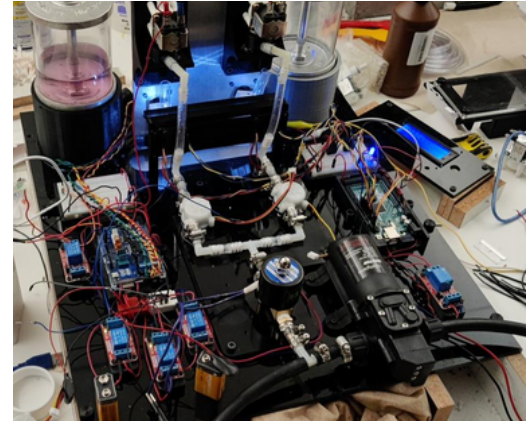
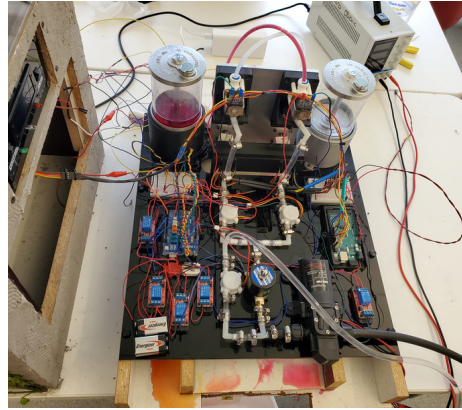


EZ-CHEM: AUTOMATIC POOL CHEMICAL TESTER



What?

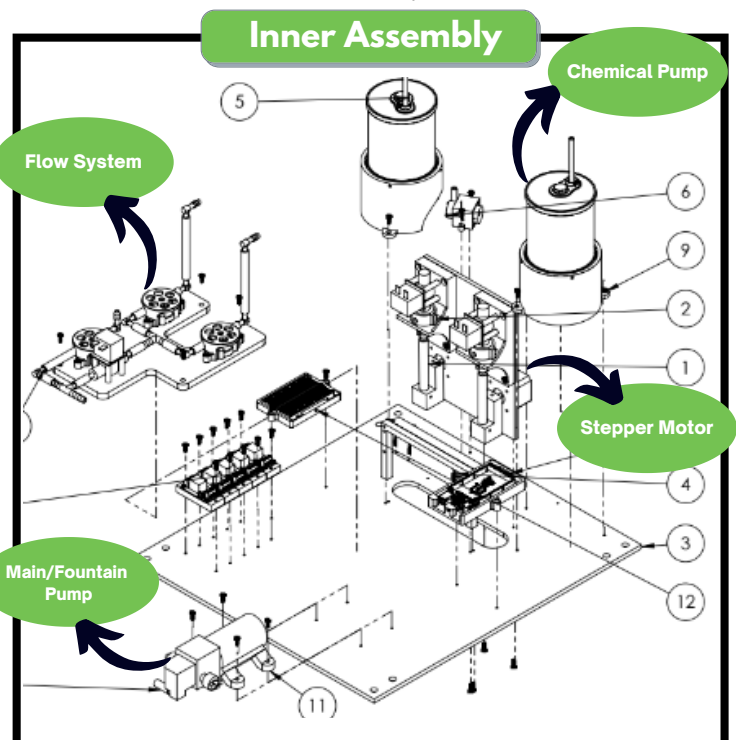
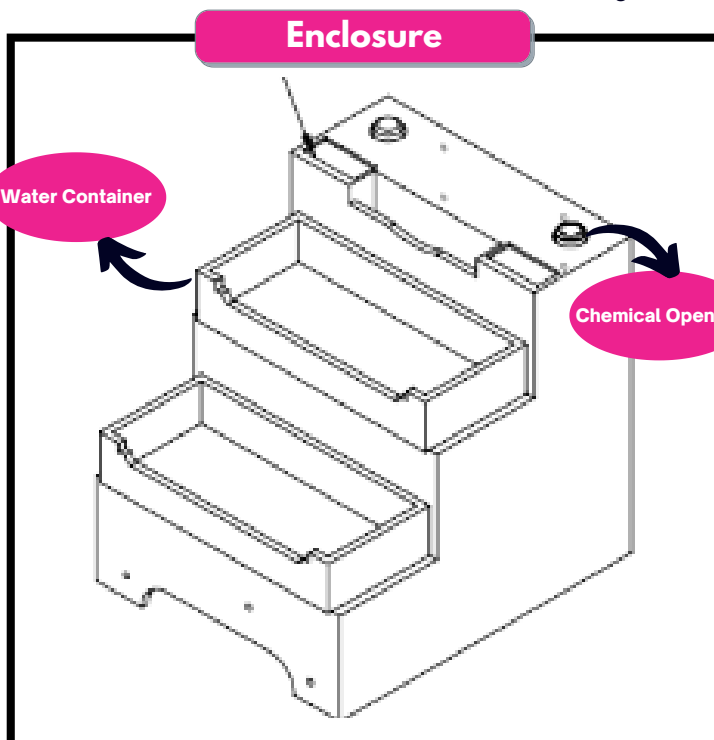
- EZ-Chem is a device that can automatically test and output **chemical** (pH and Chlorine) **levels** in a pool
- It also acts as a pool-side decoration piece.

How?

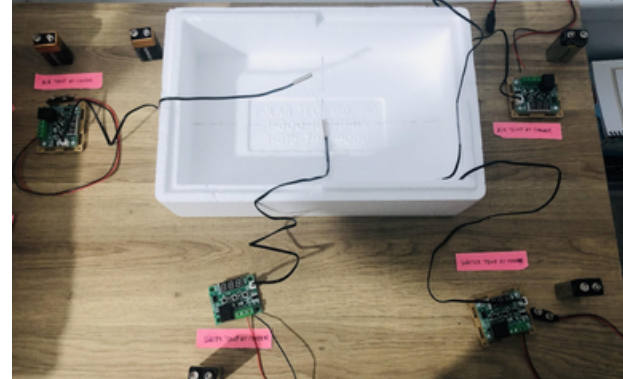
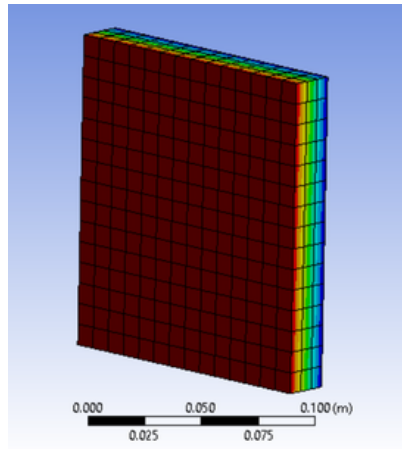
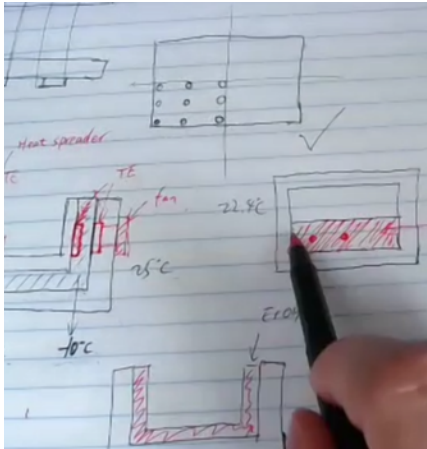
- Produced **3D CAD** models and detailed **2D engineering drawings** for Inner Assembly and Enclosure using **SolidWorks**
- Used **Arduinos**, Relays, TCS-3200 color sensors, and 5V batteries for the electrical infrastructure.
- Used **Python** for implementing and testing RGB to HSV conversion.

Results

- Outputted results of urine pH & Chlorine levels with a 93% accuracy.
- increased precision of tested results by 44% over manual kits.
- Reduced costs by \$740 compared to market products, and saved 2hrs of user's time on a weekly basis.



SELF-SUSTAINED VACCINE STORAGE DEVICE



What?

- Designed a vaccine storage device that uses minimum resources to **maintain cooling temperatures**.
- Performed a **needs analysis** to initiate the design process

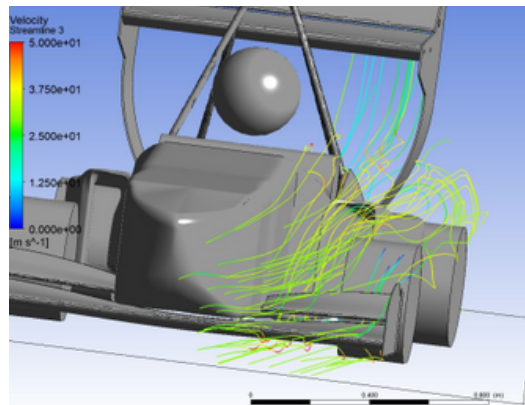
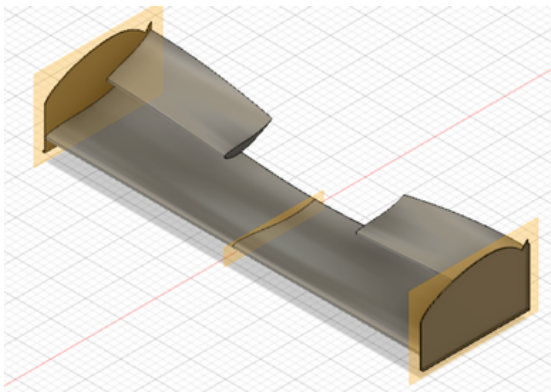
How?

- Created the device layout in **Autodesk Inventor**
- Simulated convective and radiative heat transfer using **Ansys**.

Results

- The design fulfilled its purpose when experimented with (86% accuracy).
- Expected final product cost to be 30-35% less than the current market prices.

FRONT WING - AERODYNAMICS - FORMULA SAE



What?

- Front Wing for Formula SAE vehicle to produce downforce and improve the **aerodynamics** of the racecar.
- Direct airflow from the front to sidepods for **passive cooling**

How?

- Created a program in **MATLAB** that allows for quick construction of a 2D airfoil
- Designed a front and multi-element rear wing in **SolidWorks**
- Simulated airflow around 3D wing elements using **Ansys Fluent Flow**

Results

- Reduced the overall drag on the vehicle by 18.5%
- Minimized frictional forces on the vehicle and increased radiator cooling potential by 6%



QUERY SEARCH ENGINE

What?

- A mini, google-like search engine retrieves documents from the web and outputs them based on the ranking similarity to the user query.

How?

Used **Python** to:

- Create a **scrapy**-based **spider** to crawl the web.
- Construct an **Inverted Index** in **pickle** format
- Output the results on a **Flask**-based local processor

Skills:

- **Python**
- **Information Retrieval**
- **Flask**
- **Scrapy**

GitHub Link: 

CONSUMER MARKET ANALYSIS

What?

- Created a program that learns with given training data to categorize customers buying items from a store.
- Places consumers (with a set of items bought) into clusters that indicate future buying patterns.

How?

Used **Python** to:

- Process item purchasing data and restructure it for further use.
- Construct a machine learning algorithm with **k-means clustering**
- Utilize the elbow method for finding optimal number of clusters

Skills

- **Machine Learning**
- **Python**
- **Data Analysis**

GitHub Link: 

CHICAGO SUBWAY SYSTEM

What?

- Created a program using Chicago subway system data to manage stations and rides.
- The program navigates the user through different transitions in a ride and allows them to add, remove, or change train stations.

How?

Used **Java** to:

- Construct multiple **classes** and **sub-classes** for required functionality
- Create functions that assist the program with organizing, structuring, and properly using subway system data.

Skills

- **Object-Oriented Programming**
- **Java**

GitHub Link: 