2022 Final Year Project (Computer Science)

UMS UNIVERSITI MALAYSIA SABAH

FACULTY OF COMPUTING & INFORMATICS

IOT BASED INDOOR AIR QUALITY MONITORING AND PREDICTION SYSTEM USING MACHINE LEARNING

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ABSTRACT

Air and good air quality are important for humans to carry out their everyday activities. Bad indoor air quality (IAQ) will cause to human such as irritation of the skin, nose, and mouth, headaches, dizziness, and weakness. Current concern found by author on indoor air quality in UMS's FCI such as problem in monitoring indoor air quality condition that would eventually affect the respiratory system of a student or academic staff, no proper notify system for indoor air quality condition to alert student or academic staff and inadequate statistics on indoor air pollution index to make prediction and keep track the air pollution index level. In this project, Exponential Smoothing is chosen as the research element, and it will be used for prediction purpose. Author used rapid prototyping methodology where it is a model consists of phases that able to build, test and reworked as necessary until an acceptable prototype is accomplished in the project. The goal of the proposed system is to develop a web-based indoor air quality monitoring and prediction system with IoT devices that can monitor and do prediction on indoor air pollution index (API) using Machine Learning. Finally, the proposed system will display the monitoring air pollution index (API) data from sensor and used it for prediction data chart for UMS academic staff.

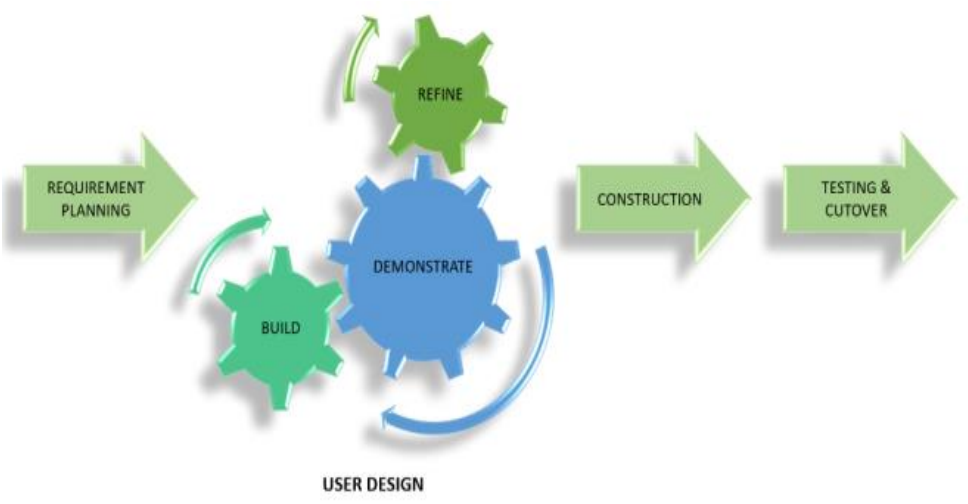
PROBLEM STATEMENT

- **Problem in monitoring indoor air quality condition that would eventually affect the respiratory system of a student or academic staff.**
- **No proper notify system for indoor air quality condition to alert student or academic staff.**
- **Inadequate statistics on indoor air pollution index to make prediction and keep track the air pollution index level.**

OBJECTIVES

- ✓ **To design an IoT Based Indoor Air Quality Monitoring and Predicting System using machine learning for admin in UMS's FCI.**
- ✓ **To develop an IoT Based Indoor Air Quality Monitoring and Prediction System in UMS's FCI using Node MCU ESP8266 with air quality sensor.**
- ✓ **To test and verify the IoT Based Indoor Air Quality Monitoring and Prediction System performance in terms of functionality such as detect air quality value in Parts per Million (PPM) based on air pollution index (API) using butane gas from lighter for toxic gases and smoke.**

METHODOLOGY



CONCLUSION

An indoor air quality monitoring and prediction system which integrates air quality sensor and Node MCU ESP8266 to form the Internet of Things (IoT) based system allows us to monitor air pollution index (API) data which calculated in PPMs. The disadvantage of the MQ135 sensor is that it cannot indicate the amount of Carbon Monoxide or Carbon Dioxide in the atmosphere, but its advantages include the ability to detect smoke, CO, CO2, and NH4 in the atmosphere. Machine learning are used to the dataset to forecast the impact of poor air quality on humans if the situation remains the same. Lastly, this proposed system includes a real-time web-based application that allows the academic staff to monitor, update, and display air quality monitoring data and prediction data chart at indoor space.

IMPLEMENTATION

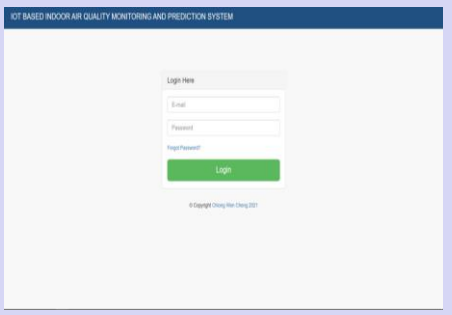


Figure 1: Login Module

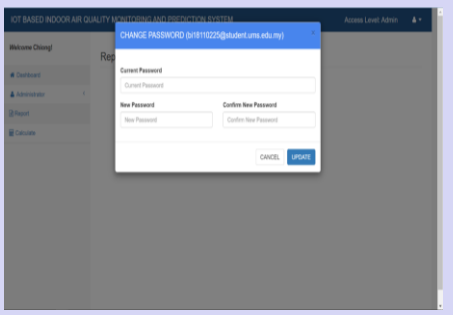


Figure 2: Change Password

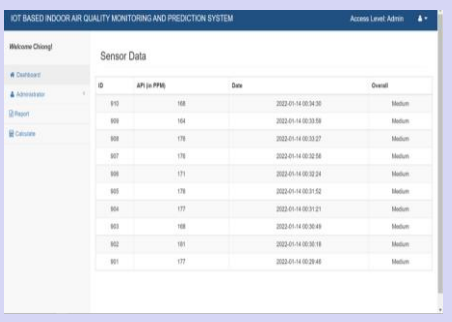


Figure 3: Dashboard

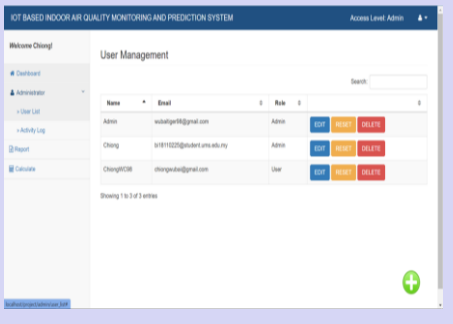


Figure 4: User Management

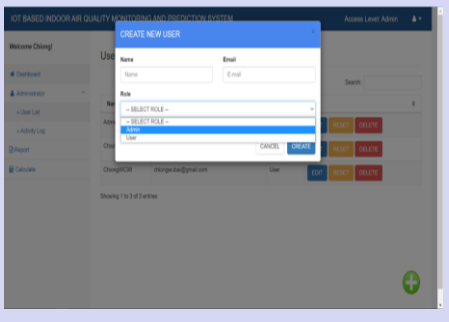


Figure 5: Add Admin

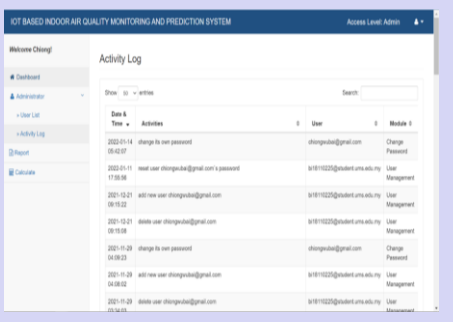


Figure 6: Activity Log

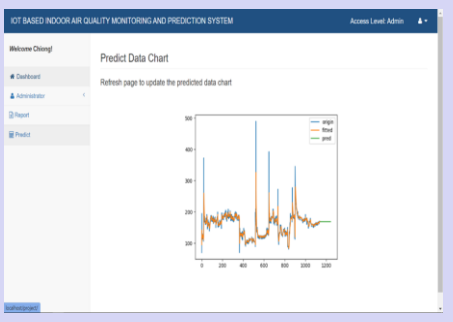


Figure 7: Sensor Data Prediction Chart

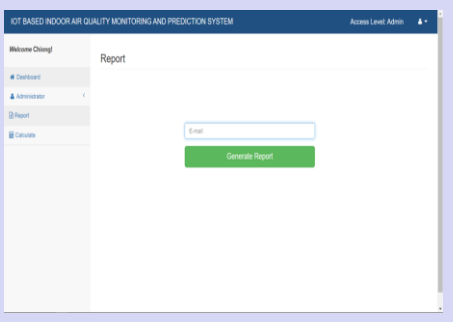


Figure 8: Report