Three Sketches (Project ideas)

Sketch One and Two: **Identify items based on four categories** (Metal, Plastic, Paper, and Food): Smart bin with an app to know the status of the bin.

Describe the project in few paragraphs.

The aim will be to train a model to help identify items (Pictures) given to it. The bigger picture is to make a smart bin that will separate items thrown in the bin, i.e., smart bin. When the items are in the bin, the bin can automatically identify the items and identify them based on four categories. The project can be extended by making an app that will notify people when the bin is full. It can either notify them after reaching each threshold or notify them hourly (12/24/36 hours). It will notify them by sending them a text message and notification on the web. The app will have live (record) trash data in each compartment; people can check it whenever they want.

Who would be the user? Are there secondary stakeholders?

People living near the surrounding and waste management companies would be the users.

What problem would it solve?

The smart bin's primary objective is to solve Landfills' unnecessary filling. Each year, landfills are filled with trash that can be reused or recycled due to contaminated waste. Smart bins would help to reduce the items going to landfills by categorizing waste at source. It will also help the waste company collect data on trash. In addition, live data and notifications after the threshold point will help them plan an effective route to empty trash cans.

What data would be used, how would you get it and how is it analyzed?

Different images of different items will be used. For example, different vegetables, fruits, and other food-related images will be used. Similarly, images of different plastic, metallic, and paper items will be used to categorize plastic, metal, and paper sections.

What is the workflow? What would user do and primary interaction.

For the first part (categorizing items), the user will only put (throw) items in the trash. The internal process of categorizing it, opening the compartment based on the category, and sending data in the app will happen automatically.

For the second part (app), the user needs to open the app and select the location and trashcan to know the live readings of that smart bin.

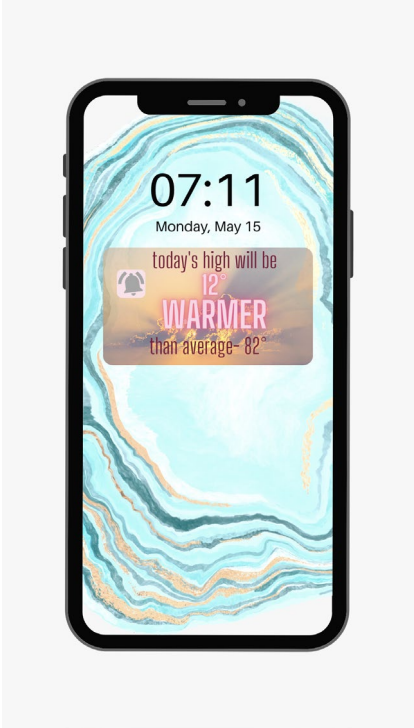
What are the results and how are they presented.

Data of each smart bin will be represented in table format. Also, Google Map View can be integrated with each smart bin to show the status (in the form of percentage).

Sketch Three: **A weather app**

Describe the project in few paragraphs.

The app will show the current weather information of the given location (like any other app). In addition, the app will have different functions that will engage users more and give them information effectively. The app will contain different activities that will unconsciously help users. Quiz (weather-related) to open the app, a comparison of today's temperature to last year, and so on can be included. The app will try to connect or establish the relationship between climate change and temperature differences.



Who would be the user? Are there secondary stakeholders?

Anyone who downloads the app and worries about climate change will be our primary user.

What problem would it solve?

The app will be designed to look at the bigger picture of climate change. It will help people get an idea of climate change and acknowledge that climate is changing and dangerous. 'We are the first generation to feel the effect of climate

change and the last generation who can do something about it,' Barak Obama. The app will help people understand the impact of climate change.

What data would be used, how would you get it and how is it analyzed?

Data will be used from one of the official sites in the US, for example, https://www.weather.gov/dmx/. The live data coming from the site will be incorporated into our app. Data from the website will be used in a template question for the quiz.

What is the workflow? What would user do and primary interaction.

The app will show the weather data on the screen and ask an interesting fact to make the user curious and want to open the app. Users need to answer the quiz to open the app.

What are the results and how are they presented.

It is typically presented as any other weather app (however, I am not an expert and need to figure out how to do so). The app will probably be limited to the Ames or Iowa area and have limited information.

Sketch Four: **An app that will provide information of possible cause of failure in the equipment.**

Describe the project in few paragraphs.

The project will be an extended version of what I did in my first master's thesis. I trained an LSTM neural network to predict the remaining useful life of an equipment. Now, I will use the predicted data (output) from the model and send a signal to the user (in an app) to notify them will the (negative) prediction. The user will get a notification only if the output data (in terms of efficiency) exceeds the threshold efficiency/effectiveness. Output is predicted based on four data inlet and outlet temperate and pressure data. Notification will contain the estimated efficiency of the equipment, how the efficiency is predicted (fault in inlet and outlet temperature and pressure), and why it happened.

Who would be the user? Are there secondary stakeholders?

The maintenance manager will be the primary user, along will the technical staff working on that equipment. Spare parts company can be a secondary stakeholder.

What problem would it solve?

It will help the problem of sudden breakdown of the equipment and save the company millions. It will help in predictive maintenance strategy. Spare parts can be ordered Just in time to save the inventory cost and/or idle time cost /if we order parts after equipment failure).

What data would be used, how would you get it and how is it analyzed?

Inlet and Outlet temperature and Pressure data have been used to train the model. For the app, output data coming from the model will only be used. However, data from sensors and actuators should be fed to the model to give the output.

What is the workflow? What would user do and primary interaction.

The app will notify users only if the predicted output exceeds the threshold value. It will address the issue (possible cause) and what will be the desired solution.

What are the results and how are they presented?

The result is shown in the form of a text message, and along with the message, an image last 4/5 datasets, which were used to predict the result, is also sent.