

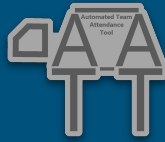


sddec20-19

Automated Team Attendance Tool

Initial Project Overview Fall 2020

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Our Team



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Project Concept

We want to be able to take attendance of team based learning classes automatically.

Taking attendance manually can be very tedious for even the smallest classes, and it can take up valuable class time. There are resources available, but they require some sort of interaction from the professor or students.

We will use a raspberry pi with a camera and object detection software, YOLO, to capture attendance.



Automated Team Attendance Tool

- Fully automatic attendance evaluation system
- Tailored to Team-Based Learning classrooms
- Will use a mounted camera to take pictures of the classroom
- Use YOLO, an object detection tool, to identify the location of students
- Use a supplied seating chart to determine which students belong to which team
- Compile a report of which teams are missing members
- Email the attendance report to the class instructor



Requirements

- **Hardware Requirements:**

- Run on Raspberry Pi
- Use a camera to take clear pictures
- Mounted such that the camera has full visibility of the classroom

- **Software Requirements:**

- Control and receive pictures from the camera
- Accurately detect the students within the taken picture
- Determine which teams are missing members
- Consolidate the attendance and send the report to the professor
- Allow the professor to create and adjust multiple seating charts for use in the system



Milestones

Software

- Student Detection
 - Detect Using Yolov3
- Seating Chart Submission
 - Interface for Professors to enter team-based seating charts and schedule attendance capture time
- Attendance Mapping
 - Determining Attendances and Absences

Hardware

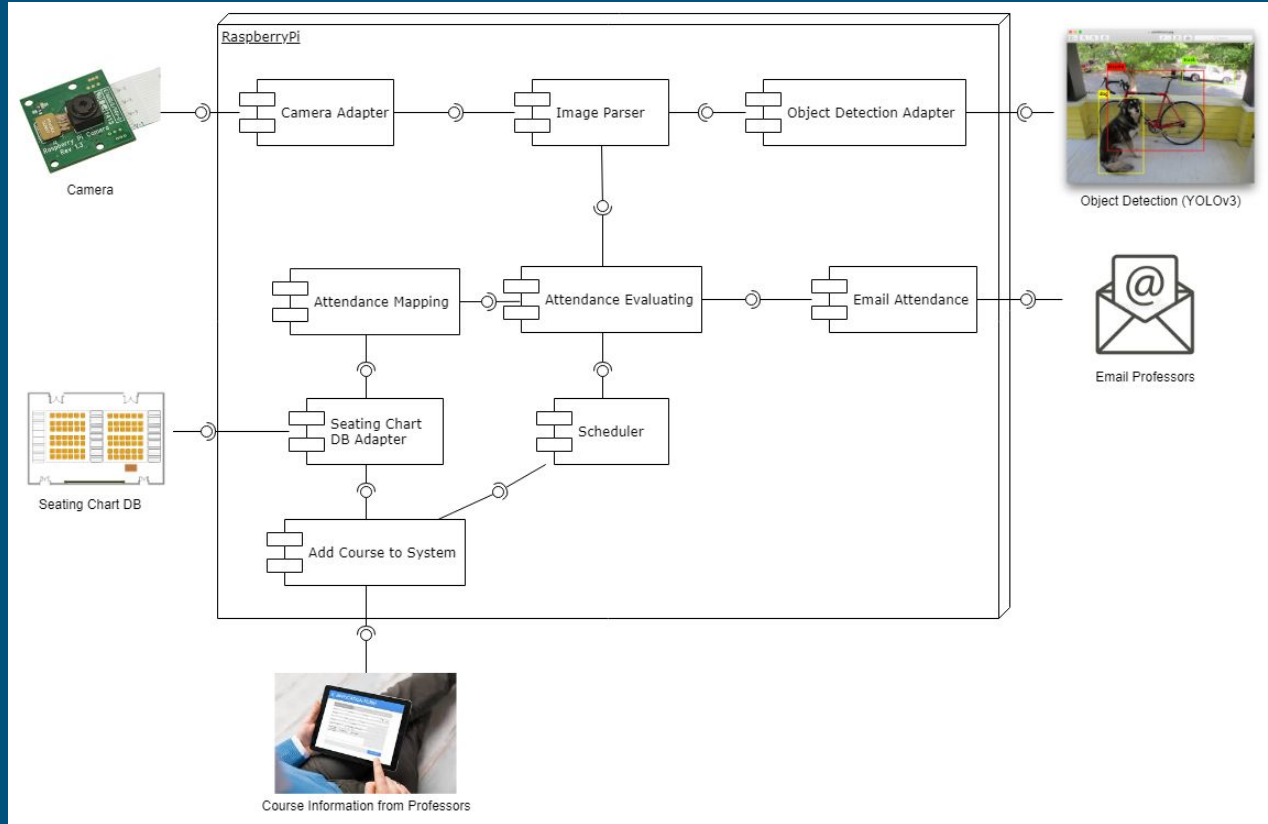
- Raspberry Pi Configuration
 - Network Setup and Dependencies
- Attendance Scheduler
 - Capture the image of the classroom based on the submitted capture time
- System Mount
 - How the system will sit in the classroom
- Email Server
 - Using mutt to send the report to professors



Design Overview

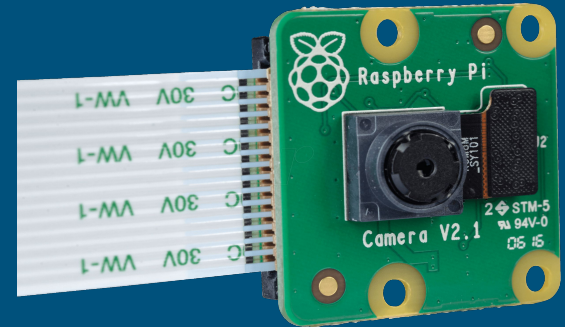
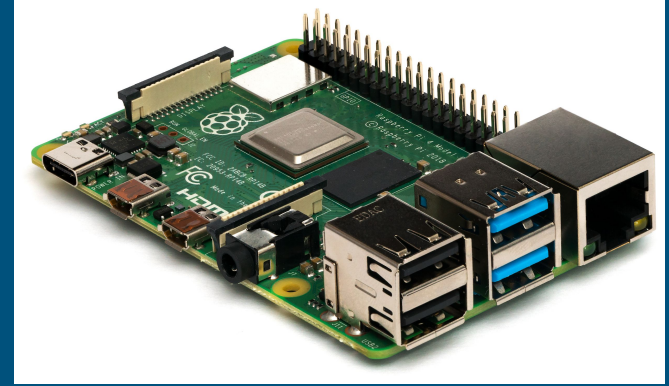
- **Attendance Evaluator**
 - Responsible for processing images into attendance reports
- **Scheduler**
 - Responsible for calling the Attendance Evaluator to run at the proper class times, and sending the reports to the professor
- **YOLO v3**
 - Object Detection tool of choice
 - Machine learning based training
- **Camera**
 - Raspberry Pi Camera Module V2
- **Seating Chart DB**
 - Stores class seating chart information for each class

Component Diagram



Hardware

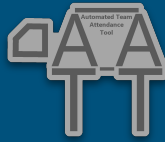
- The baseline model is the Raspberry Pi 4
- The camera we will use is Raspberry Pi Camera V2. It is 8MP and can take photos at a resolution of 3280 x 2464 pixels.
- If software works well on the Raspberry Pi, we will test with the Pi Zero W model.



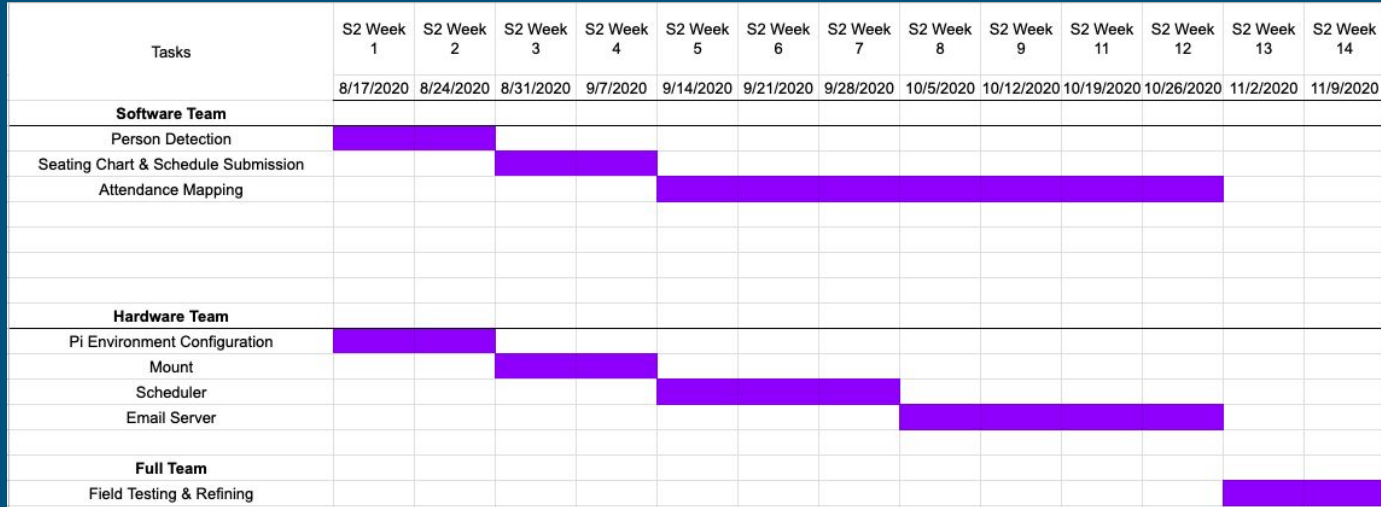


Impact of COVID-19

- We did not complete our Major Technical Goals in the Spring
- The Entirety of our Hardware Development was put on hold
 - Our Raspberry Pi needed to be connected to the ISU network to connect with our database and send emails
- Yolo Training is also on hold
 - TBL is not happening widely this semester, or is at least happening virtually
 - Without access to the classrooms, the ATAT will not be able to learn the layout of the rooms
 - It's difficult to find clean images of team-based learning environments for Yolo development
- New use in contact tracing



Project Development Plan



Gantt Chart with the work we've initially planned this semester.



Current Progress

- Last Semester
 - Researched Available Technology
 - Committed To Our Design
 - Studied Python
 - Began Testing Yolo
- This Semester
 - Develop Seating Chart Submission System
 - Develop Seating Chart Mapping Algorithm
 - Create a Scheduler and Email service on the Raspberry Pi
 - Create a mount and install the system

Questions?

