

Milestone 2 Report

Engicoders

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Project

The project is an IoT system to query, cleanse, filter, visualize, alert, and analyze manufacturing data. The project will function to empower engineers with a web application for the visualization and encapsulation of sensor data from IoT devices. Not only visualizing but this system will use machine learning techniques to draw insight into the future states of sensors.

Project Description

The project is meant to take automotive manufacturing IoT data based on user preferences from an API. API data will be pulled from the IoT cloud platform “Thinkspeak” using its GET HTTP API. The user demographic is manufacturing engineers seeking to utilize IoT data from sensors on a plant floor or that provide manufacturing data. This data is then cleansed, the cleansing process uses a combination of filters and outlier removal. Following this sk-learn ML algorithms, based on user desires, are used to predict potential future values and trends in the data. Cleansed and analyzed is displayed in standard formats to provide insight into manufacturing operations. Multiple visualizations may be displayed at a time that will show different operating sensors. These visualizations may be exported and shared to empower manufacturing engineers. Finally, an alerting system will be implemented to allow the specification and identification of discrete sensor values that are dangerous and need to be acted on.

User Requirements

- Common users will start by signing into their account
 - If the user doesn't have an account, they will be prompted to make one
 - Users are also offered to upgrade their account for a price
- Users can select a dataset from a preset list
- Users can filter the dataset they chose as they see necessary
- Users select the type of visualization they want
- Users set the axis parameters for the data they chose
 - The user can set high and low limits to be alerted if they are breached
 - The user can set alarm management options to avoid alarm issues
 - The user can select an advanced Machine Learning Algorithm to predict future values of a sensor using other sensor values
- Results will be displayed for the user in Visualization
 - The user can export the visualization
- the user will be able to see the alarm log if any went off
 - The user can export the alarm log
- Premium users will have all the functionality of the common user but be able to upload their own dataset

Requirements

Words

Function	Non-Functional
Should provide the user with data analysis and data set selected	
Should be able to create alarms based on historical data	

Table 1. Functional and Non-Functional Requirements

Use Case Diagram

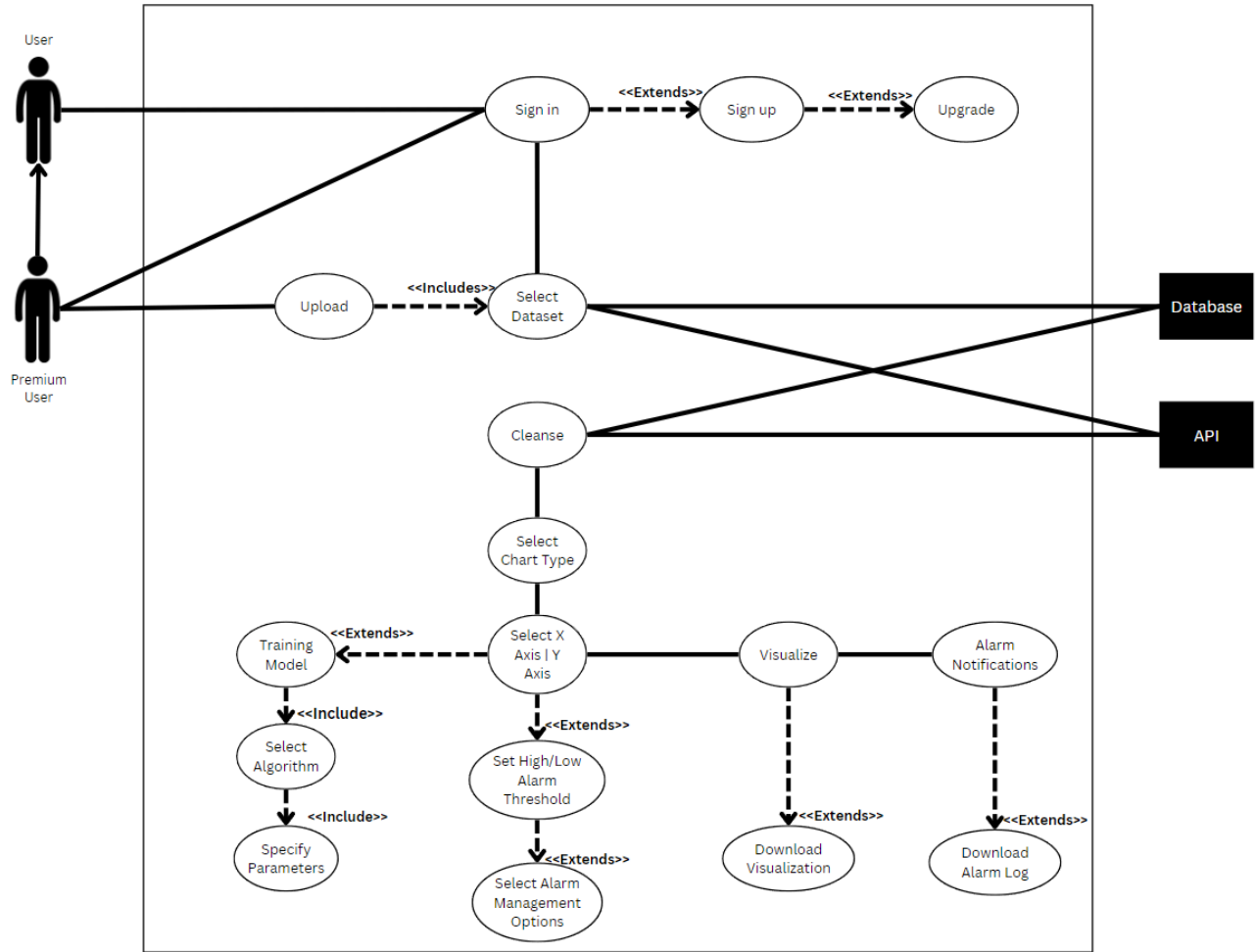


Figure 1. Use-Case Diagram

Illustrated above in Figure 1 is the typical flow of each user in our software. To start, the user must sign in; if they don't have a valid account, they will be prompted to sign up. Along with signing up, they will be offered to upgrade their account to be able to use more features. Once logged in, the user will select a dataset from a preset list on the main page. With the dataset selected, they will be able to cleanse and filter the data as they see fit. Once cleaned, they will select the chart type for their specified data. They will then set the axis values for which the data will be displayed on. With the axis set, they have two optional features they can use: prediction and alarms. If the user wants to see the predicted values, they will select the training model, choose the algorithm to use, and specify the parameters for the prediction. If the user wants an alarm system, they will set the high and low thresholds and select a management option if they want. With the features set, the user will then be able to visualize their data along with the forecast if they chose the prediction function. This visualization will be available for export. If the user added an alarm system, an alarm screen will appear with the alarm log which is also available for export.

The premium user will have all of the same functionality as the common user but with one more key function. After signing in as a premium user, they can select a preset dataset, or upload their own to manipulate, forecast, alert, and visualize. After uploading the dataset, the premium user will follow the same steps as the common user after selecting a dataset.

User Stories

As a manufacturing engineer, I want to be able to upload my own data so that I can visualize it

Acceptance Criteria: User clicks on a box that says upload, a secondary window pops up with their file explorer, user can select only a xlsx or csv file to upload.

As a manufacturing engineer, I want to be able to select my data online so that I don't have to upload it

Acceptance Criteria: User will click on a box that says upload data, this box will allow the user

As a manufacturing engineer, I want to be able to plot the direction of my data so I can predict future results

As a manufacturing engineer, I want to visualize multiple sensors at once so I can compare them

As a manufacturing engineer, I want to be able to set alerts so that I know when sensors have reached dangerous values

As a manufacturing engineer, I want to be confident that what I am seeing is actually what the data looks like so my decisions are data-driven

As a premium user, I want access to features that make me feel like my money is worthwhile so that I can show my boss the improvements to the system

In reviewing your requirements, the reader should clearly understand what the team is proposing to build.

In addition to the pdf, update your project README.md to include the details of the requirements and ensure that it is committed to your repo and pushed upstream by the end of the due date (I would suggest you create a **Requirements Engineering** branch). This will be reviewed, and feedback will be provided to you.