PREDICTIVE MAINTENANCE OF INDUSTRIAL MOTORS (IOT + ANALYTICS)

Introduction:

Overview:

The Internet of Things is a system of interrelated computing devices, mechanical and digital machines provided with Unique Identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. With the recent advancements in wireless technology, Internet of Things groped the most of the industrial clients with its features of automation and control. Automation can be considered as the most important advancement in terms of technology which can be used in the industry to automate the machines. By using IOT in the industrial motors, one can identify the working situation of the motor and can act accordingly within no time.

Purpose:

By this project, one can be able to observe the status of temperature, humidity in the environment and any vibration and sound in the motor. By this, we can control the working of a motor.

Literature Survey:

Existing problem:

Some of the causes of the motor failures are electrical overloading, vibration overloading, low resistance which cause the motor failure. They can be determined by the motor status such as vibration, temperature and sound. But there is no certain process to check over these. So, the motors in the industries cannot be checked before its failure. As a result, they will be damaged in the process, thereby giving trouble to the ongoing processes in the industry.

Proposed solution:

By using IOT in the industrial motors, we can predict the motor's failure in advance and can repair the damaged motors within no time, thereby reducing its effect on the further ongoing processes. As we check over the daily range of vibration, temperature and sound, the threshold readings of the motor can be observed and noted for the prediction of the working of these motors.

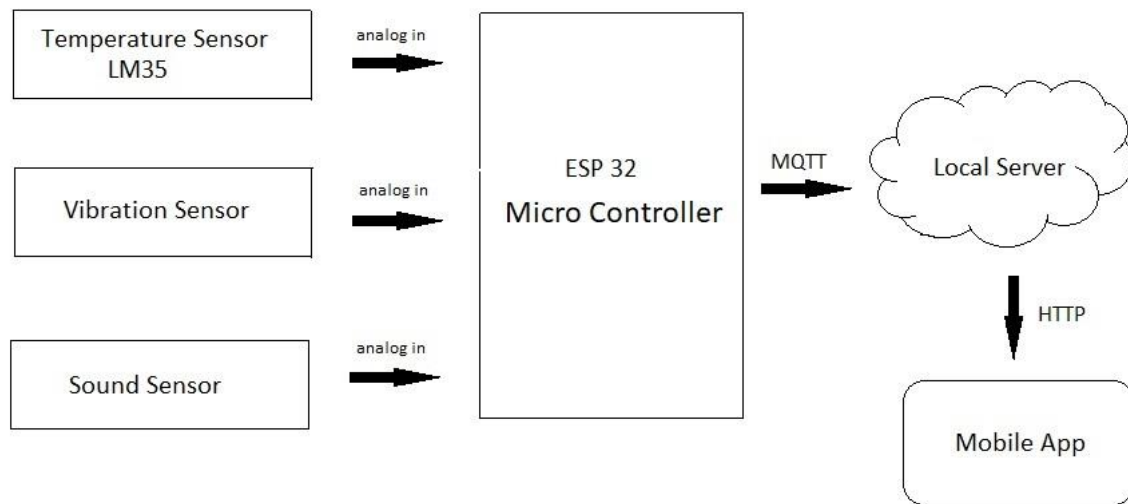# Theoretical Analysis:

Block diagram:

Figure 1: Block Diagram

Hardware / Software Designing:

The hardware part of the project involves sensors like Voltage sensor, Vibration sensor, Temperature sensor which are connected to the ESP 32 Micro Controller through Jump wires. The sensor values are captured by the micro controller, processed and then sent to the IBM Cloud services. This data will be sent to the mobile application which was developed using MIT app Inventor. Here we use python language for coding. Node-Red, Nodejs, MySQL DB, etc., Software tools are used

Experimental Observations:

Node red is used as hardware simulation. We are generating random values using node red and publishing them to a MQTT server. We have use Nodejs as backend language to catch messages from the MQTT server and storing those values in data base.
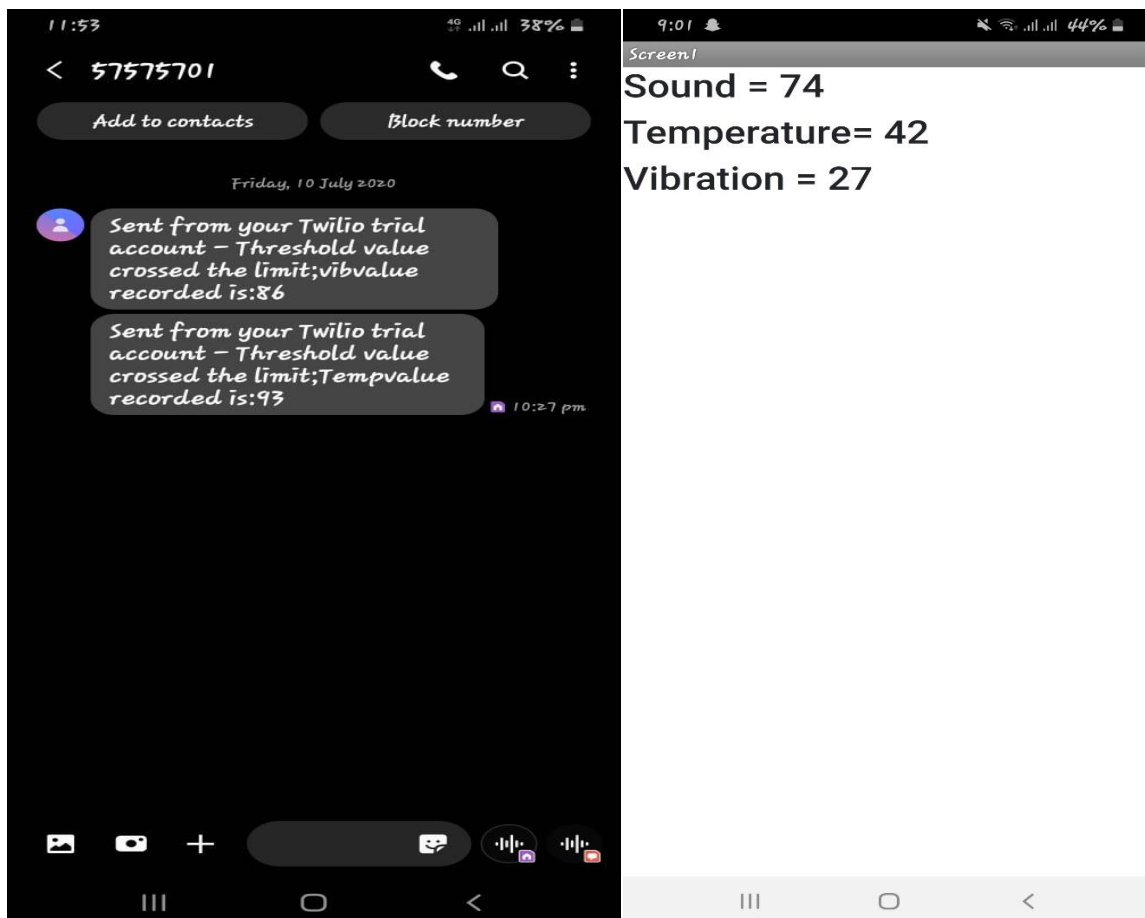
Angular is used to show the data the graphs. MIT app inventor is used for the mobile app where the values are send to the server to the app
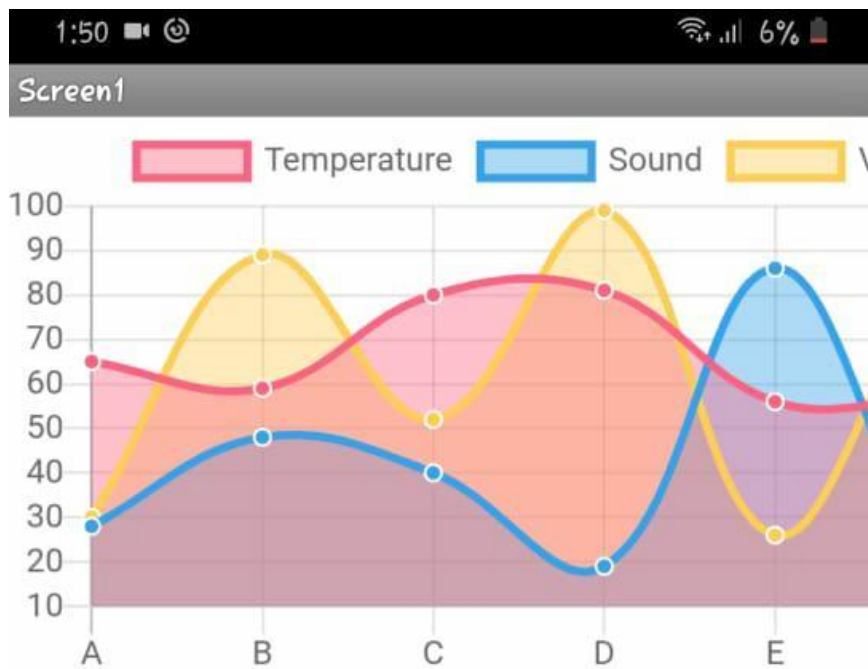
We have use Twilio messages service to get send messages to mobile. When the sensor values reach the limit then alert messages are sent to mobile

Flowchart:
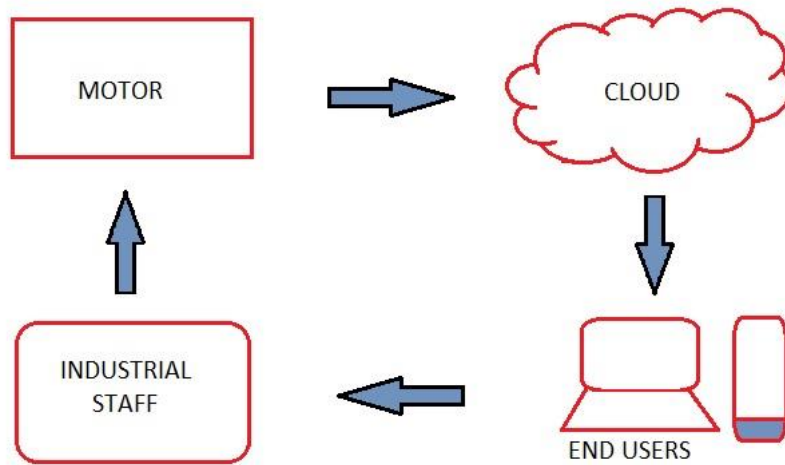
Result:

Advantages & Disadvantages:

Advantages:

Reduced downtime

Better technical support

Better knowledge of the working condition of the motor

Types of predictive analysis

Vibration, Sound analysis

Fault of Machine analysis

Disadvantages:

Compatibility

Complexity

Privacy / Security

Safety

Applications:

Connected motors

Device-to-Device communication (Motor to Mobile app)

Motor Condition Tracking

Predictive maintenance

Real-Time Monitoring

Conclusion:

Thus, the proposed system could capture the reading of the threshold values of the Vibration sensor, Temperature sensor and Sound sensor and after that evaluate at cloud then gives an indication to the concerned individuals about the working condition of the motor. It monitors the threshold values of the sensors which can be used to predict the performance of the motor.

Future Scope:

It increases the productivity of motor by continuously reporting its working condition thereby increasing the performance and efficiency of the concerned machines.

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