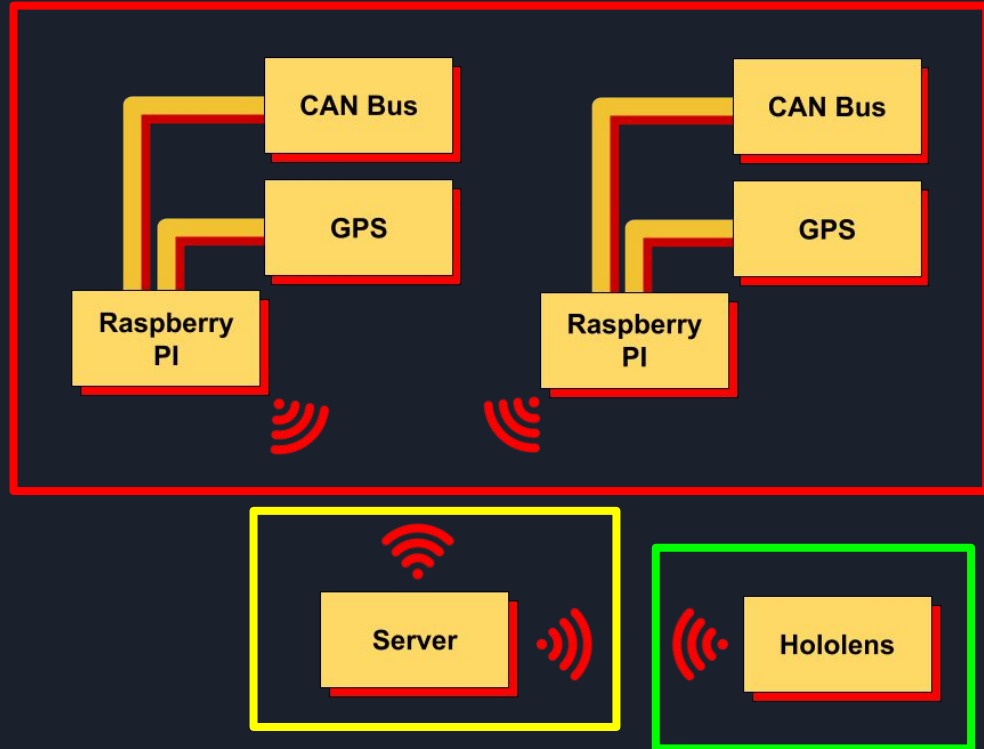
Spring Semester Summary

- Gimbal/Camera Control

- HoloLens map
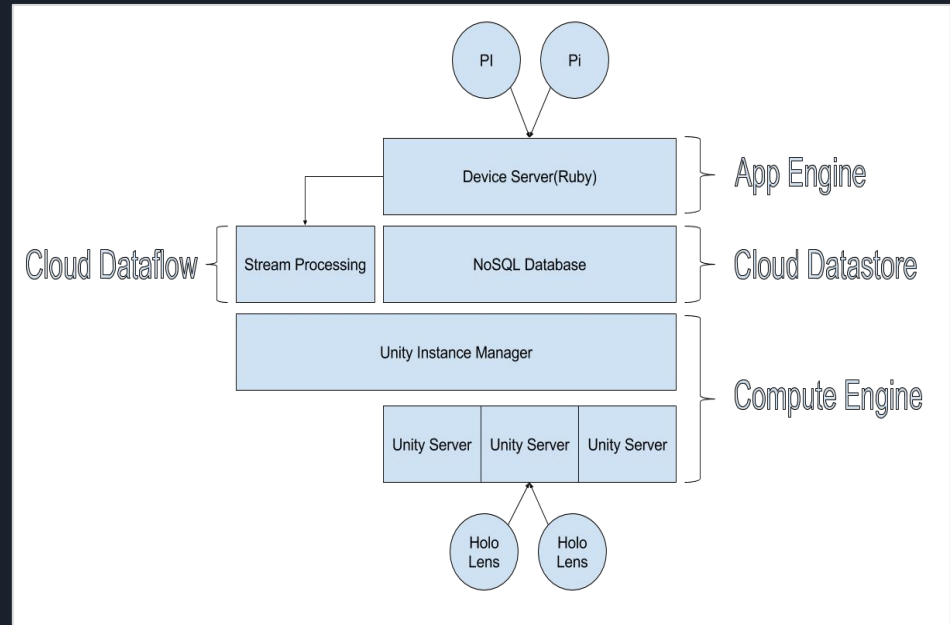
- Groundwork for Communications

Semester 2 Hardware Changes

- New focus

- Different parts

  - CAN Shield

  - GPS Receiver

Semester 2 Software Changes

- New system design

- Communications protocol

- Platform independent libraries

Deliverables

- Hardware
  - GPS Tracking
  - CAN Bus information
  - Wireless Connectivity
  - Server Access

- Software
  - Platform independent connectivity
  - Data Visualization
  - Customizable placement
  - VFX and Interactivity

Design: Functional

- Ability to view monitored machine on map using HoloLens app

- Ability to view a custom area map on the HoloLens app

- Ability to asses machine status from HoloLens app

- Ability to monitor desired CAN bus output from the HoloLens app
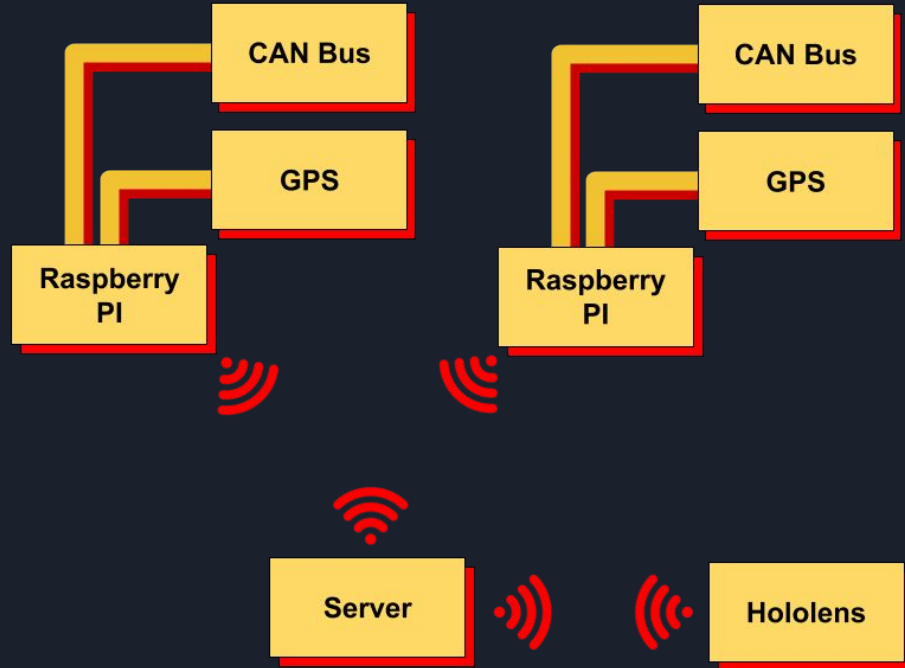
Design: Non-Functional

- The software should be able to be adapted for many different purposes

  and inputs

- The software should be secure

  - Unauthorized devices should not be able to feed false data nor
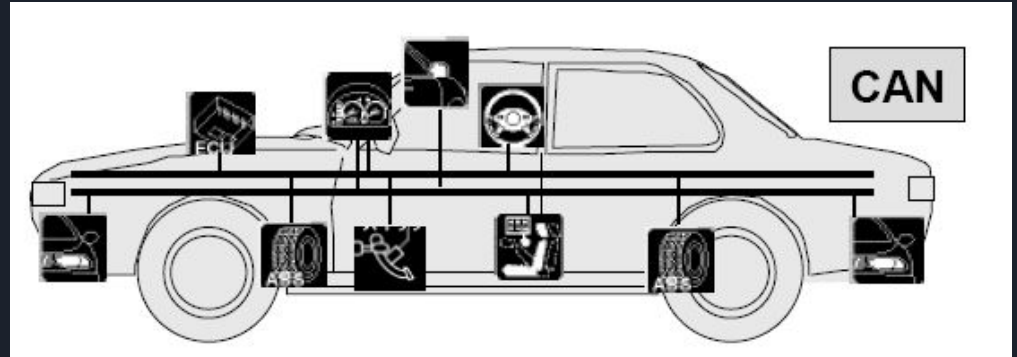
    should they be able to view device data

Conceptual Sketch

- 3 main Components

  - Server

  - HoloLens

  - PI / CAN Bus / GPS

- Wi-fi connectivity

Hardware Testing

- Hardware
  - GPS Tracking
  - Read requested CAN Bus info
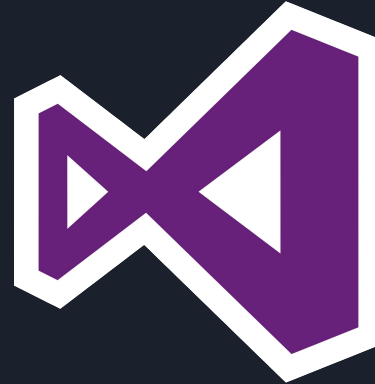 - Server Communication
  - User Tracking

Software Testing

- HoloLens
  - Editor Scripts
  - Dummy devices
  - Real Time 3D models
- Raspberry Pi
  - Test scripts
  - Receive Hardware data

Semester 1 Challenges

- Limited Documentation

- Lack of Analog I/Os

- Python

- Video Type

- Unity/Visual Studio
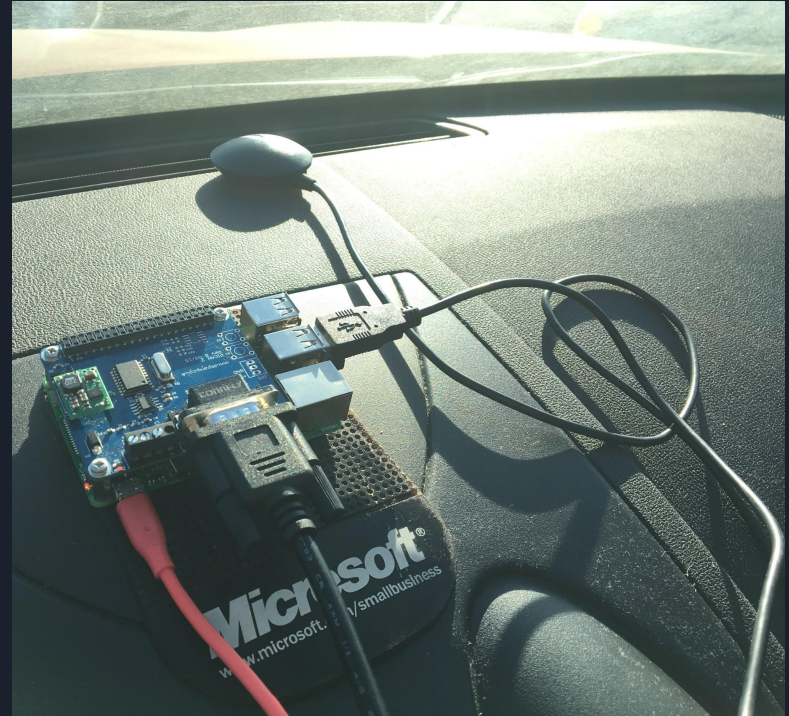
- New Technology

Semester 2 Challenges

- Unity/Visual Studio

- Hardware change

- Server Communication

Conclusion

- Effective proof of concept for benefits of AR monitoring
- Solution allows for supervisors to monitor real-time vehicle operations remotely
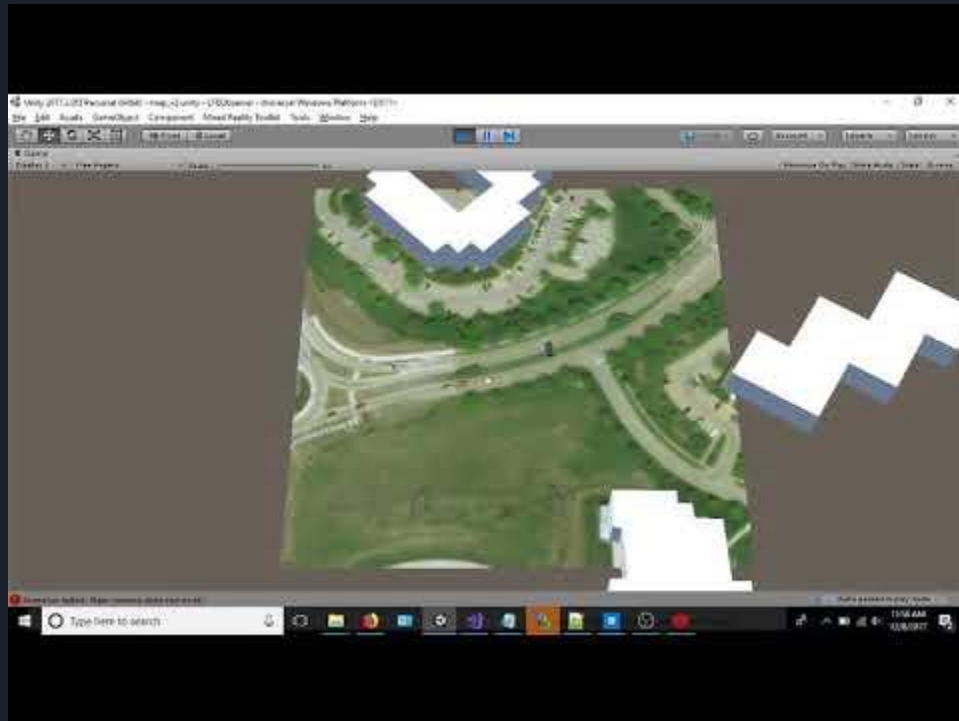 - CAN Bus
  - GPS

Conclusion (future work)

- Improvements upon HoloLens app

  - Graphical

  - Interface

- More accurate GPS

  - Global Navigation Satellite System

- Improvements to vehicle personnel identification

  - RFID

  - Miles Log

  - Time Log

Demo

Any
Questions?