CSE1901 – TARP – TAA1 Slot – Dr.D.Rekha

TARP Report

PROJECT TITLE:

Predictive Maintenance for Elevators

TEAM MEMBERS:

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WHAT IS THE PROJECT:

The project is a predictive maintenance system for elevators. Our goal is to reduce downtime and maintenance costs by identifying potential problems before they occur. We are using several data sources to predict when maintenance should be performed on an elevator.

One of the data sources we are using is the temperature and humidity of the control room. This can provide insight into the overall health of the elevator system. We are also using the health of steel ropes to predict when maintenance should be performed. Finally, we are using the condition of the speed governor in the cabin to provide additional information about the overall health of the elevator system.

By combining these data sources and using machine learning algorithms to analyze them, we can create a predictive maintenance model that can help us identify potential problems before they occur. This can help us reduce downtime and maintenance costs while also improving safety for elevator passengers.

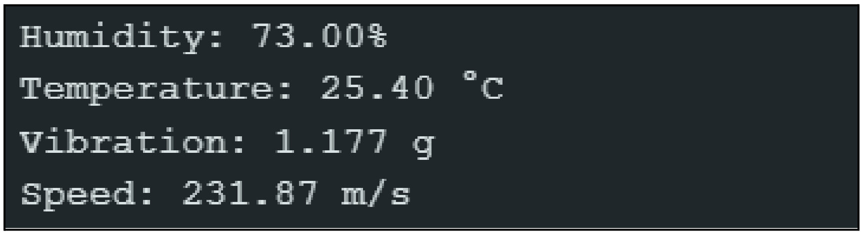
ABSTRACT:

This project aims to study the potential for predictive maintenance in the field of elevators. The goal is to develop a system that can accurately predict when elevator components will need maintenance or replacement, before they fail.This would allow for proactive maintenance, reducing downtime and increasing safety for elevator users. The system will use data from sensors installed on elevators, such as vibration and temperature sensors, as well as data on usage patterns and maintenance history. This data will be analyzed to identify patterns and anomalies that indicate a potential failure. The technique used here is deep learning. It gives us finer outcomes because of the new deep attributes, that are extracted from the dataset in

contrast with already existing attributes. This work consists of implementing a deep learning algorithm for fault detection and prediction of an elevator system. Additionally, the system will be able to predict when a component is likely to fail, allowing for spare parts to be ordered in advance, reducing maintenance times. The project will also study the potential cost savings and other benefits of such a system, as well as any potential challenges in implementing it in the real world. Overall, the project aims to demonstrate the feasibility and benefits of predictive maintenance for elevators.

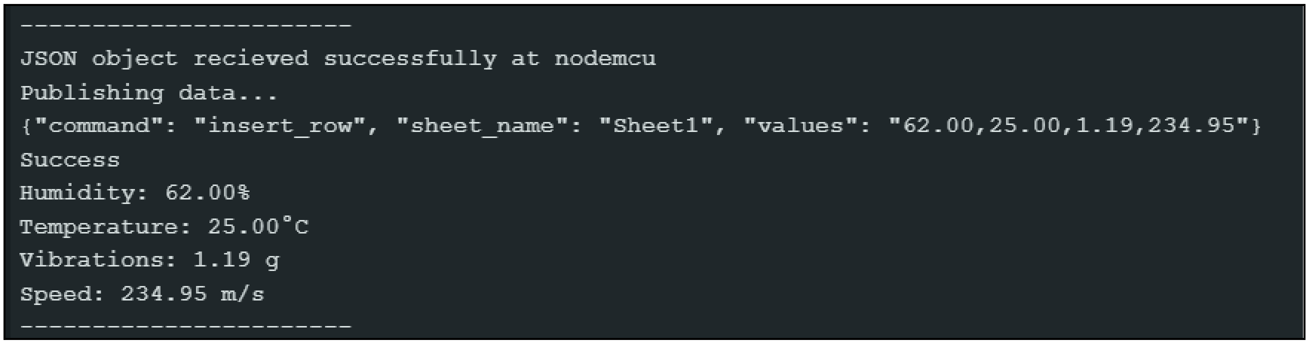
OUTPUT:

Arduino UNO readings from sensors



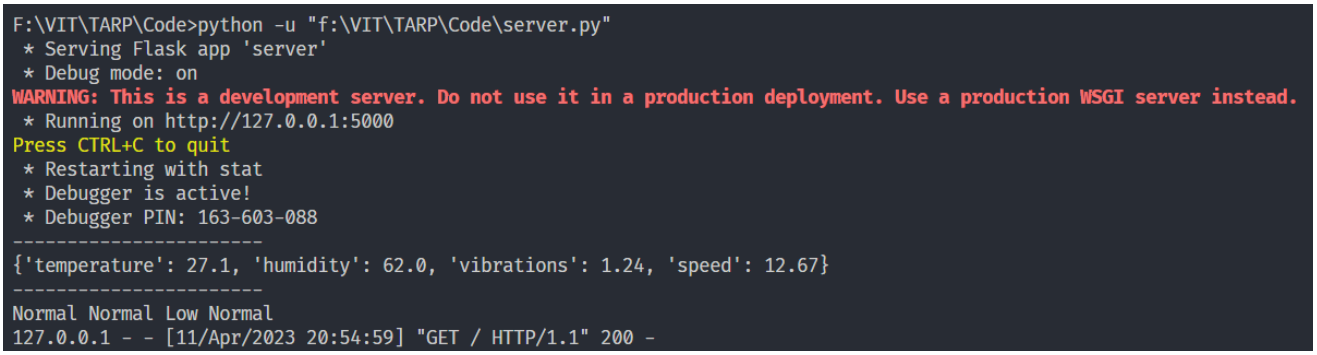
```
Humidity: 73.00%
Temperature: 25.40 °C
Vibration: 1.177 g
Speed: 231.87 m/s
```

NodeMCU receiving data from Arduino UNO



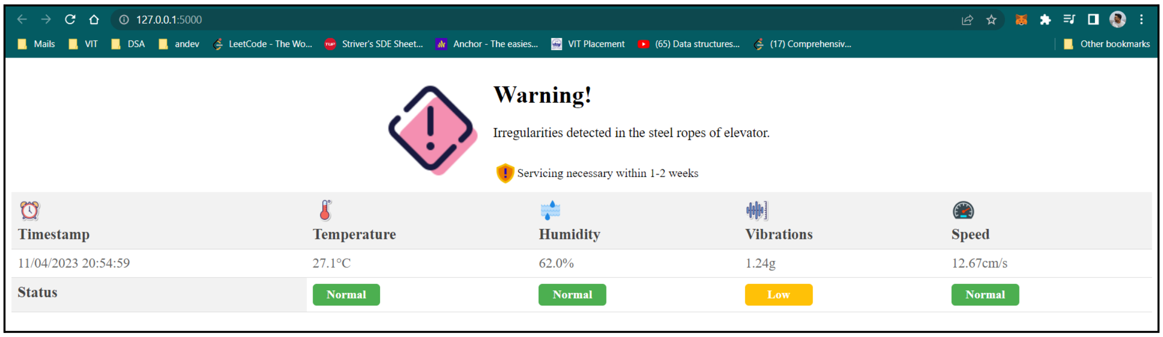
```
------------------------
JSON object recieved successfully at nodemcu
Publishing data...
{"command": "insert_row", "sheet_name": "Sheet1", "values": "62.00,25.00,1.19,234.95"}
Success
Humidity: 62.00%
Temperature: 25.00°C
Vibrations: 1.19 g
Speed: 234.95 m/s
------------------------
```

Flask Server running ML models



```
F:\VIT\TARP\Code>python -u "f:\VIT\TARP\Code\server.py"
 * Serving Flask app 'server'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on http://127.0.0.1:5000
Press CTRL+C to quit
 * Restarting with stat
 * Debugger is active!
 * Debugger PIN: 163-603-088
-----------------------
{'temperature': 27.1, 'humidity': 62.0, 'vibrations': 1.24, 'speed': 12.67}
-----------------------
Normal Normal Low Normal
127.0.0.1 - - [11/Apr/2023 20:54:59] "GET / HTTP/1.1" 200 -
```

Final Output (Status of components of elevator)



Warning!

Irregularities detected in the steel ropes of elevator.

Servicing necessary within 1-2 weeks

Timestamp	Temperature	Humidity	Vibrations	Speed
11/04/2023 20:54:59	27.1°C	62.0%	1.24g	12.67cm/s
Status	Normal	Normal	Low	Normal

WORK DONE:

There are three components for the project namely: Frontend application where the status of the components of the elevator is visible, flask server where the machine learning models are running and nodemcu server which receives sensor data from arduino.

Initially when the frontend application is opened, it sends a request to the flask server. The flask server on receiving a request from the frontend sends a request to the nodemcu server to serve the sensor data. The nodemcu server will be running continuously and waiting to receive a request, once it receives a request from the flask server, it will send the sensor data in the form of json.

Once the flask server receives the json, it will parse the data and then pass it onto the machine learning models to generate the status of the components of the elevator. Then these status of the components will be passed onto the frontend for them to be displayed to the user. The frontend application will display the individual status of all the components and it will also display which components need servicing and what is the time frame in which it should be due.

CONCLUSION:

Thus we were able to create a predictive maintenance system for elevators. We incorporated sensor data along with machine learning models to predict the health status of various components of the elevator like the environmental conditions of the control room, conditions of steel ropes to keep an eye on fraying as well as monitoring the braking speed of the elevator to gauge proper functioning of the speed governor inside the elevator cabin.

INDIVIDUAL CONTRIBUTIONS:

S. No.	Reg. No.	Name	Contributions
1.	20BAI1041	Faizah Kureshi	What is the project, 5 research papers, frontend, flask server, machine learning model training and testing
2.	20BPS1164	Rigved Telang	Abstract, 5 research papers, hardware assembly and programming, nodemcu server, dataset generation and preprocessing