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Adhunik Scarecrow: Secured Farming Engine

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ABSTRACT: Agriculture is the main source of livelihood for around 58% of the population in India. Thus, it is of the utmost importance that the crops are protected from attacks from insects, birds, animals, locust, etc. The Adhunik Scarecrow will be the device which will help farmers in protecting these crops. This device has a motion sensor which will sense the presence of any potential threats and an alert is sent by the alarm system to the farmers. The device makes a loud noise in order to quickly scare the animals away. This will provide an early and accurate detection of attacks. The device is affordable to the farmers and greatly impacting.

KEYWORDS: Field Protection System, IoT, Locust attacks, Protection Mechanism.

I. INTRODUCTION

Farmers in India have faced issues due to crop damage and have suffered through financial crisis, suicides, and family's settlement. Insects, animals jeopardize the farm, destroy it leaving farmer with no other alternative other than to overthink on this issue or end their lives. There is around 4000cr crop loss every year. Locust attacks have recently been a major concern as they are happening on large scale and across various states of India like Maharashtra, Rajasthan, Madhya Pradesh, Punjab, Haryana and many more moreover they are happening in many other countries across world. In recent times we have faced locust attacks that consisted of the Desert Locust which is considered the most destructive migratory pest in the world. In India Locust attacks have damaged at least 200,000 hectares (ha) of crops across 10 states in the last two years. Locusts can travel up to 150kms per day depending on wind speed. According to FAO, the swarm can eat food of 35000 people in a single day. Major scale attacks can cause large amount of food loss thereby leading to uncontrollable price hikes and can affect economy. The only way they can be Scare away is by making loud noises. According to a Survey It is expected that locust will grow in around 400 Times today in coming 2 to 3 years. Adhunik Scarecrow is a mechanical scarecrow with electronic components which aims to mitigate the damage done to the crops by birds and hence reduce the financial loss incurred by the farmers. Its components help it to detect birds from a range and scare them away effortlessly. Our primary objective is to help farmer avoid the Locust attacks and prevent loss caused due to same. Moreover, we also want to automate the conventional and monotonous tasks involved in farming. Adhunik Scarecrow has got sensory power which helps it to sense motion i.e., it can detect arrival of Locust, can also detect motions of other animals and human beings. Along with sensory power, Adhunik Scarecrow has got set of actions it can perform such as making loud noise that scare away the locusts, birds and other animals that damage crops in the field in a time span of 24 hours. As other actions the scarecrow can control the irrigation of crops and can monitor agricultural field.



II. LITERATURE SURVEY

Sr. No.	Name of the journal/ year of Publication	Paper Title	Author Name	Advantages	Disadvantages
1	2020 IEEEAccess	Machine Learning Applications for Precision Agriculture: A Comprehensive Review	Abhinav Sharma , Arpit Jain, Prateek Gupta VinayChowdary	ML is used to solve issues like complex dataset computation, parameter variation, optimum resource utilization, Robust to weather variations.	Varying geographical conditions poses a challenge for universal design of the prediction algorithms.
2	Journal Of Communications And Networks, 2019	An Intelligent Agriculture Network Security System Based on Private Blockchains	Hsin-Te Wu and Chun-Wei Tsai	Enhanced safety as access available to only legitimate users, symmetric encryption, and protection from DDOS attacks.	Once a loophole is found, the blockchain is hacked.
3	2019 IEEE	Secure smart agriculture monitoring technique through isolation	George Suciu, Cristiana-IoanaIstrate, Maria-Cristina Dițu	Effortless access and monitoring of data, efficient real-time management, increased efficiency with Big Data and IoT	No proper implementation for prevention of DoS attacks.
4	2016 IEEE	Development of IoT based Smart Security and Monitoring Devices for Agriculture	TanmayBaranwal, Nikita, Pushpendra Kumar Pateriya	Agricultural modernization with IoT and Wireless Sensor Networks, remote location monitoring, 84.8% success rate.	No pattern recognition feature, random number of notifications.
5	2018 IEEE	Optimum Camera Placement Considering Camera Specification for Security Monitoring	Kenichi Yabuta and Hitoshi Kitazawa	Optimum camera placement, thoroughly solved coverage problem, scene segmentation.	Few power supply and network irregularities.

III. METHODOLOGY

A) PROPOSED SYSTEM

It is very common to use scarecrows in the farm for the purpose of driving away the birds and animals so that they don't cause harm to the crops in the field. But, these scarecrows are very ineffective as they are very static in nature and cannot react to changes or intrusion of birds and animals in the surrounding thus not producing any productive output most of the times. To address this problem, we have proposed the idea of making a modern scarecrow which makes use of motion sensors and speakers in which, the motion sensors will work so as to track the motion of birds trying to cause damage to the crops and then with the help of speakers will make sound which will scare these birds away while also keeping in mind not to produce sound beyond the safe sound limit. This sound will not only scare away only the birds but also other animals, thus making this scarecrow a lot more useful, effective and also dynamic as compared to the traditional scarecrows out there.

B) COMPONENTS

The PIR/HB100 sensor which is a motion sensor has a consumption of 5 volt having range of 10-14m/20m with 10 in quantity. The temperature sensor has a range of 2m in the mechanism for the detection of weather and sending alert to the user with a single quantity. Soil moisture sensor has a consumption of 3.3 to 5 volt with a single quantity to detect the soil prediction. Air-horn / speakers with 12V consumption in an acre plan is used with a single quantity to prevent the animals, insects, birds to enter the crop field or farm field from getting destroyed. A Sim800L has a consumption of 1.2V with a range of 4g for the transmission of message alert. An extendible rod is inserted in the mechanism for the support of the model in the field. A micro servo motor has consumption of 4.8V to 6V having temperature range of 0°-60° which is used for the motion sensor to supply power. Arduino UNO is used having 14 digital input or output pins, 6 analog inputs, 16 MHz ceramic resonator, a USB connection, power jack an ICSP header and reset button. Extra components are used in the framework to build up the mechanism model.

C) ALGORITHM

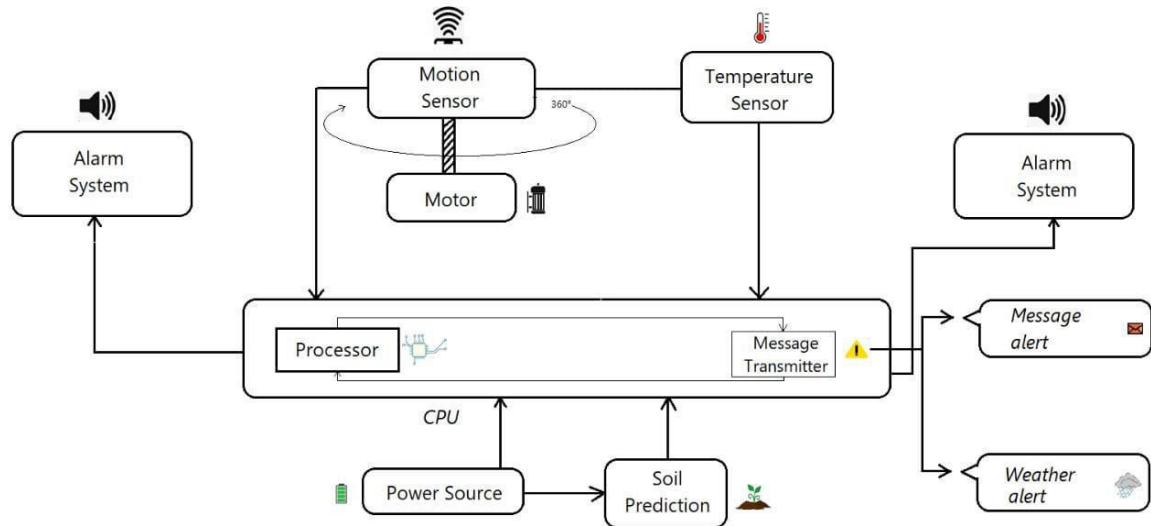
User Side:

- 1) The mechanism would detect the insects, birds in mass count or animals.
- 2) The mechanism would activate the system, connect to the processor and send a message alert to the farmer.
- 3) After the message is sent to the farmer, the device would start signaling the birds to make a loud sound by preventing them enter the field are.
- 4) Being a multipurpose system, it would detect the weather conditions and send message to the farmer.
- 5) It would also have soil prediction system inserted to alert the farmer with a mentioned schedule.

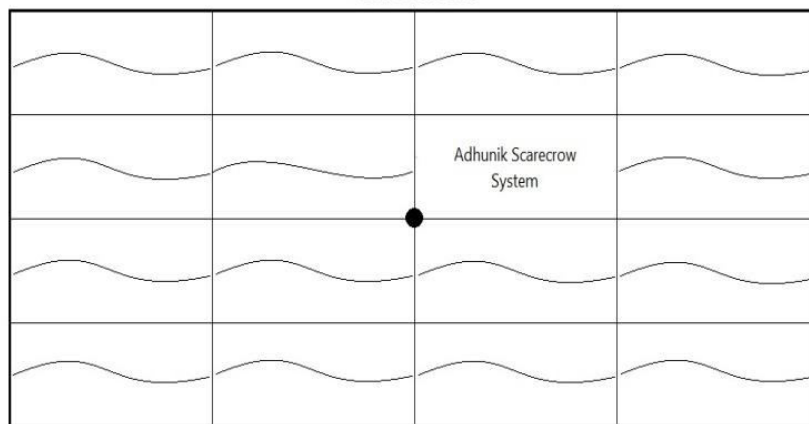
Admin Side:

- 1) Admin will have all the information of the mechanism.
- 2) It will provide all the information being transferred from the device.
- 3) This data would be stored with the user and admin.
- 4) Maintain record of its use from the very start to end use (as it is a rental model).

D) SYSTEM ARCHITECTURE



1 Acre = 43560 sq ft
 43560 sq ft = 200 ft on one side
 = 61m on one side



1 Acre = 40 Guntha

Fig: A crop field estimation

IV. EXPERIMENTAL RESULTS

1. We are conducting the test of the project in our college campus.
2. The initial testing will be performed by our professors, the front end functionality being
 - a. Detection via motion sensor of insects, animals, locusts, birds, etc.
 - b. Weather Condition detection.
 - c. Soil prediction mechanism.
 - d. Message transmission process being successful.
 - e. Alert mechanism.
 - f. Working of the motor.
3. Further the testing of sensor and processor being tested by ourselves i.e. the entire back end system being tested by us such as
 - a. Application code



- b. Whether message is sent to the end user or not.
 - c. Whether the alert message is sent after the motion sensor detects any animal, birds, insects, etc.
 - d. Many more back end activities.
 - e. Functionality of software application.
4. The device can be used in agricultural farms in village, agricultural institutions, Agriculture projects, etc.

V. CONCLUSION

The system mainly aims towards the protection of the field from various sort of insects, animals, birds from the field getting damaged.

There is no limitation of scope for this system. It can be used in various sectors like:

1. Government sector
2. Commercial Sector
3. Village area
4. Agricultural Institutes
5. Mega Crop Projects

Thus this system is currently performing the entire desired functionality as per the requirements. There are chances to fail the system if it is taken for regression testing.

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