Optimal Policy Making for Municipal Waste Segregation Based on Predictive Model Optimization

1.N.Sureshkumar2.J.Girija,3.Keerthika.M,4.J.Kiruthika,
Department of Electronics and Communication Engineering
Muthayammal College of Engineering, Rasipuram

Abstract- IOT-based smart crop protection system improves the entire agriculture system by monitoring the field in real-time to increase crop production. It is intended to monitor animal and bird outbreaks and environmental conditions for crop safety. Once the animal is detected by the sensor, a picture will be taken, the buzzer will be turned on, and the user will be notified through the registered email address. The owner/user can also use an app that can control the motor and sprinkler with an on/off button. This is meant to improve growth and protect the crop from animals and birds.

Keywords -*Smart system, Sensor, Farmers, Camera, Mobile app, Notification, Buzzer.*

I. INTRODUCTION

Nowadays farmers are suffering a lot due to birds and animals canalization in the field. Due to their outbreaks, most of the crop production were affected. The total yield of the crop has been reduced. It is difficult for the farmers to guard the field 24/7. Even though the farmers employ manpower to monitor the field to protect it from the birds and animals, it is not possible for them to monitor it at night-time. It is difficult to prevent the crop from being damaged in the daytime by the birds, as they became used to all the precautions taken like scarecrows. Our project improves the entire agriculture system by monitoring the field in real-time to increase crop production. With the help of sensors and interconnectivity, the Internet of Things in agriculture has not only saved the time of farmers but has also reduced the major damage to crops in fields. It is intended to monitor animal and bird outbreaks and environmental conditions for crop safety. Once the animal is detected by the sensor, a picture will be taken, the buzzer will be turned on, and the user will be notified through the registered email address. The owner/user can also use an app that can control the motor and sprinkler with an on/off button. This is meant to improve growth and protect the crop from animals and birds.

II. SYSTEM ARCHITECTURE

This model consists of a PIR sensor, GPS, Buzzer, Camera, Speaker, Soil moisture, and also humidity and temperature sensor for the effective monitoring of the crops.

SPRINT 1

In the Sprint 1, the values of temperature, humidity and soil moisture should be monitored. And the movement of the intruder in the field should be detected, resulting in the buzzer alert. In the real-time application, this can be achieved by using different sensors like PIR (Passive Infra-Red) sensor for movement detection and the DHT11 sensor for temperature & humidity. In this project, the python code has been developed through which the values for temperature, humidity and soil moisture will be fetched by using random data. For movement detection, the motion is stimulated in the working platform where the circuit is designed using Arduino UNO, PIR Sensor and Piezoelectric buzzer. Once the motion is stimulated, the LED will glow which is assumed as a camera and the buzzer will be turned on in order to scare the birds and animals and to drive away them from the field. The duration of the buzzer alarm can be set and adjusted in the Arduino code.

SPRINT 2

In the Sprint 2, the IBM cloud account has been created and the Internet of Things platform has been launched. In that IOT Watson platform, a new device has been created. It was connected with the source code through the device credentials and published in the cloud where the events can be monitored. As part of this, Node-Red flow editor has been launched to create the dashboard options and published in the cloud using an API key, API authentication and device credentials. In the real-time application, once the movement is detected the camera will be triggered which

will capture the images of the intruder in the field in order to send it user for intruder alert. In this project, the cloud object storage and Cloud ant DB have been used in order to store the pictures. The bucket has been created in the cloud object storage and the picture was uploaded there and the object public URL has been generated which is then given to the Cloud ant DB. Through which the picture can be accessed and displayed in the node-red dashboard. The condition has been set in the source code to assume there is a movement under which the alert audio will be played in the node-red dashboard and in order to alert the farmer or land owner the email will be sent to their given mail id, once the condition has met in the code.

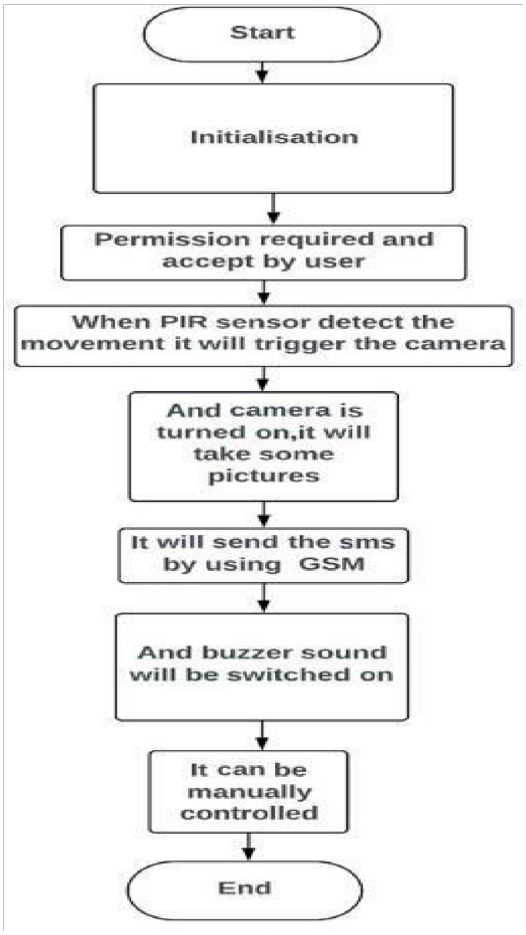

Fig. 1. Data flow Diagram

III. IMPLEMENTATIONS OF THE PROPOSED SYSTEM

SPRINT 3

In the Sprint 3, the motors and sprinklers in the field should be controlled through the node red dashboard. In the Node Red flow editor motor on, motor off, sprinkler on and sprinkler off buttons has been created and connected with the message payload in order to display the status in the debug window. An audio notification has set in order to notify while clicking on each control buttons. In this part, the values of temperature, humidity and soil moisture has been set global for the external access. The values of temperature, humidity and soil moisture will be updated at the fixed time interval and will be viewed in the node red dashboard in the donut type. These values and control process has been globalized and the separate link has been created using the get method and respective URL (/sensor or /command).

SPRINT 4

In the Sprint 4, the Mobile application should be created. Through this application the updated values of temperature, humidity and soil moisture in the field can be viewed in the mobile of the user. In this project, MIT app inventor has been used to create the mobile application. It consists of three screens which include a home screen, weather monitoring screen and control screen. In the home screen, two options were given to reach screen 1 and screen 2. Screen 1 consists of the three labels for temperature, humidity and soil moisture along the respective values and units in different textboxes. Screen 2 consists of the control buttons that is connected to the node red where the status will be displayed in the debug window.

IV. RESULT AND DISCUSSION

IOT smart agriculture products are designed to help monitor crop fields using sensors and by automating irrigation systems. As a result, farmers and associated brands can easily monitor the field conditions from anywhere without any hassle. Smart farming refers to managing farms using modern Information and communication technologies to increase the quantity and quality of products while optimizing the human labor required.

Among the technologies available for present-day farmers are wireless sensors that can detect the soil, water, light, humidity, and temperature levels in crop fields. IOT's can analyze the best time to irrigate the crops, and check temperature soil humidity, and water level by collecting the data through sensors.

Fig. 2. Node Red and Web page Dashboard

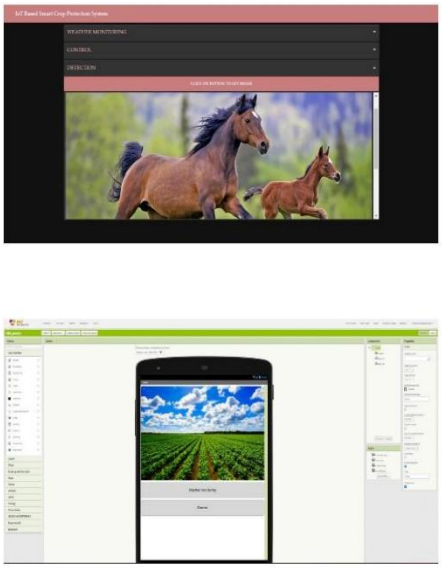

Fig. 3. Mobile app home page

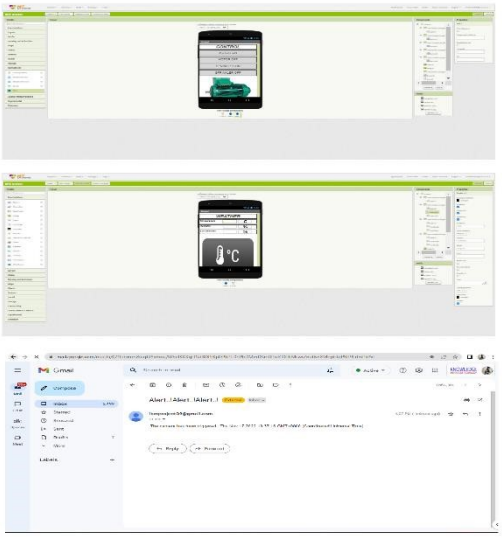

Fig. 4. Results and Notification alert

V. CONCLUSION

IOT-based crop protection for smart farming, such as monitoring for animal attacks. Using Node-Red, notifications to registered Mail ids and live monitoring of temperature and soil moisture are possible using proximity sensors (PIR sensors).

The high efficiency and accuracy of retrieving current data on temperature, humidity, and soil moisture. The paper will help farmers increase their yield and take effective care of crops. A farmer will always receive notifications, pictures, and live feeds of environmental temperature and soil moisture. With the help of these systems, various problems faced by farmers in daily life are being solved to a significant extent.

The main advantage is the ability to detect the motion of animals with the proximity sensor, notify the registered mail id, and control the motor and sprinkler remotely. Therefore, this program is cheaper and more efficient compared to other types of auto systems. The proposed system can be used to turn on / off the water spray according to soil moisture levels thus making the irrigation process one of the most time-consuming agricultural activities.

Agriculture is one of the biggest usages of water. The problem of crop canalization by wild animals and fire has become a major social problem at current times. It requires urgent attention as no effective solution exists to date for this problem. Thus, this project carries great social relevance as it aims to address this problem.

This project will help farmers in protecting their orchards and fields and save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection of their fields. This will also help them in achieving better crop yields thus leading to their economic well-being.

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