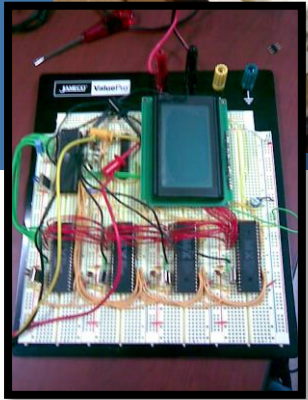
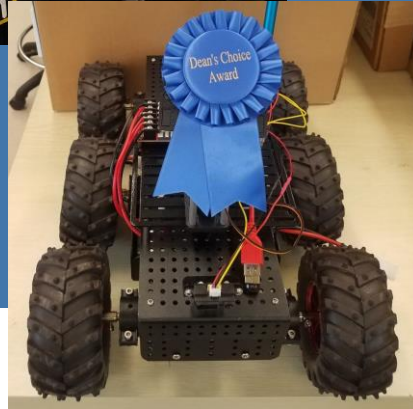


# MOVIN' ON UP... to Senior Design

Senior "Pre-Design" & Design Course Series '23-'24

Presented by Professor QV Dang for '23 Junior Advising Session

images used in this presentation obtained from UCI-related or stock photography sites



## Cashierless Convenience Store: AmaZOT! Go

UCI Samueli School of Engineering Department of Electrical Engineering and Computer Science

Team Members: Isaac Espinosa, Omar Vega, Brandon Schneider, Nicholas Yong | Mentor: Rainer Doerner

### Our Problem

The average grocery store finds customers waiting around 5 1/2 hours annually in checkout lines alone. By eliminating cashiers and having checkout automatically occur on exiting a store, we believe we can reduce this time to zero hours.

### Our Idea

- 1 - Range sensors detect when an item has been taken from a shelf
- 2 - Cameras take a picture of the customer
- 3 - Amazon's Rekognition facial recognition API matches the picture with available faces in our Google Firebase database

### The Design

Walk in and try it for yourself! Either download the Android app to your phone or use one of our demo phones, then upload a picture of yourself to our database. Then, check into the store by simply stopping by our check-in camera, pick up a food item that looks good to you, and be sure to check out before you leave!

ENTRANCE

Step 1: Get our app and upload a picture of yourself to our database



Step 5: Come again soon!

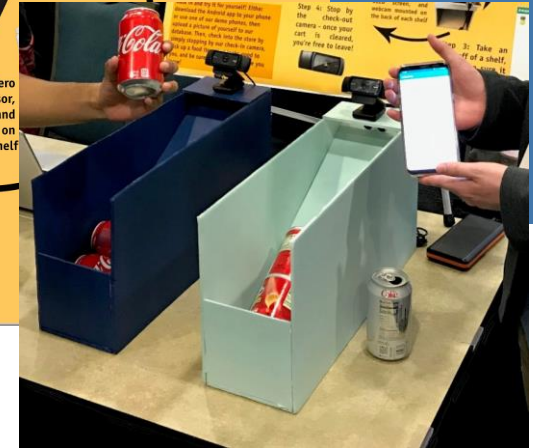
EXIT

Step 2: Come up to our check-in camera, then enter the store



Raspberry Pi Zero with range sensor, OLED screen, and webcam mounted on the back of each shelf

Step 4: Stop by the check-out camera - once your cart is cleared, you're free to leave!



# What is Senior Design?

# Senior Design Topics/Thrusts



## Industry/Faculty Proposed Projects

- Industry Based Projects
- Faculty Research Related Opportunities



## Student Proposed Projects

- Sustainability Considerations
- Community/Outreach Potential
- Autonomous Applications
- Internet-of-Things Integration

**Makes a Great Portfolio Piece**

# Your Senior Design/Capstone Advisors



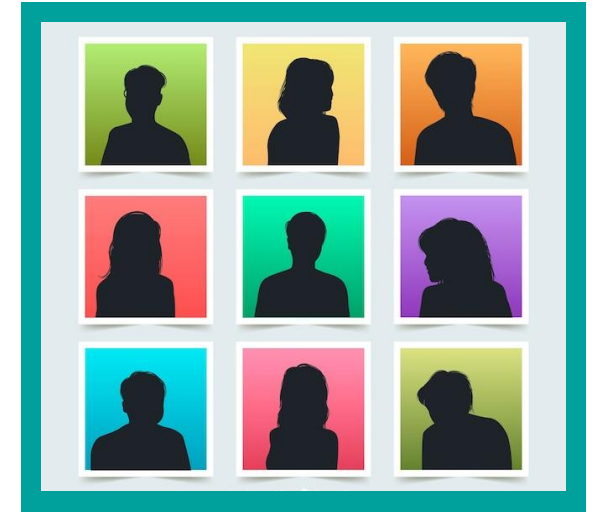
Quoc-Viet Dang



Hung Cao



Maxim Shcherbakov



Your Team's  
Client/Sponsor/Advisor

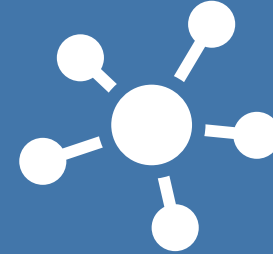
# Senior Pre-Design – S'23 – EECS 198 – 1-unit – Sign-up, **PLEASE**



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Form a Team of  
2-3 Engineers

Brainstorm Ideas  
and  
Establish Goals



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Pitch Ideas to  
Sponsor/Advisor/Client

Apply for UROP/SURP

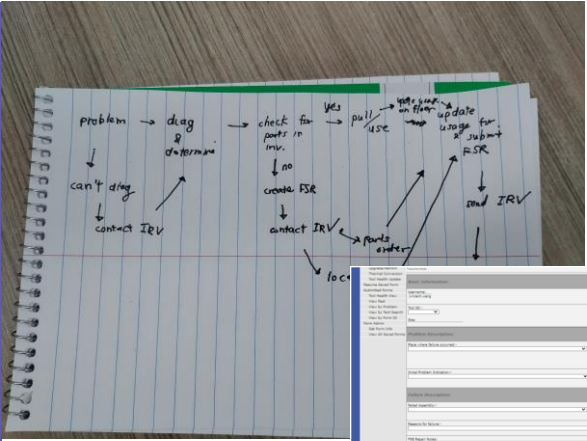


# Featured Industry Proposed Project for '23-'24

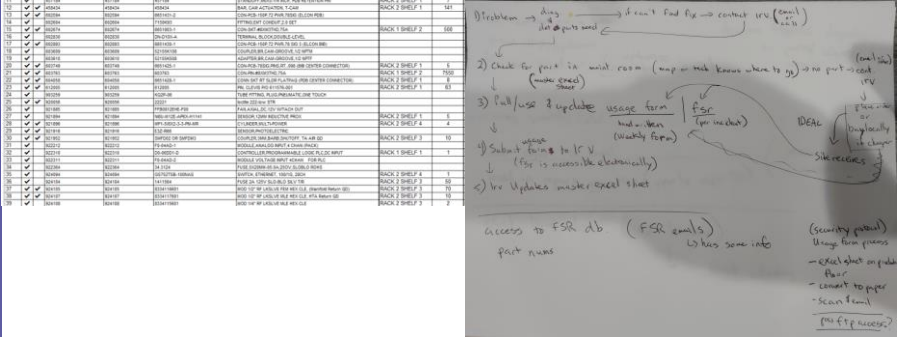


## Current Field Service Reporting and Inventory Tracking

- When a part needs to be replaced:
  - Technician checks "master" inventory Excel sheet for levels.
  - They go to inventory location to pull part(s).
  - They create a report on our FSR site, which notes the date/time, user, problem description, part name, quantity used, etc.
  - They update inventory on excel sheet/hand-filled sheet.
  - The updated Excel sheet should be sent to us in the U.S., but this does not always happen on time.
  
- At every step, there could be discrepancy with true inventory levels because of the **manual** nature of this process. Also, we have multiple overseas sites, so the problem is amplified more.



Part Number	Qty	Location	Unit Price	Total Price	Inventory Location	Stock	Order Status	Comment
1	10000	10000			STOCK 1 SHELF 1	2	OK	
2	10000	10000			STOCK 1 SHELF 1	2	OK	
3	10000	10000			STOCK 1 SHELF 1	2	OK	
4	10000	10000			STOCK 1 SHELF 1	2	OK	
5	10000	10000			STOCK 1 SHELF 1	2	OK	
6	10000	10000			STOCK 1 SHELF 1	2	OK	
7	10000	10000			STOCK 1 SHELF 1	2	OK	
8	10000	10000			STOCK 1 SHELF 1	2	OK	
9	10000	10000			STOCK 1 SHELF 1	2	OK	
10	10000	10000			STOCK 1 SHELF 1	2	OK	
11	10000	10000			STOCK 1 SHELF 1	2	OK	
12	10000	10000			STOCK 1 SHELF 1	2	OK	
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26	10000	10000			STOCK 1 SHELF 1	2	OK	
27	10000	10000			STOCK 1 SHELF 1	2	OK	
28	10000	10000			STOCK 1 SHELF 1	2	OK	
29	10000	10000			STOCK 1 SHELF 1	2	OK	
30	10000	10000			STOCK 1 SHELF 1	2	OK	



## Proposal

- Web app with GUI and database that replaces our FSR site and manual Inventory Tracking sheet (Excel file)
  - Inventory control and "real-time" reporting
  - Email compatible
  - Oracle compatible

## Project Benefits

- Access to Industry Mentor
- Real-world project, real-world problems, real-world use
- Large training data set (hand-written scans, interconnected systems, security considerations)

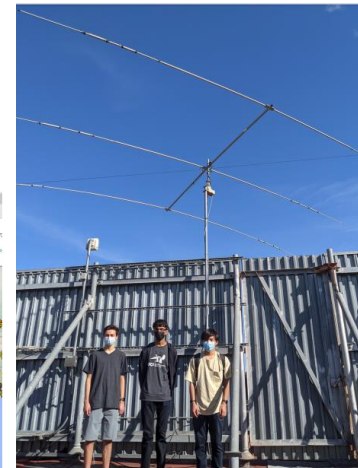
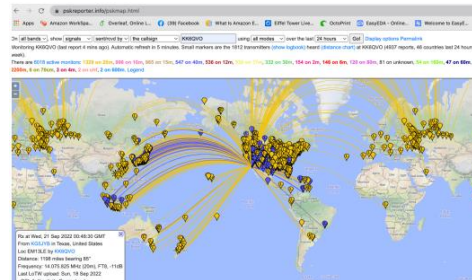
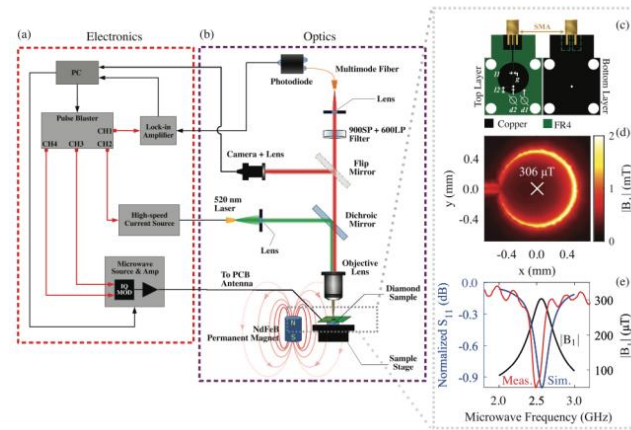
# Recent Faculty Proposed Projects

## Quantum bit

Students will be expected to build and demonstrate a room temperature quantum bit using optics and a magnet, as well as a diamond file, as per this paper:

Sewani, V. K., Vallabhapurapu, H. H., Yang, Y., Fingau, H. R., Adambukulam, C., Johnson, B. C., Pla, J. J., & Laucht, A. (2020). Coherent control of NV – centers in diamond in a quantum teaching lab . American Journal of Physics, 88(12), 1156–1169. <https://doi.org/10.1119/10.0001905>

email Professor Burke  
<pburke@uci.edu> if interested



## Around the world radio

Students will be expected to get a \$20 SDR and a Raspberry Pi, and attach it to the antenna on top of MTSA. The group will write a Python program to monitor radio signals from around the world and record the signal strength.

See e.g. pskreporter for the signal reports from Professor Burke's house. The UCI MTSA antenna should be MUCH better. See <https://sites.google.com/uci.edu/k6uci/>

Ambitious students can transmit signals if they get licensed by the FCC, which is possible during the period.

email Professor Burke  
<pburke@uci.edu> if interested

# Recent Student Proposed Projects

## Autonomous Vehicle for Localization and Mapping of Indoor and Remote Spaces

*This project aims to take similar mobile robotics indoors and apply it to small, enclosed, or remote locations. This project is based on a ROS software framework and does image processing from camera data using OpenCV and Nvidia Jetson CUDA cores, allowing it to detect lanes and road edges.*



## Privacy of Voice Activated Devices

*We added a feature to voice activated devices that provides an extra layer of privacy protection. This feature consists of a signal jammer that can be controlled by an external app. This would provide convenience for the user to activate jammer from the click of their phone to ensure complete privacy while still having full access to their voice activated device.*



# Looking to the Future

## Visit '23 Winter Design Review

3/17/23 from 1-4pm @ UCI Cove at Beall Applied Innovation  
5270 California Ave. #100, Irvine, CA 92617

[https://uci.co1.qualtrics.com/jfe/form/SV\\_7VvF8A9K0kdHZ9s](https://uci.co1.qualtrics.com/jfe/form/SV_7VvF8A9K0kdHZ9s)

Thank you!  
Questions/concerns?