SJSU SAN JOSÉ STATE UNIVERSITY

Department of Aviation and Technology

Technology Program Senior Projects

May 13, 2022

Senior Project Profiles

Compiled by the Department of Aviation and Technology

San Jose State University

Spring 2022

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408 924-3190, or visit our website:
http://sjsu.edu/avtech

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Senior Project Team Presentation Schedule on May 13, 2022

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a. Dr. Tehrani's class:	
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2. MAJAK Pet Food Dispenser	8:15 - 8:30 am
3. Pool Monitoring and Safety Device	8:30 - 8:45 am
4. SERO: Security Robot	8:45 - 9:00 am
5. Posture Expert: Smart Chair Posture Pad	9:00 - 9:15 am
6. E-Grow	9:15 - 9:30 am
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Break	9:45 - 10:15 am
b. Professor Ionescu's class:	
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12. X-Ball	11:15 - 11:30 am
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c. Dr. Yan's class	
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17. Voice Activated Drink Maker	1:15 - 1:30 pm
18. Solar Power Portable Charger	1:30 - 1:45 pm
19. Word Clock	1:45 - 2:00 pm
20. Jabil Scholars – Machine Learning	2:00 - 2:15 pm
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24. Smart Safety Handle for Public Transportation	3:30 - 3:45 pm
25. Smart Fish Tank Beginner Kit	3:45 - 4:00 pm
26. multi-purpose injection pen	4:00 – 4:15 pm
27. Eyewash Station Water Sensor	4:15 - 4:30 pm
28. Wildfire Monitoring & Early Detection System For Remote Areas	4:30 - 4:45 pm
29. Home Air Quality Monitoring System	4:45 - 5:00 pm

Shreddinator: Plastic Shredder

Student Team Members:
Mohammad Fadzrill Aliff bin Fadzhairi
George Khalilieh
Thalia Tran
William Tran
Hao-Yin Yu

Faculty Advisor: Dr. Nik Tehrani

Project Scope and Objectives:

1. Create a portable, affordable and accessible plastic shredder to promote plastic recycling.
2. Encourage the learning of plastic wastes reduction and plastic disposal.
3. Educate the community on transforming plastic waste into sustainable and meaningful products.

Project Results:

1. Create a functioning prototype that can at least shred single-use plastic bottles.
2. Implement IoT functions and interactions with the shredder machine to ensure safety.
3. Provide instructions, information, and control through a mobile interface.

Sponsors: SJSU Sustainability Office,

Product Images:

MAJAK Pet Food Dispenser

Student Team Members:

Joseph Holt
Alexander Aivaliotis
Kim Nguyen
Manjider Chung
Akhdan Gadang

Faculty Advisor:

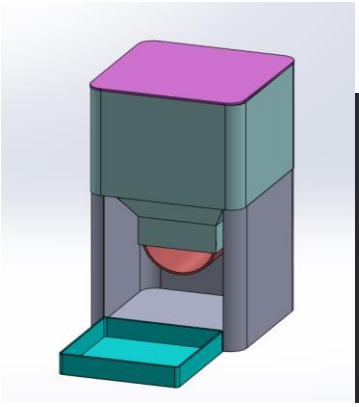
Prof. Nik Tehrani

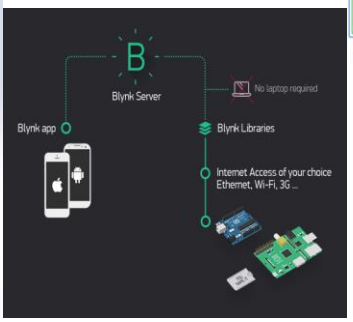
Project Scope and Objectives:

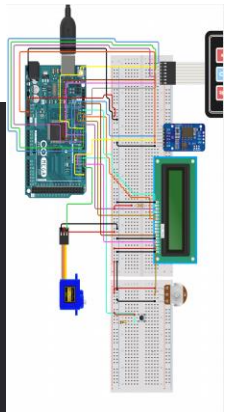
The Majak PFD is an IoT mechanical device developed and designed to provide an automated pet feeding experience at the click of a button. Either by pressing a physical button or through a mobile app, pet parents can plan and schedule feedings or dispense food immediately to their hungry pet companions. In addition to automated feedings, The Majak PFD also incorporates a dual notification system through colo-coded LED status indicators that inform the user of the state of the device and notifications through email/text messages, which tell the user of successfully dispensed food.

Project Results:

1. Designed CAD models for housing assembly and electronics subassembly.
2. Housing assemblies fabricated via FDM additive manufacturing at Jabil Blue Sky.
3. Created circuit incorporating an Arduino microcontroller to control a motor and various sensors.
4. Mobile device communication and control by integrated IoT hardware.
5. Device status LED indicators and email/text notifications to the user.







Pool Monitoring/ Pool Safety Device

Student Team Members:
Dat Pham, Khai Mai, Julius Ali, Heredia Herendira, Ilya Nikitin

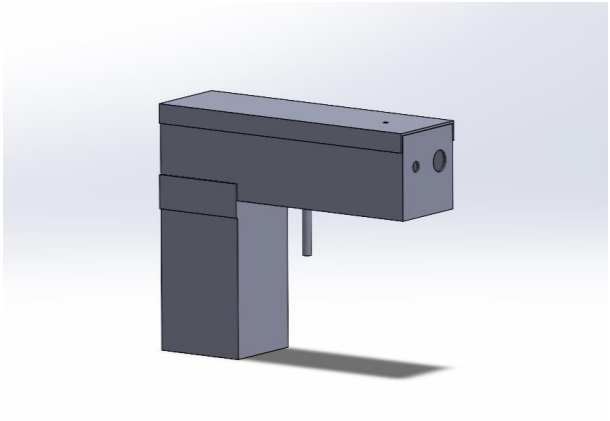
Faculty Advisor:
Dr. Nik Tehrani

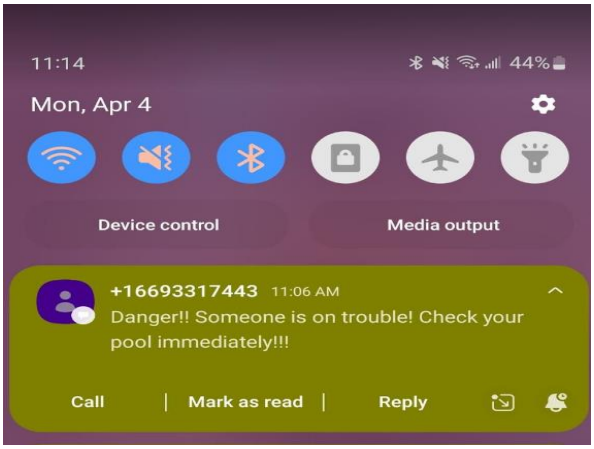
Project Scope and Objectives:

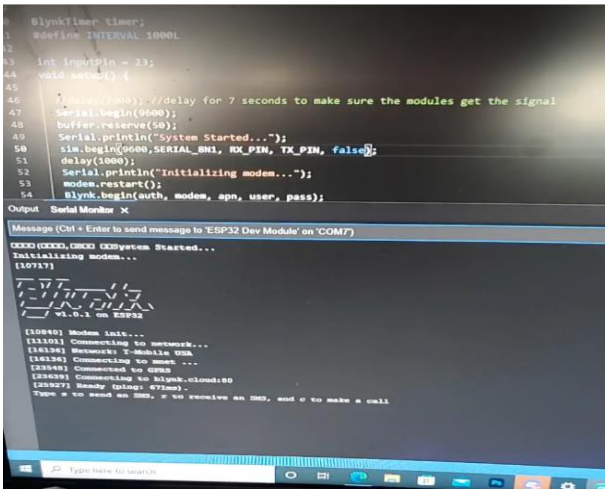
1. The device is equipped with a water sensor which triggers a message and call to the homeowner when a child or pet falls into the water. It can easily detect the water motion.
2. The device has an innovative design to ensure safety in all pools: spas, ornamental pools, constructed or temporary pools.
3. The device comes with a Blynk app used to set up and control the pool alarm. With the Blynk app, users can deactivate the alarm to allow swimming. Use it to adjust the sensitivity of the system.
4. Setting up is easy and batteries included.

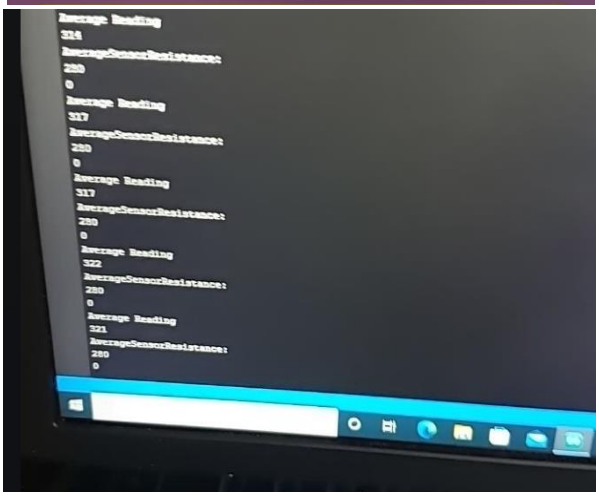
Project Results:

1. Successfully triggered the alarm to send messages and auto make a call to users' phones.
2. The device is connected to Wi-Fi so the user can modify the water sensitivity.
3. It successfully links with Blynk to track the water level measurement.









SERO - Security Robot

Student Team Members:
Andrew Ha
Nha Phung
Leslie Rameriz
Celina Khauv

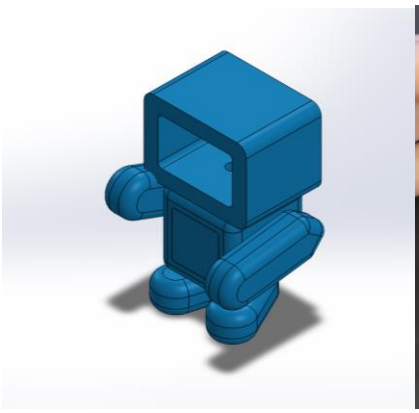
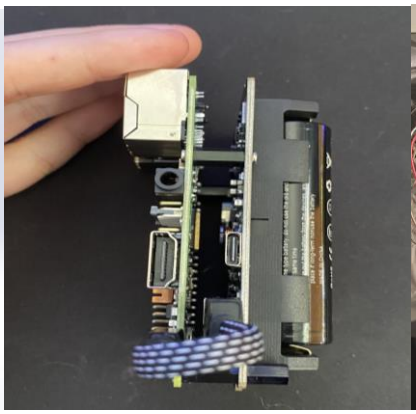
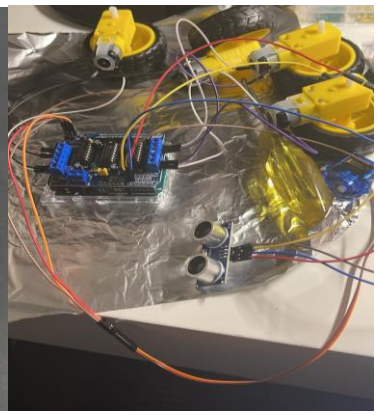
Faculty Advisor: Dr. Nik Tehrani

Project Scope and Objectives:

1. **Objectives:**
    a. Security robot for kids and senior people
    b. Eco friendly: Rechargeable batteries, durability
    c. Voice assistant and mobility
    d. Secure IoT, cloud database, and storage
2. **Scopes:**
    a. Market research: benchmarking, customer range
    b. Determine Bill of Materials, product cost, and selling price
    c. Robot 3D model: drawing, printing, and assembly
    d. Programming:
        i. Voice command
        ii. Movement of wheels: obstacle avoiding and Bluetooth control
    e. Purchase and solder electronic components
    f. Prototype

Project Results:

- Created a 3D model for physical assembly and prototype
- Completed the coding of voice command and movement of wheels
- Working camera with recording ability

Posture Expert - Smart Chair Posture Pad

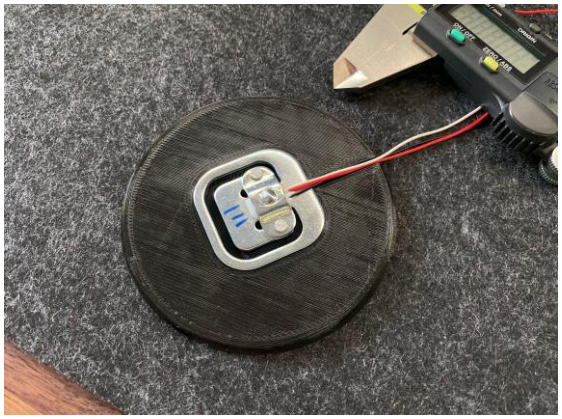
Student Team Members:
Andrei Astafyev
Ashley Havrilla
Roberto Mandujano
Aaron Tran
Ben Zhu
Faculty Advisor:
Dr. Nik Tehrani

Project Scope and Objectives:

- To design and develop a desk chair pad/insert that provides audible and digital notifications to inform the occupant to correct their posture and reduce strain on the body from extended seated sessions.
- Assemble a sample desk chair pad that utilizes load cells and additional output devices and a Raspberry Pi microcontroller to simulate the product.
- Develop code that will successfully operate the desk pad and account for a user's weight, posture, and positioning.
- Research proper seating positions that limit strain and test the final desk chair pad to acquire data from "correct" and "incorrect" positioning to ensure the product completes the task as expected

Project Results:

- Determined which sensors and output devices will be utilized in assembly (along with wiring schematics and parts list
- Designed and 3D printed functioning load cell distribution pads to ensure loads are measured accurately.
- Wrote code to test sensors in an array and acquired data from numerous occupants
- Finalized product and demonstrated effectiveness



E-Grow

Student Team Members:
Siavash Jamshidi
Gabriel Valenton
Afshin Motalebi
Justice Molina
Khalid Salih

Faculty Advisor: Dr. Nik Tehrani

Project Scope and Objectives: Our objective is to create an interactive application that uses quantitative and qualitative data to help beginners, and those with experience learn how to make informed trading decisions. Our platform includes the decision-making bot created by Siavash and a dashboard that allows users to visualize and interact with the data. Furthermore, we plan to use the bot's AI capabilities to execute trades on behalf of the user.

Project Results: We delivered a web-based application that allows users to interact and view their data and the suggestions they receive from us. Using Python libraries, an automated program runs through many data sources, collecting different variables about the markets or cryptocurrencies' status. From the data extracted, we calculate the trend and validity using statistical analysis to make sense of it. Our app functionalities include being able to select different currencies, calculating the market sentiment value, calculating the ADX and trends, viewing the market stats, and being advised to buy or sell. The output of this data is visualized in a dashboard where you can see the trends and weight of the trend and other significant indicators. The app is hosted on Amazon Web Services.

STRONG DOWNTREND for BCHUSD: The ADX is 32.25
STRONG UPTREND for MKRUSD: The ADX is 43.59
STRONG UPTREND for USDTUSD: The ADX is 56.69
STRONG UPTREND for DAIUSD: The ADX is 75.99
STRONG UPTREND for MATICUSD: The ADX is 35.63
STRONG UPTREND for AAVEUSD: The ADX is 38.42

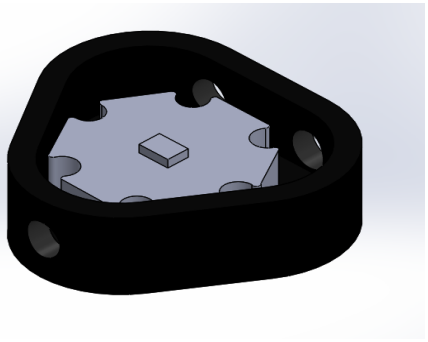
Blue Car Solutions

Justin Cabral, Matthew Krek, Alexander Chow, Fernando Gamboa, Matthew Gonzales

Problem:

Ridesharing and other transportation services have suffered and restrained due to safety restrictions brought on by COVID-19. Blue Car Solutions is providing a new product to protect drivers and passengers from contracting illnesses using our new device.

Image of First Product and New Concept:



Product:

Our product is a UVC light system that will shine on the back cabins of any car and eliminate pathogens and germs on the cabins' surfaces and those that are airborne. Due to the adverse effects that UVC light has on people, our device additionally contains sensors that will detect passengers and prevent the device from activating if there are passengers present.

Benefits:

Our product boasts the ability to denature pathogens on surfaces or are airborne in a matter of minutes, allowing for sanitation between rides. Car enthusiasts will be pleased to know that our product does not significantly affect the interior of cars. Additionally, our device is compatible with many different vehicles and is easy to install.

Components:

Our product utilizes the following components:

- Ultraviolet (UV-A) High Power LED Stars
- ASA filament to 3D print the casing due to its great thermal properties
- Arduino Uno to upload our code to and run our safety protocol

Wumpster

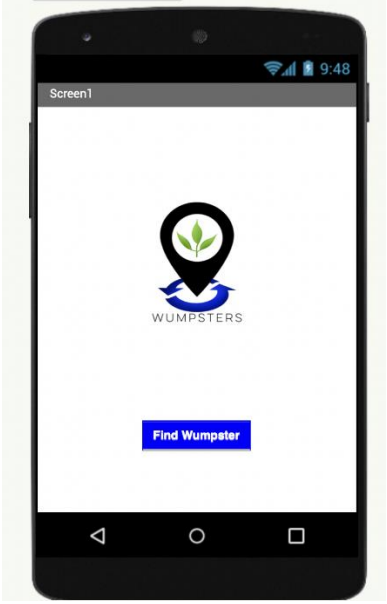
Student Team Members: Sabrina Bonifacio, Bryan Do, Charlie Ventura, Steve Vaquez
Faculty Advisor: Vlad Ionescu

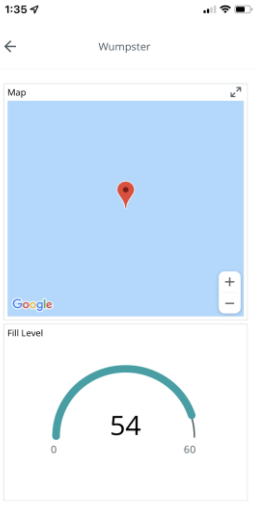
Project Scope and Objectives:
The goal of this project is to enhance the environmental well-being of the San Jose State University campus by finding a user-centered waste management solution that takes advantage of technological advancements and innovative design. The problem we are trying to solve is the amount of full/overfilled bins around campus that go unchecked for long periods of time. Throughout our campus and the surrounding downtown San Jose area, proper waste management has been an ongoing issue as individuals often do not ensure they are placing their trash in the correct bins. Our proposed solution would provide an IoT Waste management system that will allow efficient garbage disposal by automatically moving the user's trash to the respective compartment after the user has placed the trash.

Project Results: The Wumpster is configured to be a streamlined waste bin. The IoT materials will be contained in a plastic housing at the top of the lid to prevent signal loss. The Wumpster will send data to the Wumpster mobile app to indicate the nearest waste bin, the type, and status of the bins (usable or full). If the bins are full, the rotary system will rotate and block the waste placement platform to prevent users from inserting more trash in the Wumpster.

The Wumpster prototype currently consists of various materials for the form factor. The body of the Wumpster is of plastic material in a rounded shape. It is a scaled-down version of our 32 gallon specification and is currently 20 gallons. The compartment lid, where users place the trash, is made of a combination of wood and hard foam that is secured with screws. Wood pillars were also used to create the gap for the compartment lid between the bin opening and top of the lid. The revolving mechanism is made of a wood pillar as the center with hard plastic attached for the fin-like structures that sweeps trash into the bin. The Wumpster will use a 3.7v 2500mAh lithium-ion polymer battery that is recharged by a solar panel as the power source.

Additionally, the Wumpster Mobile App has been created with the initial designs for users to interact with the various Internet of Things implementations. The Wumpster Mobile App will allow users to determine the location of the nearest Wumpster and know the type, along with the fullness, of the Wumpster.





Aqua Terration

Project Objectives/Scope:

- Main purpose of this project: To create a system that automatically dispenses water to water crops/plants depending on a soil moisture sensor where low soil moisture means soil is dry, needing to be watered and vice-versa, while data and instructions can be received and sent to and by the Arduino microcontroller, respectively.
- Hardware Components: 1x Arduino MEGA 2560 microcontroller board, 1x Sparkfun Soil Moisture Sensor, 1x Plastic Solenoid Valve, 1x Fountain Pump and 2x pipes with valve, varying number of jumper cables, 1x barrel jack connector
- Software used: Arduino IDE, MIT App Inventor 2 for the Smartphone app.

Project Results:

1) Arduino code successfully allows the system to automate by opening the valve given the conditions that: the system receives power, sensor relays low moisture data and the override is not set to “off”, otherwise Arduino powers down and valve stays closed.
2) Smartphone app is set up for BLE (Bluetooth Low Energy) connectivity. Can connect to Android devices and Windows OS computers but not iPhones/iMacs from Apple. App allows for the smartphone to act as an “override” to turn the system on-and-off, as well as view weather data.

Sponsor: N/A

Faculty Advisor: Dr. Vlad Ionescu

Student Team Members: Travis Pham, Ryan Kim, Anthony Lew, Tyler Boden

MediSpense

Project Scope and Objectives:

The Medispense is pill dispenser that contains a corresponding app that can track and notify the users when to take their medication. The goal of this project is to produce a pill dispenser that can aid users in taking their medications properly, thus alleviating confusion and preventing overdosing and underdosing of medications. This product is primarily directed towards any medication user and the elderly. Users should expect to dispense their pills, improve medical organization, be reminded when to take their medication, and interact with a user-friendly application.

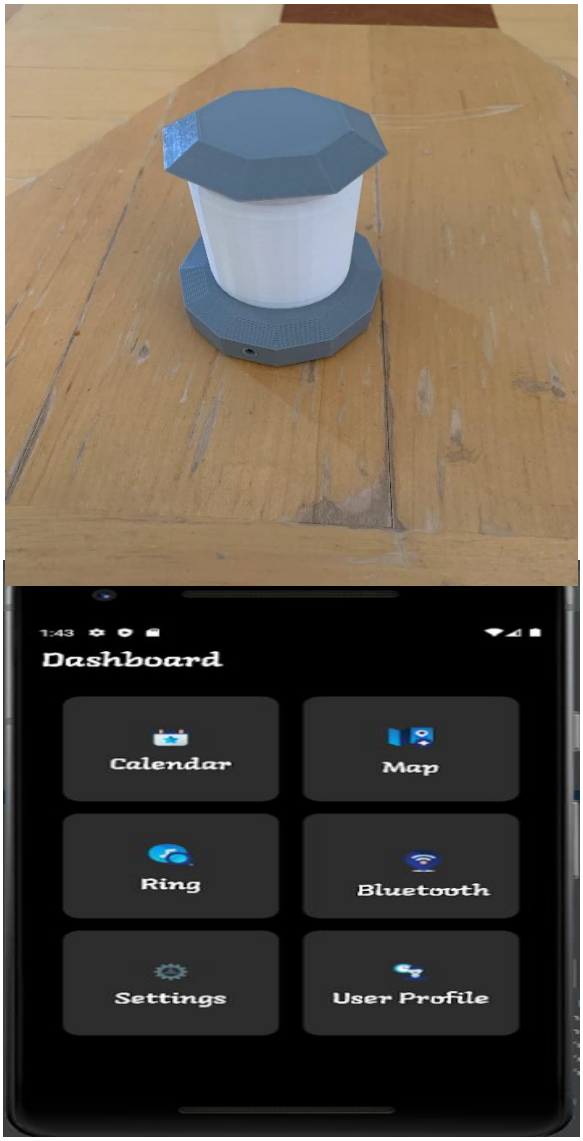
Project Results:

The MediSpense functions as a pill dispensing organizer. The dispenser functions with a rotating medication wheel with each pill having a designated spot. The corresponding app features a user-friendly interface with a functioning calendar, notification system, and countdown feature for pill consumption.

Sponsor: N/A

Faculty Advisor: Vlad Ionescu

Student Team Members: J. Elias Rodriguez, Elskee Silorio, Jimmy Rojas, Luis Amaya



BlockView Blinders

Project Scope and Objectives:

1. Develop a Blinds Systems that can be set into different modes depending on the users preference (light sensor, privacy)
2. Create a mobile application that allows the user to change these settings manually and have a friendly UI system.
3. Create a “Privacy Mode” which can sense movements from outside the window to close the window consequently
4. Incorporate weather API to geographically tell where the sun is and if the blinds need to be closed or open due to this information.

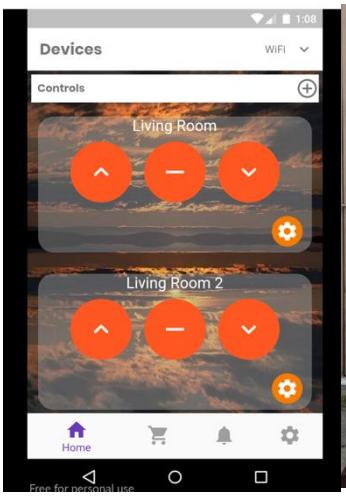
Project Results:

Our team was able to create a properly operating prototype which was able to connect to our app over Wi-Fi networks. We are still adding more features to the app to increase functionality. Our next goal is to create a design look and feel for luxury.

Sponsor: No Sponsor

Faculty Advisor: Vlad Ionescu

Student Team Members: Jenna Huynh, Thinh Hoang, Michael Cheng, Rose Tong, Matthew Rizzo



X-Ball Detector

Company Name: XBD Incorporated

Project Scope and Objectives:

- 2 Hall Effect Sensors inside the ball will detect if a ball is out of bounds.
- Magnetic boundary line under the field boundary line will help trigger the sensor detection.
- There is a main unit that includes the red LED and LCD screen that is used to show spectators to see if the ball is out of bounds.
- Providing very accurate and real-time to referees as well as the spectators.
- Small, lightweight sensors will be implemented into various balls that will be durable and won't hinder gameplay.
- Syncing wirelessly through an app which also displays a virtual LED and LCD screen for easy accessibility.

Project Results:

The X-Ball Detector is a device that can detect if a football is out of bounds. This device aims to increase the legitimacy of on-field rulings and help referees on calls regarding out-of-bounds. Hall sensors in the ball would allow accurate detection relative to the out-of-bounds marker. When sensors are triggered by the magnetic boundary, an out-of-bounds signal would be displayed with the help of a red LED light and an LCD screen that will display "Out of Bounds!". This will also display in the app with a virtual LED and LCD. This signal will last for 5 seconds.

Sponsor: SJSU

Faculty Advisor: Professor Vlad Ionescu

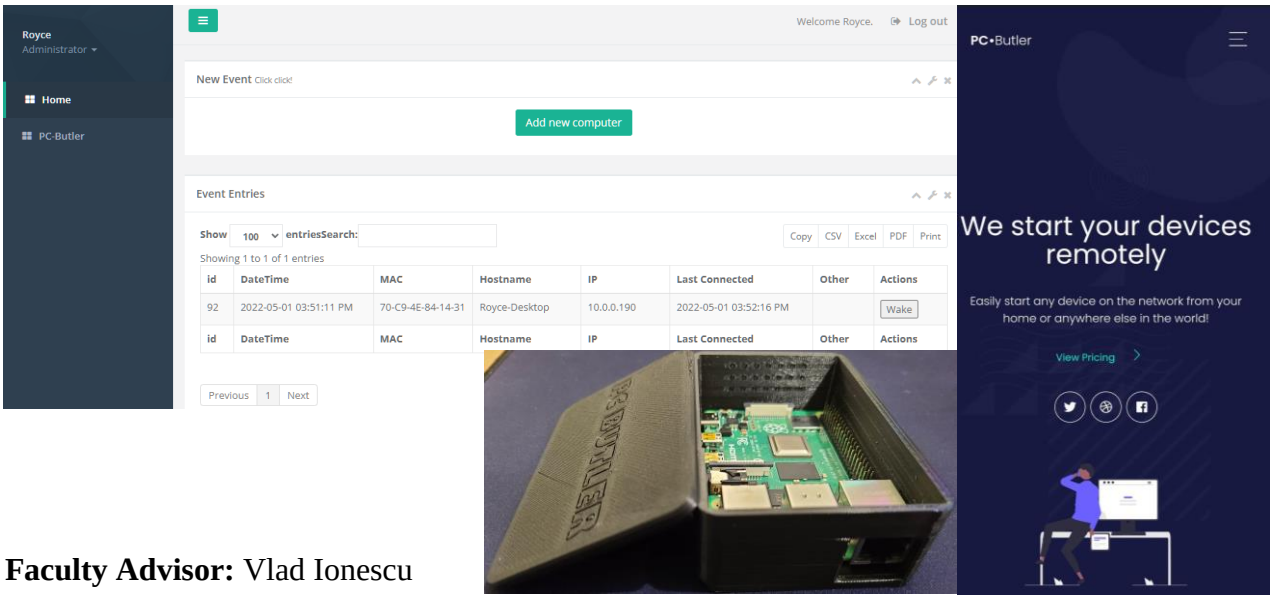
Student Team Members: Anirudh Nair, Christianedane Lim, Joseph Dyer, Tommy Huynh, Tri Nguyen

Scope and Objectives:

PC Butler is a remote device management service that allows businesses to access their on-site infrastructure through our secure service portal. The objective of this product is to use an Always on IoT device to automatically perform network discovery and monitor power states of discovered devices. This information is then used to remotely manage these devices, using Wake-on-Lan functionality to wake them on from a fully powered down state and access their resources from any network using remote desktop applications. The service runs on a web interface so it can be accessed using any computer or mobile device. It can be accessed by both IT personnel to ensure proper management and employees to access their own personal resources such as their personal workstations. To ensure security, all cross-network traffic will be encrypted using TLS 1.3 and all resources will be secured with login credentials.

Results:

PC Butler can currently communicate between the IoT device and the server, sending and monitoring networking and device information across remote networks using API calls. IT personnel can access this information at dashboard.pcbutler.net to ensure proper service functionality. The service can monitor devices and wake them up remotely through the press of a button. Once the device is fully powered it should enable the preconfigured RDP server setup by the user and give the user secure access to their personal resources.



Faculty Advisor: Vlad Ionescu

Team Members: John Wen, Royce Whitaker, Sai Paladugu, Lucia Ho, Nathaniel Reyes

Cybersecure Multilock

Project Scope and Objectives:

1. Design a smart door lock allows users to open doors more easily while providing security
2. To allow users to have multiple ways to unlock the door
3. Design an Android app that can remotely control the opening of the door so that the user can control the opening and closing of the lock even when the user is not nearby
4. Implement a touch screen capable of displaying all functions for the user to select
5. Design and build a 3D printed front and back panel capable of holding all the components
6. Users are able to see the power life of the smart lock through the power lights on the back panel, which allows the user to charge the battery

Project Results:

1. Successfully built five ways to open the smart lock: face recognition, fingerprint recognition, Pin pad, remote app control, and physical key
2. Successfully implemented web server and Raspberry Pi client communication, users can use the Android app to be able to control the Raspberry Pi through the network
3. The LCD touch screen was successfully implemented to allow users to use their fingers to select how they want to unlock the smart lock
4. Successful implementation and installation of all electronic components in the 3D-printed panels. Users can see the battery level of the product

Faculty Advisor: Professor Vlad Ionescu

Student Team Members:

Jiaheng Xiang, Mengyu Zhu, Son Doan, Chaoxiang Chen

UV Sanitizing Chamber

Student Team Members:

Anthony Chan

Karn Saini

Johnny Trang

Jordan Truong (Team Leader)

Faculty Advisor: Dr. Yan

Project Scope and Objective:

1. Design a functioning, safe, and user-friendly product in which items can be stored and thoroughly sanitized while avoiding the use of traditional water-based sanitizing solutions. The sanitizing chamber focuses on disinfecting items that may be water sensitive such as electronics, paper, consumables, etc..
2. Assemble and program a circuit that turns on/off UV-C bulb and tracks/displays sanitization time automatically.
3. Research proper UV-C sanitizing requirements including wave frequency parameters, duration, as well as potential health risks from direct exposure.
4. Meet the following specifications:
   a.) Minimum UV-C wavelength of 222 nm for disinfection
   b.) Accommodates most phone sizes
   c.) Automatic shut-off sensor to avoid direct exposure to skin and eyes

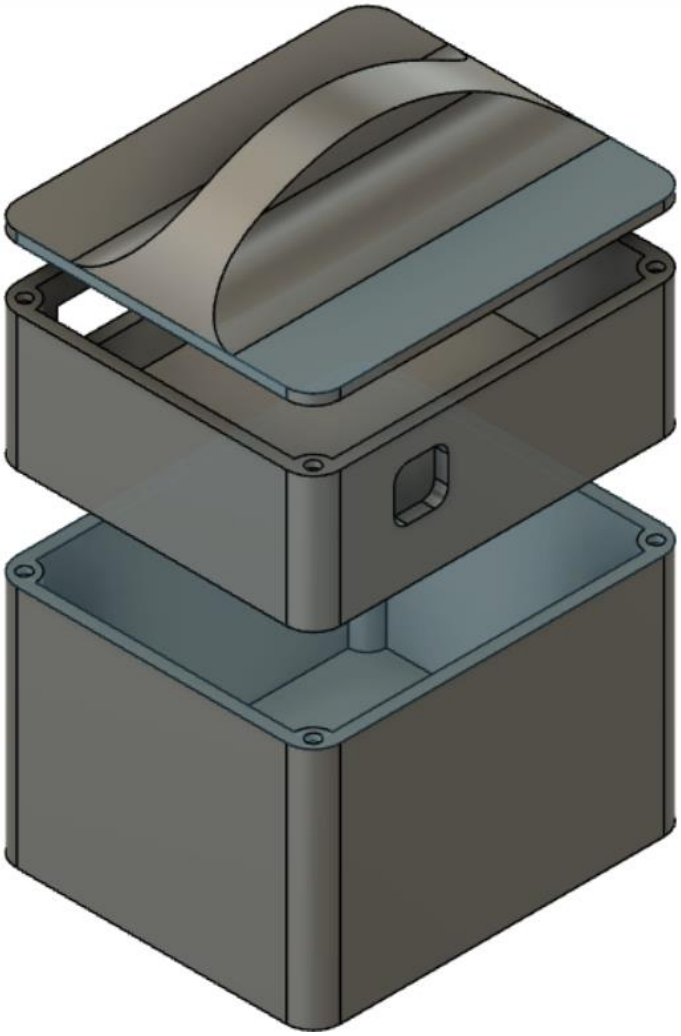
Project Results:

1. Designed and 3D printed CAD models of all 3 components of the product on SolidWorks
2. Fabrication of printed parts to accommodate accessory parts (LCD display, magnets, wires)
3. Interfaced all electronics hardware with digital software

Sponsor:

None

Product Images:



Smart Dog Collar

Student Team Members:

Vincent Asaro

Yasmine Springer

Hubert Pascual

Jeiffer Araujo

Shan Pannu

Faculty Advisor: Dr. David Yan

Project Scope and Objectives:

1. Design and build an IOT smart dog collar through Solidworks, and 3D printing in Cura with an Ultimaker 2+.
2. Track a dog's beats per minute (BPM), number of steps, and GPS location.
3. Users should be able to view their data on a website, and app.

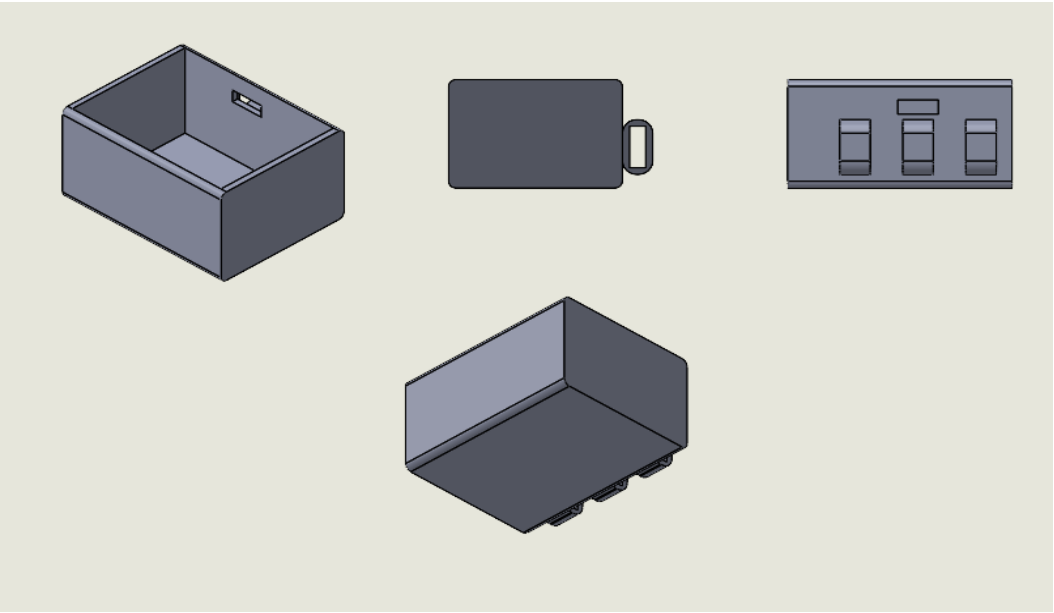
Project Results:

1. Designed a CAD model of a chassis that fits on an existing dog collar.
2. Users can see BPM, steps, latitude, longitude, and a satellite image of their dog's location through Thingspeak, and a smartphone app called Thingview.

Sponsor:

None

Product Images:



Voice Activated Drink Maker

Student Team Members:

Samantha Tamondong

Christian Navarro Parra

Alexander Pena Ruiz

Rolando Zamora

Faculty Advisor: Dr. David Yan

Project Scope and Objectives: (detail your project scope and objectives below)

1. Design and build a voice activated drink maker to facilitate the process of serving a drink of your choice.
2. The voice activated drink maker will be designed for people who suffer from blindness and have difficulty serving themselves drinks.
3. Provide SJSU students with a project that involves hands-on experience for students that will learn how to integrate electronics, software, hardware, and to learn about fabrication processes.
4. Meet the following specifications:
    a. Speech recognition is used to invoke the machine to carry out actions
    b. Will be able to request various types of mixed drinks by using voice recognition
    c. Voice system will indicate when a certain action is taking place and when it is complete

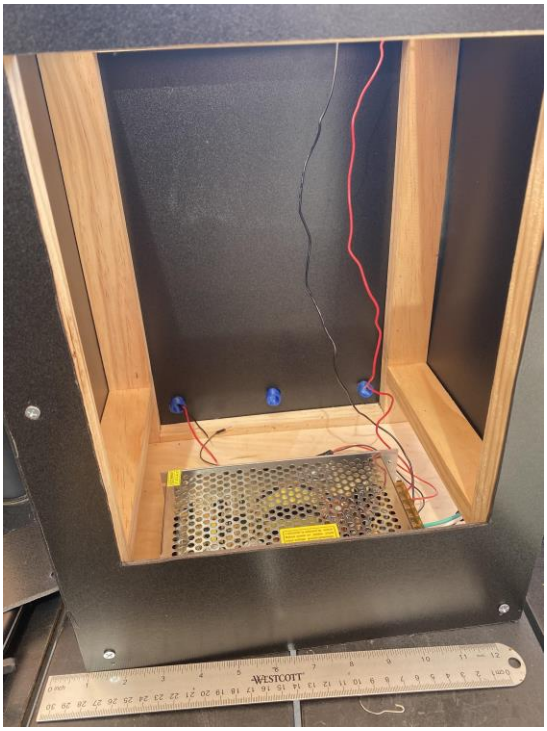
Project Results: (detail your project results below)

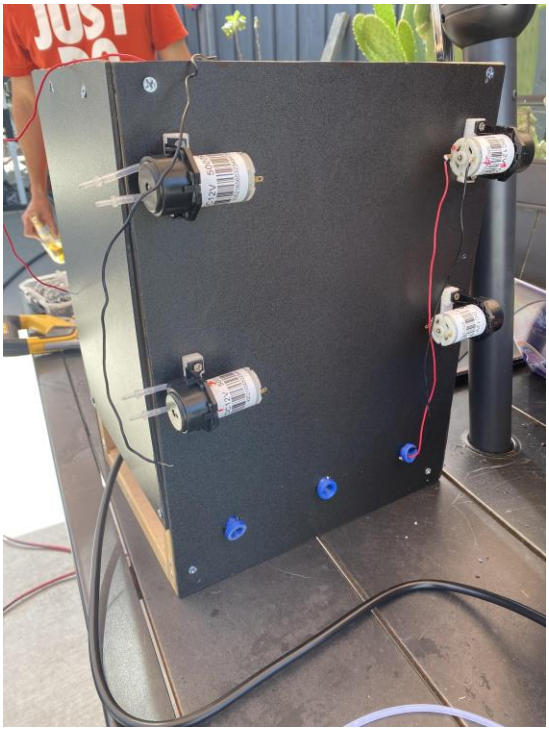
1. Designed a CAD model of the drink maker using Solid Works.
2. 3D printed funnel, cup holder, and funnel holder
3. Fabricated drink maker frame, sub frame, and attachments.
4. Interfaced electronic hardware with software.
5. Incorporated Amazon Alexa with electronic circuit

Sponsor: (provide any sponsors if your team has)

No sponsor

Product Images: (attach your product images)


WESTCOTT



Solar Power Portable Charger

Student Team Members:

Jimmy Zhao
Rachel Hart
Zixi Yang
Shida Xie
Xueqi Zhu
Jordan Shing

Faculty Advisor: Dr. David Yan

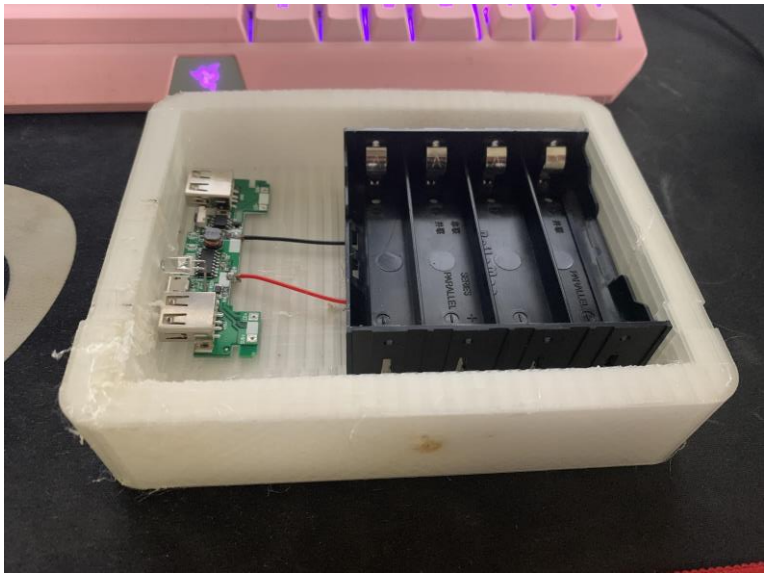
Project Scope and Objectives:

1. Design and assemble a solar power portable charger. The product can provide power to the user anywhere there is sunlight.
2. Provide SJSU students with a project that helps students understand how to use a 3D printer, how to design and assemble parts, and how to use CAD.

Project Results:

1. Designed a CAD model of the case in Solid Works.
2. Have a custom PCB made containing all the ports and components needed.
3. Use a 3D printer to print the outside box
4. Assemble those parts and test it works.

Product Images: (attach your product images)



Word Clock

Student Team Members:
Alexander Boothroyd-Kobayashi
Louis Frame
Udhaykaran Singh
Elijah Len

Faculty Advisor: Dr. David Yan

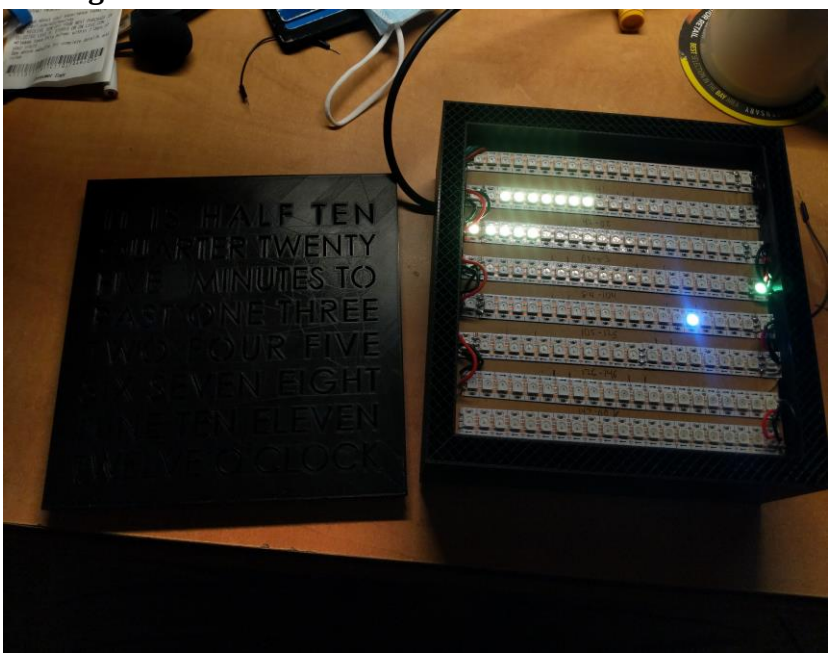
Project Scope and Objectives:

1. Design an functioning LED Clock that can display time
2. Learn about arduino coding and its implementation into the clock
3. Create functioning breadboard for the Time clock
4.

Project Results:

1. Designed a CAD model of the clock using SolidWorks.
2. Coded Lights for functionality based on time
3. Successful Creation of Breadboard to tie all aspects of the clock together
4.

Sponsor: None
Product Images:



Jabil Scholars – Machine Learning

Student Team Members:

Bong Miranda (Team Leader)
Cooper Banchero
George McIchero
Dan Nguyen

Faculty Advisor: Dr. David Yan

Project Scope and Objectives:

1. Design and build a Machine Learning Model that classifies the failures of calibrations of optical assemblies. Multiple values of angles are involved. The program is supposed to identify and help correct defects found in assembling optics.
2. Perform stuadies related to machine learning and active alignment in machines to improve assembly processes.
3. Provide SJSU students with a project that involves learning how to write software for a machine, and to learn about product assembly processes.
4. Meet the following specifications:
   a. Able to identify shortfalls in a large amount of data.
   b. Identify 6 different KPI's.
   c. Vendor sets USL and LSL.

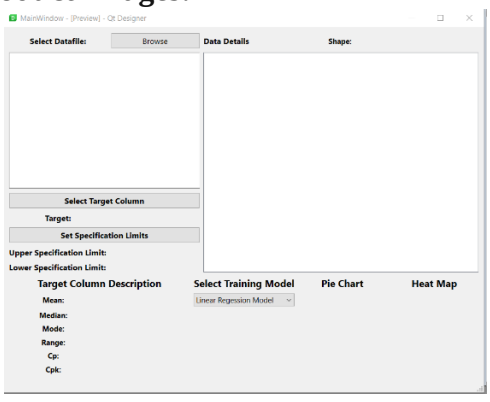
Project Results:

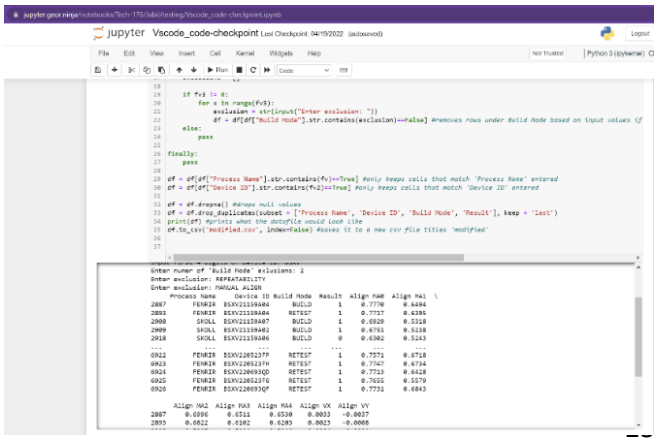
1. Designed a Machine Learning model in Python programming language.
2. Perform Cpk and Cp analysis on imported KPI data from CSV files.
3. Parse CSV files.
4. Created a Graphical User Interface with Qt Designer.

Sponsor:

San Jose State University Department of Aviation and Technology and Jabil

Product Images:





Pretreatment of Aluminum for Soldering Using Mina

Student Team Members:
Brien Heitz (Lead)
Suhail Sadiq
Grace Drew

Faculty Advisor: Dr. David Yan

Project Scope and Objectives:

- Validate use of Mina as a viable way to solder components to a flexible aluminum circuit board.
- Determine equivalency between Aluminum and traditional copper-based circuit board materials.
- Determine process changes and line requirement changes needed to introduce Mina into an SMT line at Jabil.
- Develop a process for Jabil that consistently and accurately produces aluminum circuit boards using automated surface mount technology (SMT) manufacturing equipment.
- Perform mechanical strength test of solder joints in shear using Mina.
- Develop control tests using existing Jabil products that use copper as the base metal.

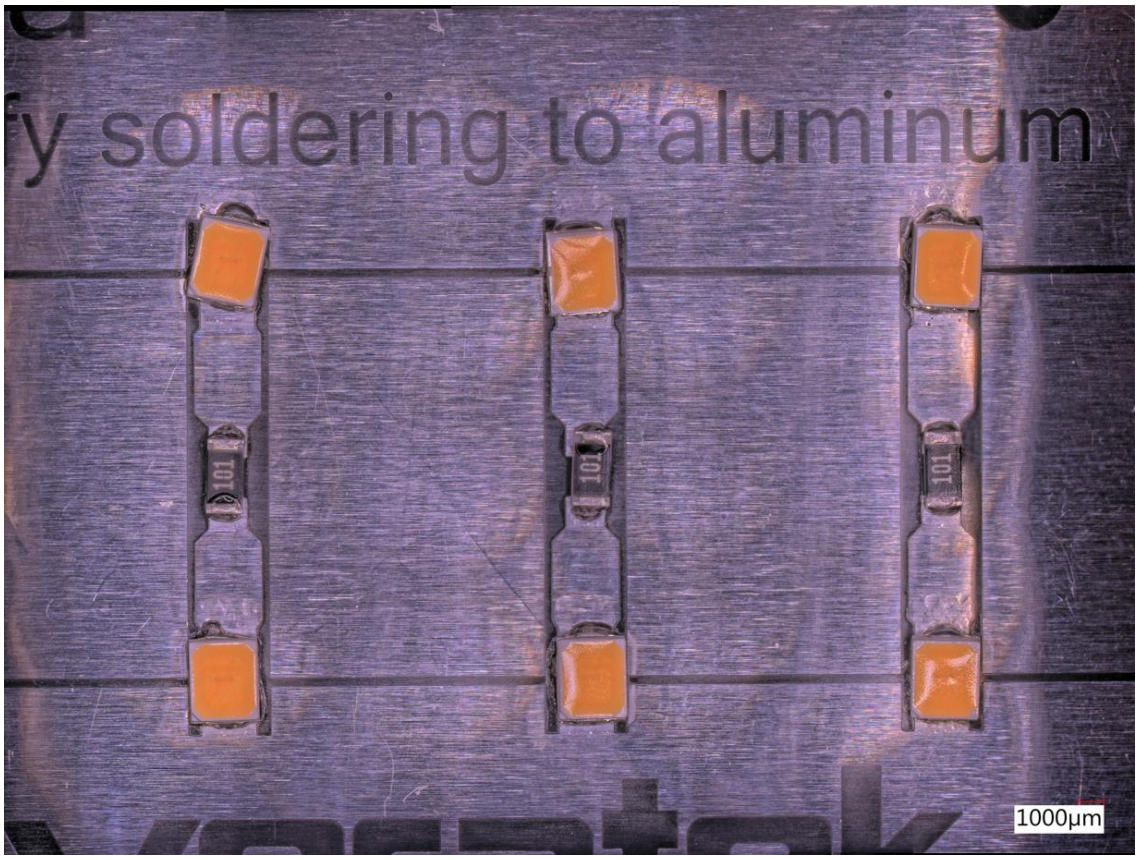
Project Results:

- Designed two screen printing stencils, one of the 3mm type for the application of Mina, and one 5mm type for solder paste.
- Created an optimized reflow oven profile to allow for optimal solder flow.
- Experimented with automated epoxy application using a pick-n-place machine to reduce the amount of lifting we were seeing with the components, specifically the LEDs.
- Performed cross-sectional analysis and micro sectioning of test boards.
- Used X-Ray microscopes to visually analyze and measure voiding in the solder joints with up to 150x magnification. Voiding of between 25% and 75% was common and seemed to have no affect on the circuit's performance.
- Produced and tested over 50 aluminum flex circuits. Of those 50 only 5 were 100% functional. Our best process only had a 10% success rate.
- We concluded that the Mina material is too inconsistent for mass production, however it is a viable way to solder components to an aluminum base.

Sponsor:

- Jabil - Blue Sky Innovation Center
- Averatek

Product Images:


fy soldering to aluminum
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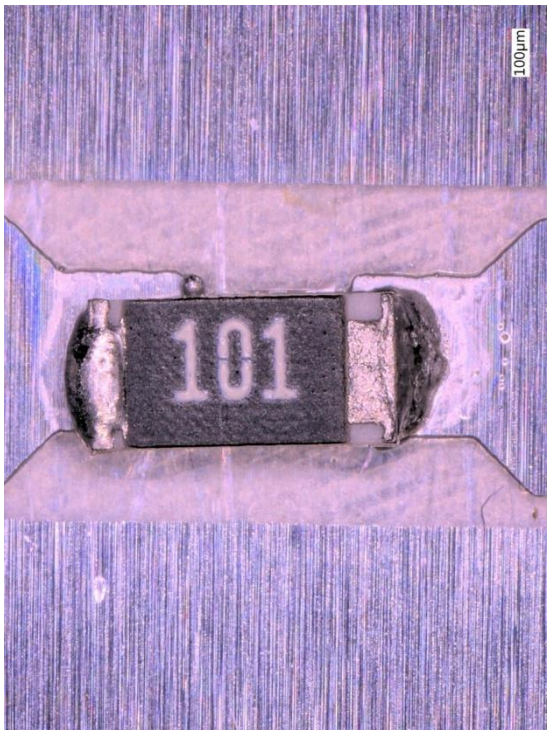
101
101
1000µm


100µm
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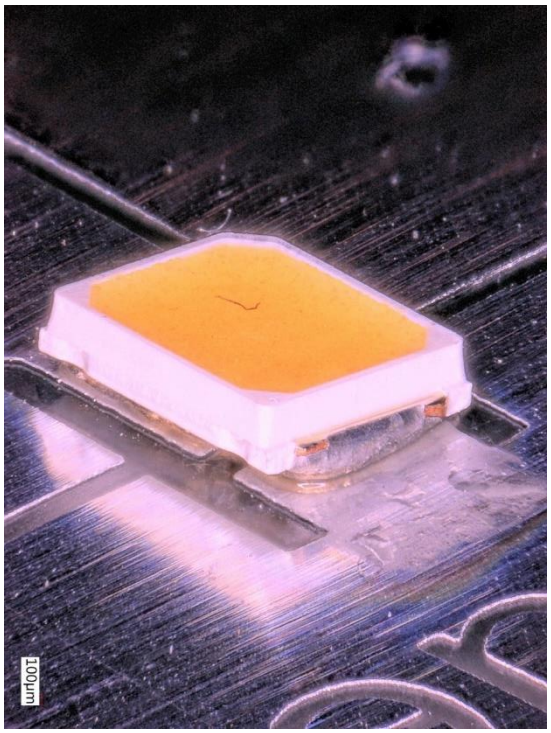
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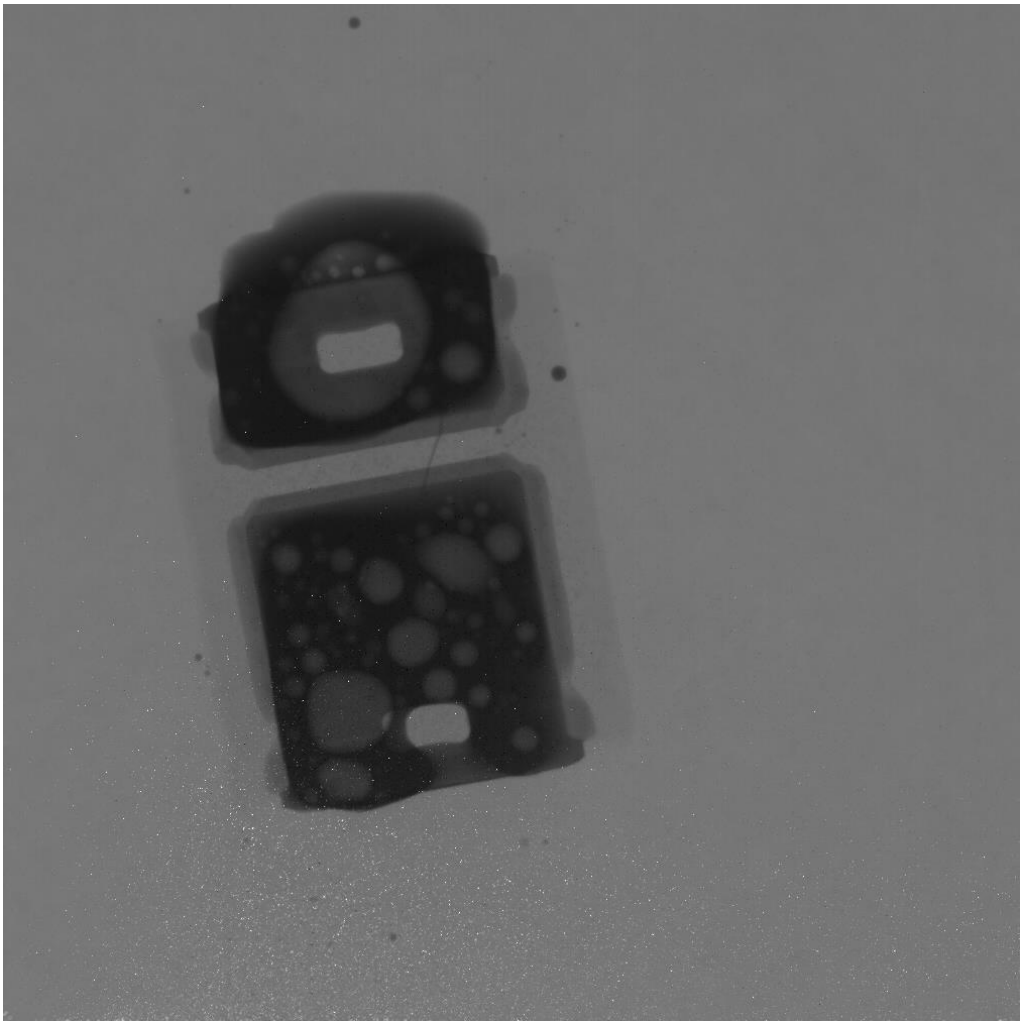


Light Fidelity Verification & Comparative Analysis

Student Team Members:

Yaochen Wei(CNSM Student)
J.Enrique Martinez (BME Student)

Faculty Advisor: Dr. David Yan

Jabil Advisor :

Henry Nguyen
Nathan Cantwell

Project Scope and Objectives:

1..The Set-up design and validation aof a **Light Fidelity (Li-Fi)** wireless data transmission system that will incorporate Wi-Fi transmission benchmarks for fidelity juxtaposition.

2. The Li-Fi evaluation kit provided by Jabil will be set up to work under various conditions to measure fidelity parameters such as function at a distance,general transfer rate,and bandwidth.

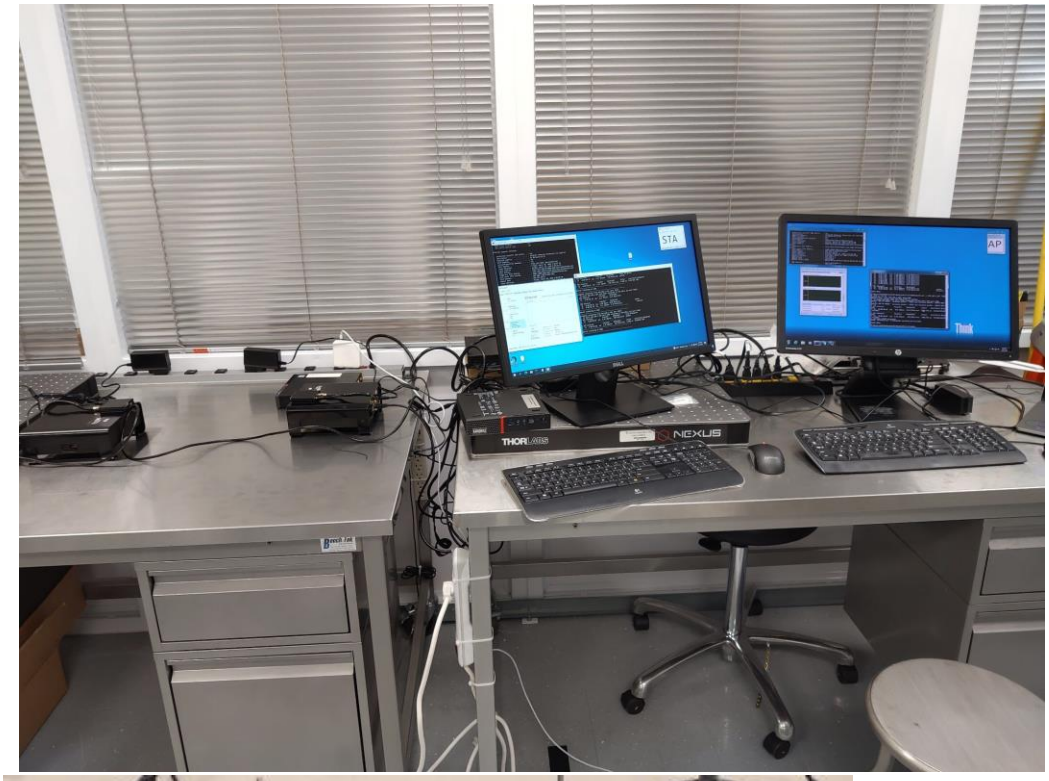
3. Meet the following specifications:
   a. Speed Testing (Distace)
   b. Speed Testing (Limitation)
   c. Bandwidth
   d. System Configuration(Progressive)

Project Results:

1. Generating the best speed , the visual communication occurs when the light antenna points to each other directly in the distance of 1 meter
2. The limitation of Li-Fi kit
   a. The horizontal and vertical difference could maintain a good status between 0.3m
   b. The visual light cannot penetrate most of the materials which enhance the privacy
   c. The speed of the kit is stable but lower than the daily Wi-Fi use
3. The file transporting of the Li-Fi (Progressive)

Sponsor: Jabil inc (Blue Sky Innovation)

Product Images: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Smart Manufacturing (Jabil Scholars)

Student Team Members:

Yu Ying Chang

Dmitriy Samusenko (Chemical Engineering major)

Faculty Advisor:

Dr. David Yan

Jabil Advisor:

Jennifer Gamboa, Mark Tudman, Quyen Chu

Project Scope and Objectives:

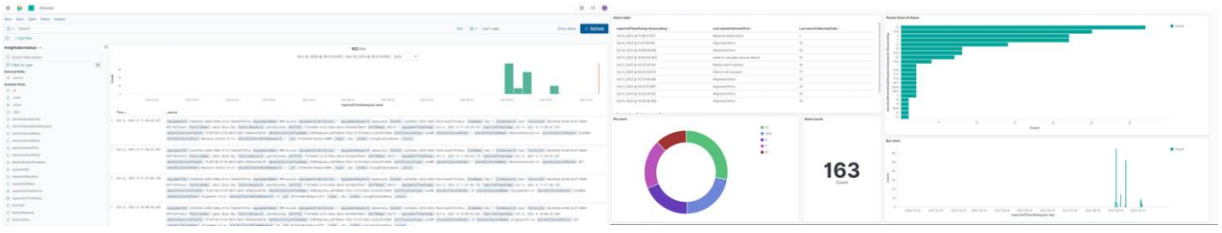
1. Create and design instantaneous dashboards that allows immediate data visualizations to identify errors and send out alarms in order to increase productivity and reduce costs.
2. Perform near real time data visualizations to monitor the production line
3. Provide SJSU students with a project that involves hands on experience and also related to real world manufacturing
4. Meet the following specifications:
    a. Analyze a huge amount of data
    b. Send the alarms when errors happen
    c. Customize the visualizations and dashboards for SMT production line

Project Result:

1. Designed a dashboard with a visualization tool
2. Perform data analysis for different perspectives (volume, height, area of the paste)
3. Create near real time data visualizations

Sponsor: Jabil

Product Images:



Smart Safety Handle for Public Transportation

Student Team Members: Kenny Nguyen, Shella Long, Huyentram Nguyen, Michelle Chen

Professor: Ali Zargar

Our project is a Smart Safety Handle for public transportation that can be used to help keep passengers safe and not miss their stops. The passenger will receive a variable vibration warning according to how hard the driver engages with the brakes. This would be achieved with the implementation of a flex sensor that is attached to the driver's brake. With the incorporation of the Smart Safety Bus handle, passengers will be more alert when riding the bus.

Passengers will not only enjoy feeling safer while riding the bus but will also have a form of entertainment when interacting with the bus handle. The Smart Safety Handle will have an LED screen and have indicators to passengers know which stops they are at. The LED screen will display the bus stops and passengers are able to notify the driver which stops they want to get off. The Smart Safety Handle will be replacing the original handles that we have in public transportation. A way to monetize this product is by incorporating advertisement banners that will run at the bottom of the screen.

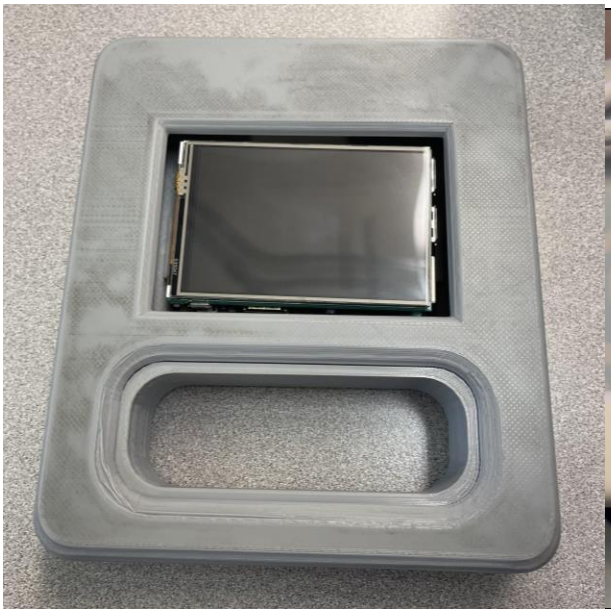


Figure 1 (left): The handle with the LED screen in it
Figure 2 (right): Raspberry Pi running the games that display on the LED screen

Smart Fish Tank Beginner Kit

Student Team Members: Huy Le, Kelvin Lee, Khant M Htoo, Isaiah Dolce, Zihui Huang

Faculty Advisor: Dr. Ali Zargar

Project Introduction:

The inspiration for this project is based on the needs of a fish enthusiast who may not have the time (or mindfulness) to maintain their fish tank's environment and feeding. Our current prototype scope is limited to a few factors; however, it could be expanded to include water replacement, tank cleaning, salinity, and other fish environment factors.

Project Scope and Objectives:

1. Design a fish tank kit that is transferable between different tank sizes and types. The equipment will identify the water temperature (See Fig. 3) and the amount of food left in the feeder and manage these variables with food hoppers and heaters.
2. Provide an automated, all-in-one-place solution for heating and cooling the fish tank's temperature and feeding the fish on a schedule.
    a. An ultrasonic sensor is integrated into the fish feeder module to detect the food remaining in the module (See Fig. 1).
    b. A heater and temperature probe will monitor and heat the water based on the user's input (See Fig. 2).
3. Develop an application on the Raspberry Pi to allow the user to control and cloud-save the settings for the water temperature and fish feeder.

Project Results:

1. Designed a CAD Solidworks model and 3D printed the fish feeder module (see Fig. 1).
2. Programmed each sensor and interconnected them to work together.
3. Develop a python application to control the sensors and actuators via Raspberry Pi touchscreen.
4. Offer heating and cooling solutions for the fish tank.
    a. Use an aquarium heater to raise the water temperature (See Fig. 2).
    b. Attached a fan or cooling compressor for evaporative water cooling.

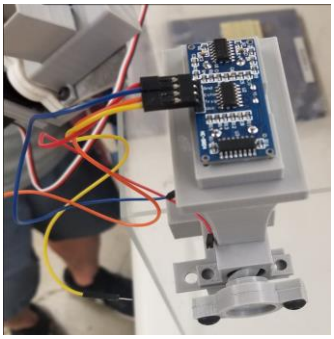


Fig. 1: Fish Feeder Module

Fig. 2: Heater

Fig. 3: Temperature Sensor

Multi-Purpose Injection Pen (M.I.P)

Student Team Members:

Judy Barnachea, Alejandro Escalona, Christopher Phan, Jimmy Phan, Alvin Troung

Faculty Advisor: Dr. Ali Zargar

Project Scope and Objectives:

1. To design and create a multi-purpose injection pen that is reusable for different kinds of medical use (e.g vaccines, insulin, etc.)
2. Create an easy-to-use injection product with simple mechanics for a wider target audience
3. To reduce toxic waste such as opposed needles and pens.

Project Results:

1. Designed a full 3D CAD model of the Multi-Purpose Injection Pen
2. Developed a retracting system for pen
3. Successfully created parts using 3D printer
4. Once assembled, test the multi-injection pen to see if it is fully functional.

Product Image:

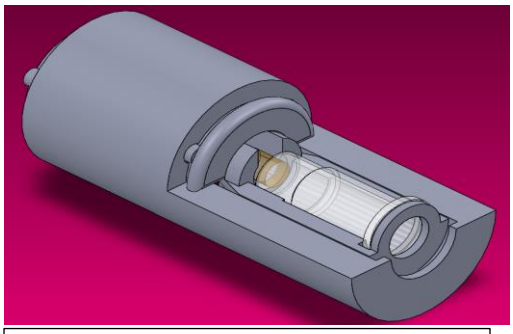


Figure 1: 3D CAD (Loading

Figure 2: 3D Printed Components

Figure 3: Loading Mechanism

Figure 4: Vaccine Capsule

Eyewash Station Water Sensor

Student Team Members:

Victor Escatel, Eduardo Escatel, Roger Young, Brenden Espanola, Kamran Siddiqui

Faculty Advisor: Dr. Ali Zargar

Our project is an eyewash station water sensor that will enable industries, that incorporate eyewash stations, the ability to monitor and maintain their eyewash stations more effectively and efficiently. Our device will send an email notification to the customer's desired recipients and service providers.

WIFI connectivity will allow the ease of use for the customer by transforming eyewash stations into IoT devices. The current process on which an eyewash station is maintained, is outdated and time consuming. Our device consists of a fixed, yet accessible, Arduino board and a detachable moisture sensor that is integrated into the eyewash station reservoir. The moisture sensor will notify the Arduino if the eyewash station has been used, while the Arduino board will connect to our IFTTT service which will send out an email to the desired recipients. In order to attract customers, each device will be pre-configured with the customer's SSID, password, desired location for the eyewash station, and desired recipients. This will enable a plug-and-forget operation, allowing customers to have multiple devices throughout their factories.

Arduino Board outside of its mounting case

Illustration of our desired finished product

Wildfire Monitoring & Early Detection System For Remote Areas

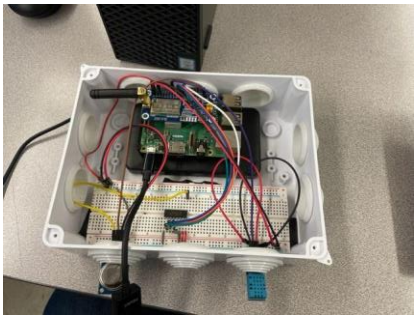
Student Team Members:

Benjamin Howarth, Devon Tran, Ziqin Li, Jeremy Hedlund, Kovi Nguyen

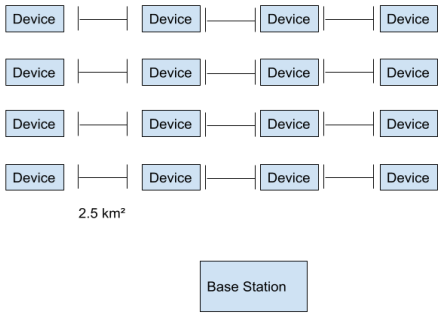
Professor: Dr. Ali Zargar

By using an IoT(Internet of things) solution we can monitor for wildfires in remote locations and notify the proper authorities within seconds of a wildfire breaking out as well as taking temperature and humidity data to predict when fire risk is the highest.

We have created an IoT solution that uses a MQ-2 sensor and a DHT11 sensor to identify a susceptible area for wildfires. This solution will use the DHT11 sensor to create a temperature/humidity record in the area in order to reduce wildfire damage in the future through early monitoring and the MQ-2 will determine when a wildfire breaks out by detecting CO2 levels in the area. The raspberry pi runs the code for the sensors at the prototype device and where the data is being collected at the base station. The SX1262 LoRa HAT(LoRa networking device) then sends the data from the sensors on the (on our device) to the base station through multi-level relay to achieve long-distance point-to-point communication (up to 5km). The data being sent includes the temperature/humidity data at the location where the device was positioned as well as the CO2 level in the area the device was positioned. From the base station that is connected to wifi, the data will be sent from the LoRa Hat module to a cloud instance storing the sensor's data that is being fed to it from the devices. Our product will be able to monitor 24 hours a day 7 days a week. This low cost device has the potential of saving billions of dollars in damages caused by wildfires through early detection as well as notifying the authorities right when a fire breaks out to limit damage. Our devices can be positioned every 2.5 square kilometers so if you were looking to cover a 40 square kilometer area (16 total devices) you could cover the area for as low $300 * 16 (a device every 2.5 km²) = $4,800.



Device, Unit containing sensors



Example of a 40 square kilometer coverage zone

Base Station, Unit connected to Internet

Home Air Quality Monitoring System

Student Team Members: Michelle Xiang, Yuqian Guo, Luis Montanez, Haoran Zhao

Faculty Advisor: Dr. Ali Zargar

Project Scope and Objectives:

1. Design, develop and build a smart home air quality monitoring system with an integrated air filter to detect temperature, humidity, PM2.5 (airborne particles less than 2.5 micrometers wide) and CO in the air.
2. Feature a user-friendly interface app experience to interface with the product.
3. Have the product be Wi-Fi capable to allow for application programming interface (API) calls and for mobile app functionality.
4. Have the product detect pollutant levels of the indoor air using hardware sensors including the DHT22 sensor for measuring temperature & humidity, MQ-7 sensor for measuring Carbon Monoxide, and DSM501 sensor for measuring PM2.5 particulates.
5. Automate the product monitor to detect and alert dangerous levels of pollutants, comparison of indoor and outdoor data, and prompt for user action.

Project Results:

The Home Air Quality Monitoring System is for indoor use and features sensors to detect harmful air particles such as PM2.5 and CO. Combining Wi-fi capability and a third-party IoT platform “Blynk” as a model for the mobile app, users can access and monitor the air quality levels and remotely control the air purifier from anywhere in their home. Our prototype for presentation is battery-powered, allowing it for portable use. In production units, users will have the option to choose a battery-powered model or a model with a standard AC.

Fig-1: Front View, consisting of the top half (air filter compartment) and the bottom half (air monitor compartment)

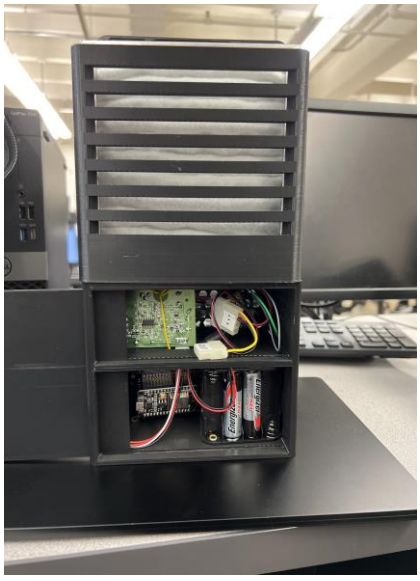


Fig-2: Back View, revealing the battery compartment and circuitry