
Introduce Final Project ECE 558 Winter 2022

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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 join Emily and me in a Team meeting to discuss progress, deliverables, etc.
- ☐ You will do a technical presentation and demo of your final project during ECE 558 Demo Day (in the classroom)
 - All 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

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Target system

- Your project should consist of one or more Android apps
 - Your project must use the Android platform and Kotlin
 - Your application should use fragments and Jetpack components
- Your project may use external sensors, SBC's (RPI3, Huzzah32 ...), 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: <https://www.vysor.io/>

Combined ECE 540/ECE 558 project

One final project, one demo (ECE 540 demo day preferred), one set of deliverables

- Scope:
 - At least one of the team members should 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



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Winter 2021 Wall of Fame winner

SmartFarmer
Tyler H. and Richard R.



ECE 558 EMBEDDED SYSTEM PROGRAMMING

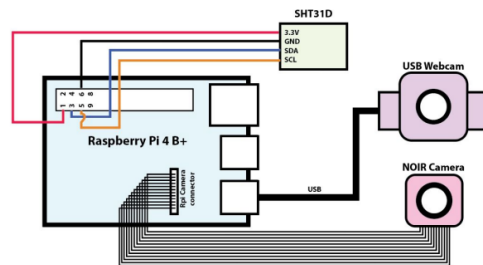


Figure 2: Updated schematic for our implementation of the project.



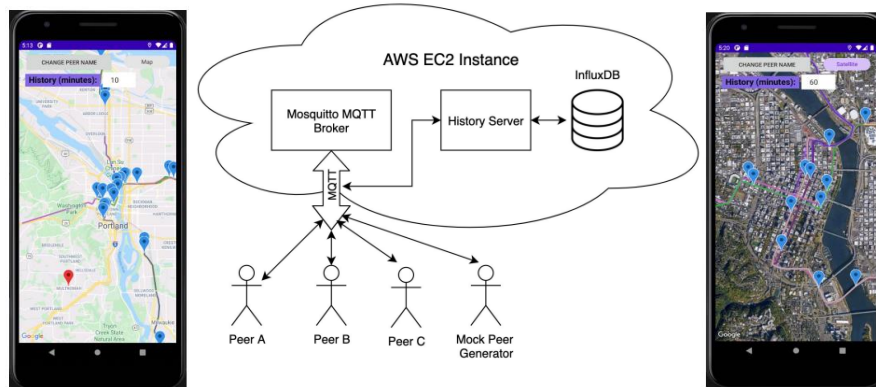
 **Portland State**
UNIVERSITY

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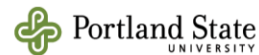
Winter 2021 Wall of Fame Runner-up

Marco Polo (Peer to Peer location sharing)

Oliver R. and Miles S.



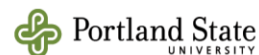
ECE 558 EMBEDDED SYSTEM PROGRAMMING



Other Notable "Wall of Fame" Winners

- ☐ IoT-based Thermostat Controller
 - Daniel D., Meshal A., Tristin K.
- ☐ Communication Hub
 - Roberto G. Maty B.A. and Aron S
- ☐ Real-time Object Detection w/ Machine Learning
 - Mohak P., Archit T.
- ☐ Mobile Camera Robot
 - Charles S., Brett C., Scott M.
- ☐ Recipe Book – Soup to Nuts Meal Making Support
 - Lowren L. James N., Cody O.
- ☐ Hub of Things
 - Surendra M., Josh S., Colin M.

ECE 558 EMBEDDED SYSTEM PROGRAMMING



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 Thu 03-Mar
 - Would be to your advantage to beat this deadline since it will give you more time to work on the project
- Team meeting w/ Roy and Emily on Thu, 10-Mar (and Fri, 11-Mar if needed)
 - Will be via Zoom (15-20 min/ea)
 - Discuss project goals, progress, barriers, deliverables, etc
- Demo Day is **Wed, 16-Mar from 5:00 PM – 7:30 PM**
 - 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 Canvas and GitHub by 10:00 PM on Thu, 17-Mar
 - Please do not miss the deadline - we need time to grade them

Grading

- ☐ Team meeting/progress update – 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
- ☐ 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 and C (or ASM) 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 ideas

- ❑ Extend Project #2 w/ additional sensors (wind speed and direction, moisture, etc.)
- ❑ Implement an Android app that makes use of a web-based RESTful API (Weather app, real-time stock pricing, nutrition, Netflix catalog (https://flixed.io/us/en/lp/streaming-availability?utm_source=flixed&utm_medium=organic&utm_campaign=netflix-api), Trimet, ...)
- ❑ Single or dual device arcade game
- ❑ 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 2022 "Wall of Fame" Winner(s)

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