# Assign Final Project ECE 558 Winter 2021

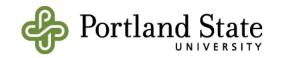
## Final Project

- You will work in teams of 2 or 3 (w/ instructor permission)
- Your project proposal must be approved by the instructor
  - Approval based on difficulty and whether I think you can complete it in the ~3 weeks you have to complete it
- You will submit a written project progress report to D2L and added to your GitHub repository
- You will do a technical presentation and demo of your final project during ECE 558 Demo Day (via Zoom)
  - All of the team members are expected to participate. Arrange exceptions ASAP!
- Your project must be at least as difficult as any of the other projects
- Your project complexity must support the size of the team (e.g. every team member should be able to make a significant contribution to the result)
- You must manage the project w/ GitHub and GitHub Classroom



## Target System

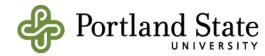
- Your project should consist of one or more Android apps
  - Your project must use the Android platform
  - Using Fragments, async tasks, etc. is encouraged but not required
- Your project may use external sensors, SBC's (RPI3, BBB, ...), microcontrollers...
  - Quite a few prior teams have built on their Project #2 and added an internet-connected component to the project not required but encouraged
- You must demonstrate your project in class on an Android device...having a narrated video to use as part of your final project presentation will make the presentation go smoothly
  - You should have all the required hardware and equipment to debug and demonstrate your project
- Your results must be visible and preferably interesting to the class (e.g. things that move, video, etc.)
  - You can share your screen during your presentation
  - Vysor: <a href="https://www.vysor.io/">https://www.vysor.io/</a>



## Combined ECE 540/ECE 558 project

Since several of you are taking both ECE 540 and ECE 558 this term we are willing to consider joint projects that meet these requirements:

- At least one of the team members must be enrolled in both ECE 540 and ECE 558 this term
- Your final project must be at least as complex as any of the other projects in either course
- The project needs to meet the requirements for both the ECE 540 and ECE 558 final projects
  - Your project must include an SoC w/ embedded CPU and custom hardware and software running on the Nexys A7
  - ☐ Your project must include an Android app interfaced to the SoC running on the Nexys A7 board
  - ☐ The scope of the development effort for the SoC and the Android app must be comparable
- Work with Roy before the proposal is due to agree on concept and scope of the project
  - Be prepared to discuss the concept and work-breakdown (who will be doing what)
  - Final decision on what is acceptable as a combined project is Roy's

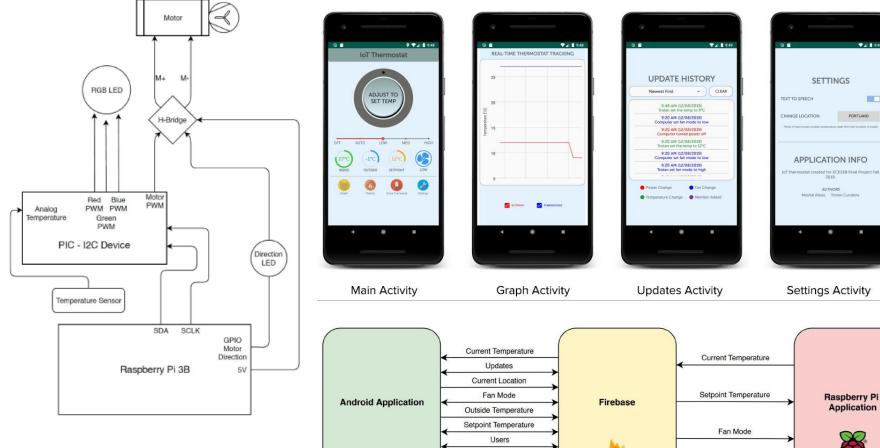


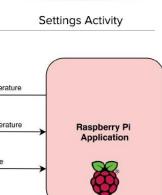


## Fall 2019 Wall of Fame winner

### **IoT-based Thermometer**

Meshal A. and Tristin C.





## Fall 2019 Wall of Fame winner (cont'd)

### **Deliverables**

### ANDROID APPLICATION

#### Base Deliverables:

- · Ability to adjust temperature
- Ability to set fan mode (manual or automatic)
- Display current temperature from Raspberry Pi temperature sensor
- Multiple phone integration (when one person changes the settings other phones using the app will be notified)
- Implementation of sound
- Ability to read and write data to Firebase

### Stretch Deliverables:

- Add speech recognition so the user can set the temperature with their voice
- Add a real time graph
- What-if scenarios (example: if I have my system on for this long then it will cost X amount of money)
- The ability to schedule the thermostat to operate during a certain time block
- Has the ability to access current weather conditions
- Notifications to all phones when thermostat settings change

### RASPBERRY PI APPLICATION

#### Base Deliverables:

- Utilize Android Things
- Uses LED to indicate whether the system is heating, cooling or stable
- Motor direction indicates whether system is heating or cooling
- Ability to read and write data to Firebase

#### Stretch Deliverables:

- Add a screen to Raspberry Pi
- Add text to speech to Pi app to verbally indicate that the temperature has been changed

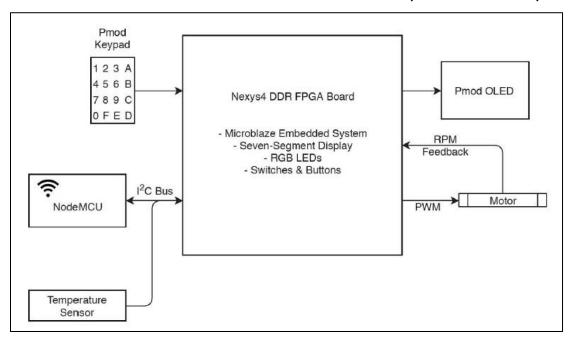
DELIVERABLES HIGHLIGHTED IN GREEN AND BOLDED WERE COMPLETED.



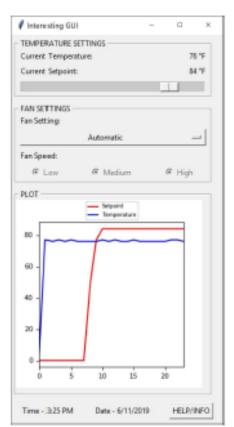
## ...Its predecessor

## IoT-based Thermostat Controller (Combined ECE 558/544 Project)

Daniel D., Meshal A., Tristin K.





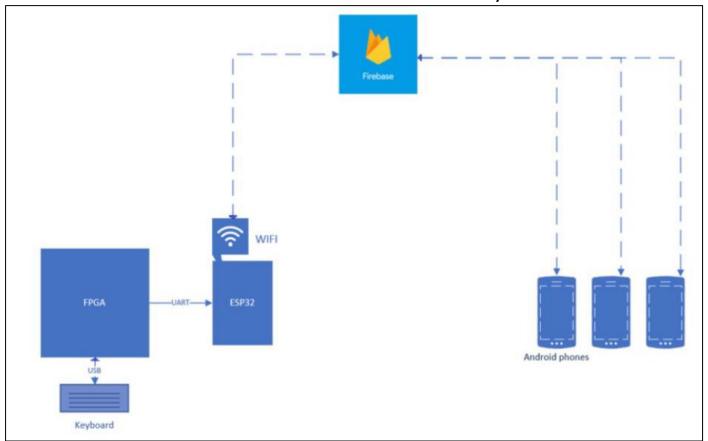




## Spring 2019 "Wall of Fame" winner

## Communications Hub (Combined ECE 558/544 Project)

Roberto G. Maty B.A. and Aron S

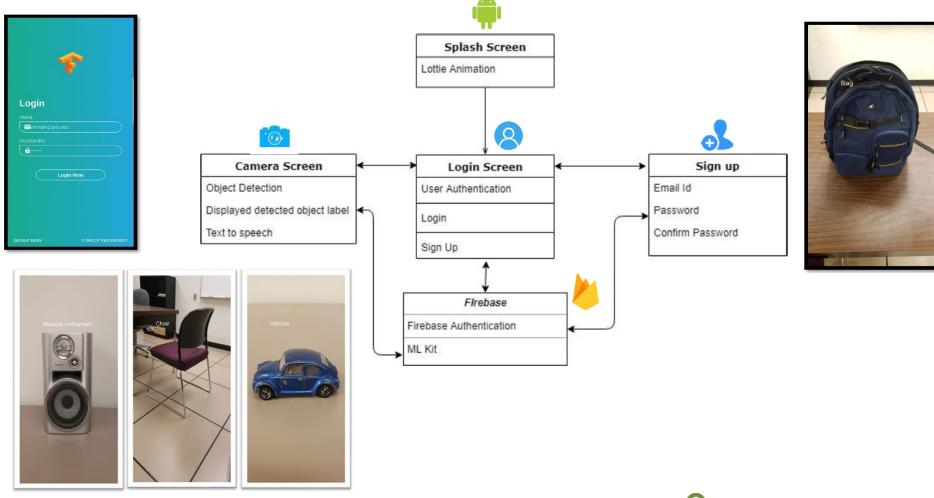






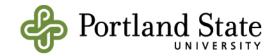
## Fall 2018 Wall of Fame Winner

### Real-time Object Detection w/ Machine Learning



## Other Notable "Wall of Fame" Winners

- Mobile Camera Robot
  - Charles S., Brett C., Scott M.
- Hub of Things
  - Surendra M., Josh S., Colin M.
- Recipe Book Soup to Nuts Meal Making Support
  - Lowren L. James N., Cody O.
- Android Ground Drone Video-enabled mobile platform
  - Daniel C., Jonathan F., Luis S.



## **Project Proposal**

The project proposal must include:

- Project name and team members
- Project description
  - What will your app do?
  - □ What Android capabilities will you use (ex: sensors, GeoLocation, web services, etc.)
  - □ What other hardware will you use (RPI, Robotic platform, etc.)
  - What tools (besides Android Studio) will you use?
- Design Approach
  - □ How do you plan to split the work?
  - ☐ How will you demonstrate success?
  - What are your options if you start running out of time?
- Milestones
  - Target dates to demonstrate that you're making acceptable progress towards completion



## **Timetable**

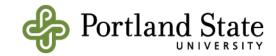
- Proposal submitted to D2L no later than 10:00 PM on Mon, 01-Mar
  - Would be to your advantage to beat this deadline since it will give you more time to work on the project
- Written progress report to D2L by 10:00 PM Thu, 11-Mar
  - Describe your project (block diagram and flowcharts would be helpful)
  - Explain your design approach and who's assigned to what task(s)
  - Give a status of what you've completed and what's left to complete
  - Each team will have about ~15 minutes to present
- □ Demo Day is Mon, 15-Mar from 5:00 PM 7:30 PM via Zoom
  - Each team will ~15 minutes to discuss their project
  - Please let me know about conflicts w/ exams, other final projects during the same timeframe. I will try to meet your needs.
- Deliverables due to D2L and GitHub by 10:00 PM on Wed, 17-Mar
  - Please do not miss the deadline we need time to grade them



## Grading

- □ Written progress report up to 5 pts
- □ Demo presentation up to 20 pts
- Demonstrates the committed functionality up to 40 pts
- □ Quality of your design report up to 15 pts
- Quality of your source code up to 15 pts
- Degree of Difficulty up to 5 pts
- Extra credit -up to 7 pts

The Final Project is worth 20% of your final grade



## **Deliverables**

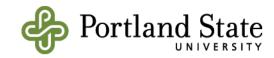
- ☐ Your approved proposal
- Your written progress report
- Narrated video(s) of your demo
- Design report:
  - Overview of your project
  - Design details, including a theory of operation, state transition diagrams, class diagrams or equivalent, etc.
  - Results (good and bad)
  - A description of how to set up and use your project/software.
  - Contributions of individual team members
  - No more than 10 pages please
- Source Code:
  - Archive of Android Studio project(s)
  - (combined project) SystemVerilog code that you wrote
  - Your code should be liberally commented and use descriptive signal and/or variables names
- .pdf of your demo presentation



### Additional Hardware

## PROCURE ANY ADDITIONAL HW YOU NEED IMMEDIATELY!!!

- EPL store
- Dig-ikey, Mouser, etc.
- Surplus Gizmos (surplusgizmos.com)
- sparkfun.com, adafruit.com and other hobbyist sites (see Circuit Cellar and Elektor)
- If you purchase online consider paying the extra shipping charges for 2 day or 3 day delivery...it's better than not getting hardware until a few days before your project is due



## Project Resources Online – a Small Sampling

- http://www.raspberrypi.org/ Raspberry PI website
- http://www.elektor-labs.com/ Project ideas, kits, etc.
- http://www.clubjameco.com/index.php/contents More project ideas, kits, etc.



## Winter 2021 "Wall of Fame" Winner(s)

This space just waiting to be filled by....you

