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Crop Protection from Wild Animal using IOT

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Abstract*: Crops in the farms are many times devastated by the wild as well as domestic animals and low productivity of crops is one of the reasons for this. It is not possible to stay 24 hours in the farm to sentinel the crops. So to surmount this issue an automated perspicacious crop aegis system is proposed utilizing Internet of Things (IOT). The system consists of esp8266 (nodeMCU), soil moisture sensor, dihydrogen monoxide sensor, GPRS and GSM module, servo motor, dihydrogen monoxide pump, etc. to obtain the required output. As soon as any kineticism is detected the system will engender an alarm tobe taken and the lights will glowup implemented at every corner of the farm. This will not harm any animal and the cropswill stay forfended.*

Keywords: Crops

I. INTRODUCTION

Agriculture is the strength of Indian Economy. Animals cause serious damage to crops by running over the field and tramplingover the crops. It causes the financial problem to the farmers. Agriculture is the backbone of Indian economy but because of animals interference in agricultural lands will be huge loss of crop. Farmers in India face serious threats from pests, natural calamities &damage by animals resulting in lower yields Traditional methods followed by farmers are not that effective and it is not feasible to hire guards to keep an eye on crops andprevent wild animals. Animals like wild boars, elephant, tiger and monkeys etc cause serious damage to crops by animals running over the field and trampling over the crops. It causes the financial problem to the farmers.

ARDUINO: POWER SUPPLY ARDUINO APR9600 NODE MCU SPEAKER LCD Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED. Arduinoboard designs use a variety of microprocessors and controllers.The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits.

PIR SENSOR: A passive infrared sensor (PIR sensor) isan electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

NODE MCU: Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi Fi SOC from Espressif Systems, and hardware which is based on the ESP-12 module. The term "Node MCU" by default refersto the firmware rather than the development kits. The firmwareuses the Lua scripting language. It is based on the Lua project, and built on the Espressif Non-OS SDK for ESP8266. It uses many open source projects, such as lua-cjson and SPIFFS. TheESP8266 is a low-cost Wi Fi chip with full TCP/IP stack and microcontroller capability

II. LITERATURE REVIEW AND OBJECTIVE

Objective

- The literature on IoT-based plant protection systems against bird and wildlife attacks is relatively new andthere is little research in this area.
- The proposed system used infrared sensors, camerasand deterrents to detect and prevent animal attacks.
- The study concluded that the system was effective inreducing crop damage.

Literature Review

T. Gayathri et al, [10] proposed the system for monitoring the growing status of the corn (maize) plant continuously and intimate the agriculturist using wireless sensor network (WSN). But in practice, cultivator faces too much effort in the farmland. This paper makes eases the work of the farmer in cultivated land through the usage of different kind of sensors. The two LDR sensors are interfaced with PIC16F877A microcontroller whereas its top array receives solar radiation for supply current and the bottom of the LDR array is for measuring leaf area index (LAI). The humidity sensor will compute the moisture level in the corn field, if the leveldecreases, then it automatically switches ON the DC motor. Allthe particulars of farmland are sent to the farmer through GSM and revel in the LCD screen.

Smith et al. [1] proposed a holistic view of the IoT applicationsin agricultural settings, highlighting the potential of technologydriven solutions to mitigate wild life related crop damage. “A review on smart public transport system based on IOT,” by P. Singhal et al. (2021).

P Davis et al. [2] research showcases that NodeMCU based wireless sensor networks offer real-time monitoring and data collection capabilities, significantly reducing crop damage by enabling timely interventions.

V. Brown et al. [3] research demonstrates that the integration ofIoT and machine learning technologies can lead to more sustainable and eco-friendly solutions for wildlife managementin agriculture.

S. Krishnan et al. [4] temperature of the student is monitored using an IR temperature sensor, and if it crosses the threshold level, an SMS is sent to the parent regarding the health condition of their child.

Garcia, Laura et al. [5] paper highlights the evolving role of machine learning in predicting and preventing crop damage, emphasizing its potential in proactive protection.

Rivera, Sofia et al. [6] illustrates how IoT technology enhancesvineyard crop protection through real time monitoring and datacollection.

James et al. [7] research highlights the benefits of a holistic IoT system, providing efficient crop protection and environmental insights for sustainable farming.

Parker, Emma et al. [8] paper emphasizes the potential of IoT technology in revolutionizing crop protection strategies formore sustainable and efficient agricultural practices.

AMingkwan et al. [9] research showcases the viability of solar-powered IoT technology in delivering efficient and eco-friendlycrop protection solutions.

Swati Chandurkar et al. [10] system utilizes technologies such as GPS, GSM, NFC, and RFID to track the location of buses inreal time

III. MATERIALS AND METHODS

This study proposed a YOLO v5 model as a object detector to detect the helmet wearing and non helmet wearing motorcyclist.For UI designing we are using C# and back-end asa python. A traffic video surveillance system that uses a convolutional object detector to identify non-helmet wearing motorcyclists. If a violation is detected, the motorcyclist’s number plate number is extracted and reported. The main objective is to use the concepts of machine learning and deep learning to create real time classifier. The studies and research done on real-time object detection are inherited to gain knowledge in creating a new specific model. We focus on usingpre-trained models to perform transfer learning to create a new model specific to our task

Existing work

The existing systems mainly provide the surveillance functionality. Also these systems don’t provide protection from wild animals, especially in such an application area. They also need to take actions based on the on the type of animal that tries to enter the area, as different methods are adopted to prevent different animals from entering suchrestricted areas. Also the farmers resort to the other methodsby erecting human puppets and effigies in their farms, which is ineffective in warding off the wild animals, though is useful to some extent to ward off birds .The other commonly used methods by the farmers in order to prevent the cropvandalization by animals include building physical barriers, use of electric fences and manual surveillance and various suchexhaustive and dangerous method.

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Proposed Work

In proposed camera are interfaced to the puppet. As soon as the PIR sensors go High on detecting motion within a range of10 meters, the camera will be turned ON which first capturesan image and then starts recording the video for about five to six minutes, which will be stored on board as well as cloud, simultaneously a message will be generated automatically to the registered number using a SIM900A module to inform about the intrusion along with the details of the temperature and humidity obtained by interfacing dht11 temperature and humidity sensor. If the motion detection is dueto an authorized person with a valid RFID, who is mostly a farmworker, his attendance gets recorded automatically. Whereasif the motion detection is due to that of an unauthorized person without the valid RFID tag, the system further processes the image and video using Haar feature based Cascade Classifiers for object detection, and decides if the entity is an animal or human intruder.

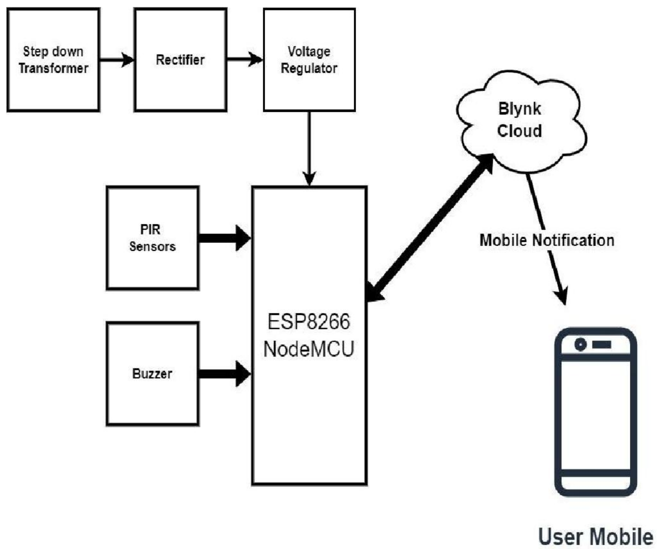

Fig 3.2.1. System Architecture

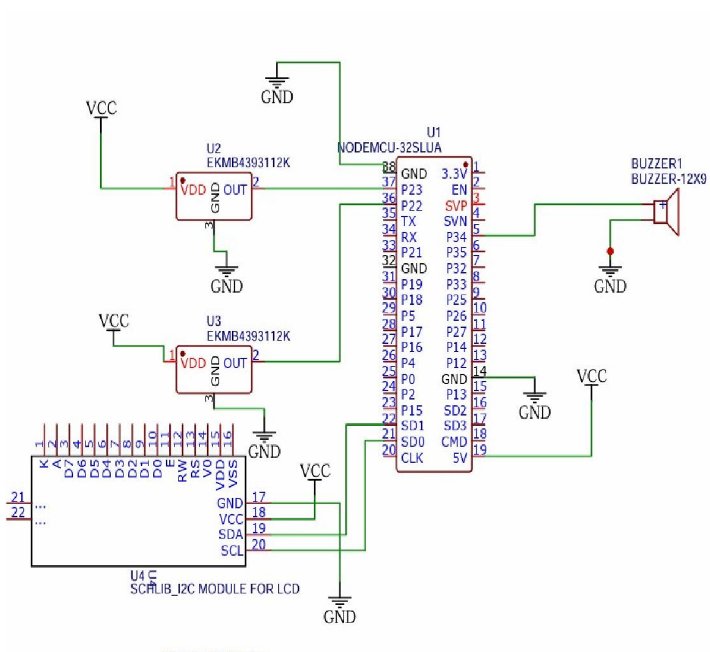

Fig 3.2.2 Circuit diagram

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Algorithm: Wild Animal Protection System
Initialize:
Set BLYNK_TEMPLATE_ID to "TMPL3c368mOdJ"
-Set BLYNK_TEMPLATE_NAME to "Wild AnimalProtection"
-Set BLYNK_AUTH_TOKEN to "2lk_jy-O3nutqv098uiH08bXHLxL_PDP"
-Include necessary libraries: ESP8266WiFi,BlynkSimpleEsp8266
Declare global variables:
ssid (WiFi SSID)
password (WiFi Password)
conditionMet (boolean indicating if the condition is met)s
Define function connectToWiFi():
Loop Function (loop()):
Check if WiFi connection is lost:
i. If lost, print "WiFi connection lost. Reconnecting..." and callconnectToWiFi().
Check if conditionMet is false:
i. If false, enter notification sending block:
Loop three times:
Send notification "Alert: Condition met!" usingsendNotification() function.
Print "After notification" to serial monitor.
Delay for 1000 milliseconds between notifications.
Print "Connecting to [SSID]".
Begin WiFi connection with provided SSID and password.
Continuously check WiFi connection status until connected:
i. If not connected, print "." and wait for 500 milliseconds.
Once connected, print "WiFi connected" and display the IPaddress.
Define function sendNotification(msg):
Log event "animal_entry" with the provided message (msg).
Print "After function call" to serial monitor.
Setup Function (setup()):
Initialize serial communication at baud rate 115200.
Call connectToWiFi() function to establish WiFiconnection.
Begin Blynk service using providedBLYNK_AUTH_TOKEN, ssid, and password
Set conditionMet to true to prevent repetitive notifications.
Run Blynk service

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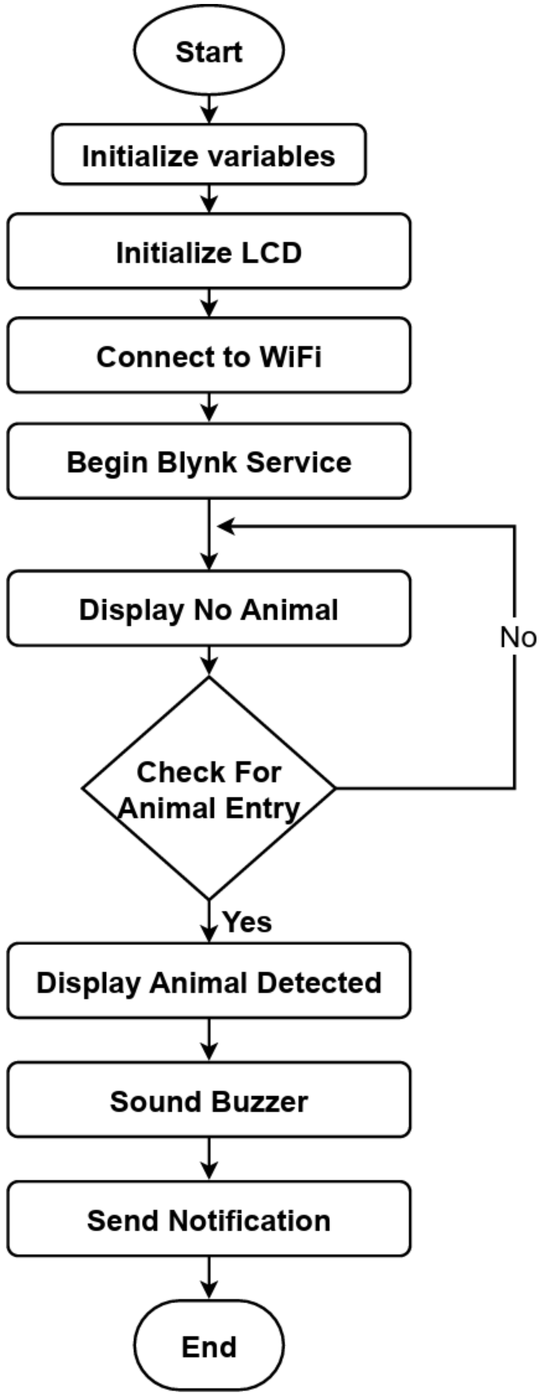
Flowchart



IV. CONCLUSION

The problem of crop protection by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. In this project, we presented an integrative approach in the field of Internet of Things for smart Agriculture based on low power devices and open source systems. The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. Also

Save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields. This will also help them in achieving better crop yields thus leading to their economic wellbeing.

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