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Croptor - The Crop Protector

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Abstract: Farming is most important assets of our country. India is known as agricultural country. But in today scenario, farming got affected due to many reasons such as lack of interest by youth, weather's effect, water supply effect, crop protection. From these all reasons, we find the major problem in farming is protection of crop. Farmers are not able to protect their crop from thief, animals, bird and weather effects because farmer's resident place is far away from the farm. In this project we develop a system in which a motion sensor detect the presence of animal, human or bird between the boundary of farm and blow siren so birds and animal run away from farm and if thief trying to stole the crop then they will also run away by hearing siren. In case of water level degradation in soil our system will automatically start the water motor. Our system also sends notification to farmer at the time when someone is trying to enter in the farm and also for degradation in water level.
Keywords: Animal, Human Detection, Soil Moisture, Water Pump, Video Capturing, Camera, Raspberry pi, Mobile.

I. INTRODUCTION

In the "Croptor-The Crop Protector" we have the solution for farmers. In this system we assembled IOT device like PIR(Passive Infrared) sensor[11], Soil Moisture sensor[8], 5v Motor Driver, Water Motor[10] , Camera Module[9], Raspberry pi[7], Buzzer, LED and connect them with android application to perform some functionality. Before we go to working of system first we have to know more about above IOT devices [11]PIR sensor is a passive infrared sensor which is detect human and animal body heat and return output in digital form 0 and 1. [8]Soil sensor is a sensor is device which detects water in soil and return output in digital form. 5v motor driver is use to run motor from raspberry pi. [10]5v motor is a water pump which use from move water from well to farm. [9]Camera module is a module which is used to capture video from raspberry pi. [13]Buzzer is used for make noise when someone enter in farm and LED going to blow. Now the most important device of our system {7}Raspberry pi which is main part to assemble all above device raspberry pi[7] is a IOT device which give commands to other devices and retrieve output from them and send it to [15]Android application via [12]mysql database, raspberry pi work on debian linux operating system.

II. LITERATURE SURVEY

Wireless Sensor Networks(WSN) for agriculture: The state –of-the-art in practice and future challenges [1] says that we review the potential WSN applications, and the specific issues and challenges associated with deploying WSNs for improved farming. To focus on the specific requirements, the devices, sensors and communication techniques associated with WSNs in agricultural applications are analyzed comprehensively. The above system resulted as monitoring of farm in wireless manners. We can retrieve data of farm through mobile. System has advantages like Farmer does not have to visit farm manually every rime and it also time saving and giving appropriate results. System also has disadvantages like high cost, high maintenance and it not suitable for all weathers.In end conclusion of system is to improve it and make it cost reliable and make it capable to working in all weathers.

A Decision Support system for managing irrigation in agriculture [2] say that automatic Smart Irrigation Decision Support System, SIDSS, is proposed to manage irrigation in agriculture. Our system estimates the weekly irrigations needs of a plantation, on the basis of both soil measurements and climatic variables gathered by several autonomous nodes deployed in field. In end conclusion of system is to improve it and make it without use of decision support system.

Architecting an IoT-enabled platform for precision agriculture and ecological monitoring [3] say that designing a private Internet of Things (IoT) enabled platform for the research in precision agriculture and ecological monitoring domains. The paper further describes the implementation of the platform and its evaluation using various sensor nodes deployed at the research and end-user facilities. In last it conclude that the system has to be improve and make it reliable for every weather.

A Temperature Compensated Smart Nitrate-Sensor for Agricultural Industry [4] say that the developed portable sensing system consists of a planar interdigital sensor, associated electronics, instrumentation and Electrochemical Impedance Spectroscopy (EIS) based analysis. The system is capable of measuring nitrate concentrations in the range of 0.01 to 0.5 mg/L in ground and surface water. In end it concludes that the system must have to increase capacity of nitrate measuring.

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A secure user authentication and key-agreement scheme using wireless sensor networks for agriculture monitoring [5] says that Agriculture is the backbone of our economic system and plays an important role in the life of an economy. It does not only provide raw material and food, but also provides large employment opportunities. Therefore, agriculture requires modern technology for increasing the productivity. In this context, wireless sensor networks (WSNs) could be utilized for monitoring the climatic parameters such as (temperature, humidity, light, carbon dioxide, soil moisture, acidity etc.) in an agriculture field. The climatic parameters are very important in terms of growth, quality and productivity of crops.

Measuring Macro Nutrients Of The Soil For Smart Agriculture In Coconut Cultivation [6] says that This paper explores the prospective of Internet Of Things (IOT) in the area of agriculture, aspired at the coconut tree cultivation. Smart agriculture replaces the traditional mechanism. In this paper multi model data collection and hardware setup system is proposed. It collects multiple environmental data such as macro-nutrients (Nitrogen (N), Potassium (P) and Phosphorus (K)), pH value and moisture level of thesoil with the help of wireless sensor motes. Once motes collect the information fromthe soil, it transmits its data to the data collection centre with the help of energy efficient data forwarding algorithm.

Sr No.	Year	Research work on	Technologies /Devices Used	Outcome
1.	2015	Wireless Sensor Networks(WSN) for agriculture: The state –of-the-art in practice and future challenges	Wireless Communication Technologies-Zig-bee, GPRS/3g/4g modules , Wi-Max, Wi-Fi, Bluetooth and Various Sensors (Soil moisture Sensor, Temperature Sensor.	Increase in Cost , Scalability has to be improved.
2.	2016	A Decision Support system for managing irrigation in agriculture	PLSR (Partial Least Square Regression)and ANFIS (Adaptive neuro Fuzzy Inference Systems) machine learning techniques used	Good performance, Accurate Prediction of field related information.
3.	2017	Architecting an IoT-enabled platform for precision agriculture and ecological monitoring	Sensors for data collection, Web portal implementation using PHP and laravel framework, Paas cloud deployment, drone for capturing images. Arduino and Raspberry Pi is used.	Accurate and regular monitoring of precision agriculture, aquaculture and monitoring various ecological factors. and very precise image taken by drone.
4.	2017	A Temperature Compensated Smart Nitrate-Sensor for Agricultural Industry	Spectrophotometric method along with a planar type interdigital sensors are used to detect the nitrate level in soil, Arduino Yun has been used to produce sinusoidal volt and soil and temperature sensors has been used	Portable, Linear across different nitrate levels, Performance improved with this method.
5.	2017	A secure user authentication and key-agreement scheme using wireless sensor networks for agriculture monitoring	Wireless Sensor Networks based on IoT and BAN (Burrows-Abadi-Needham) and AVISPA tools are used for protocol validation	Highly Secured, Cost is reduced
6.	2017	Measuring Macro Nutrients Of The Soil For Smart Agriculture In Coconut Cultivation	Macro Nutrients such as Nitrogen, Potassium ,along with that phosphorous are collected deficiency level is identified using data forwarding algorithm	Improved Productivity Cost and time is also saved.

Table 1: Comparisons of Literature Survey

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III. METHODOLOGY

Croptor -The Crop Protector is a system which is used by users like farmers, students, and Agriculture department. User can login in our system by android application by username and password as a user or as a admin. In system raspberry pi and all IOT devices set at farm and user is far away from farm (home) with mobile in which our [15]android application is installed. [7]Raspberry pi is power up and start it's functionality like to detect human and animal with [11]pir sensor if any human or animal is enter in farm pir sensor send digital output to raspberry pi raspberry pi set [13]buzzer and LED on and [9]camera module start capturing video after a particular length of video it save to local storage on raspberry pi and it's path store on [12]mysql database. All hardware device can be controlled from raspberry pi using python[14] language. User get notification at that time on [15]android application user can view video on mobile and start or stop siren from mobile this is the main functionality of our system and other functionality is to detect water from soil using [8]soil sensor user can start or stop water pump from android app when water detected in soil by soil sensor water pump automatically stop, android application connect to raspberry pi using [15]php script.

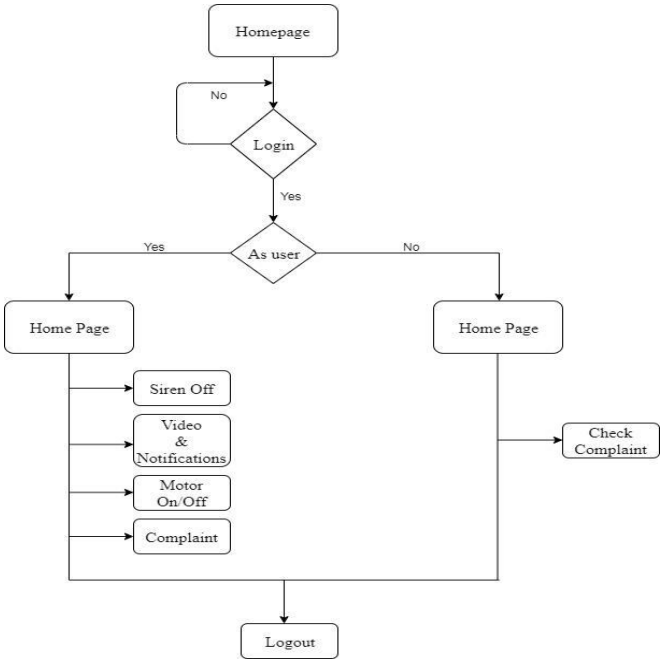


Figure 1: Flowchart of Croptor

IV. IMPLEMENTATION

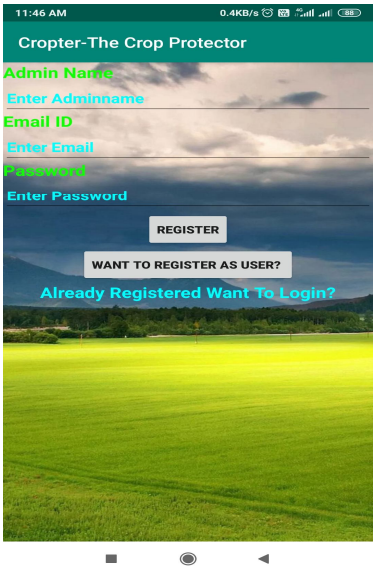


Figure 2: Admin Registration Page

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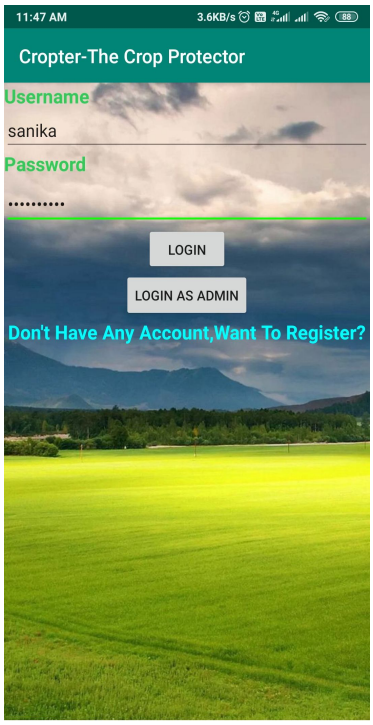


Figure 3: User Login Page

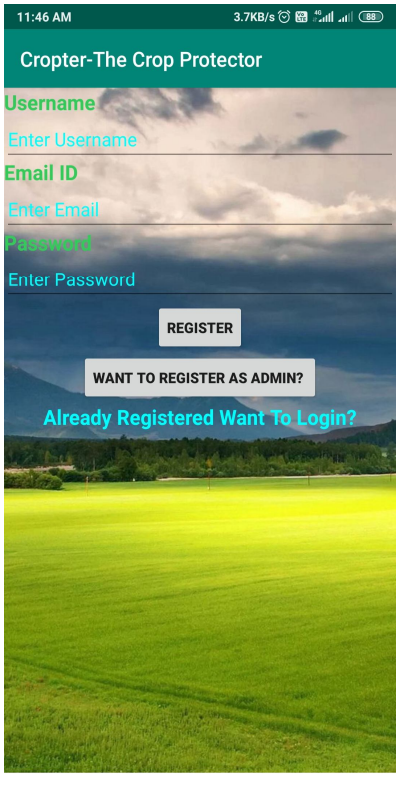


Figure 4: User Registration Page

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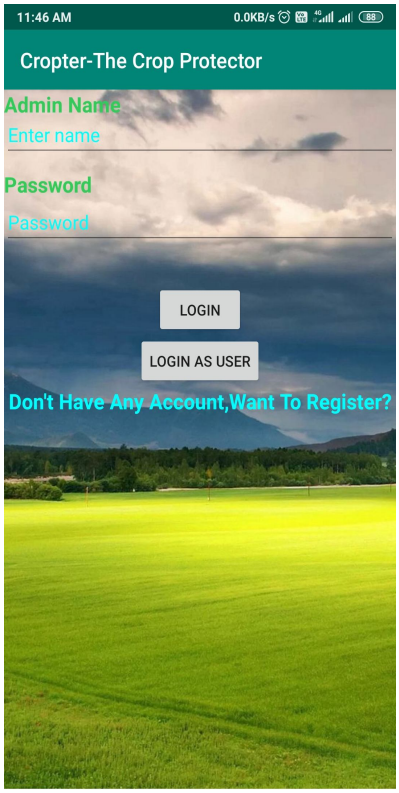


Figure 5: Admin Login Page

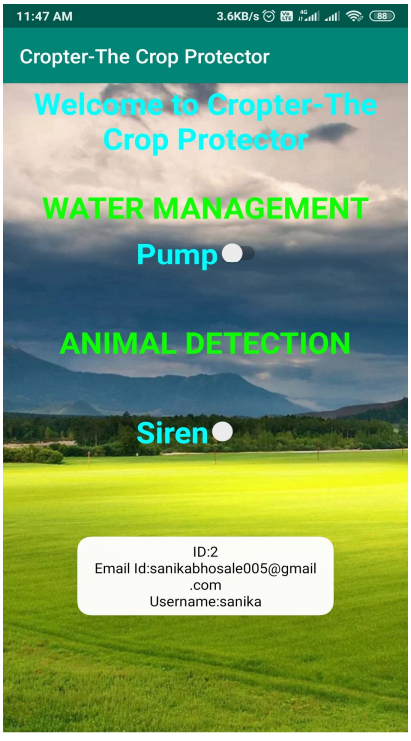


Figure 6: Home page

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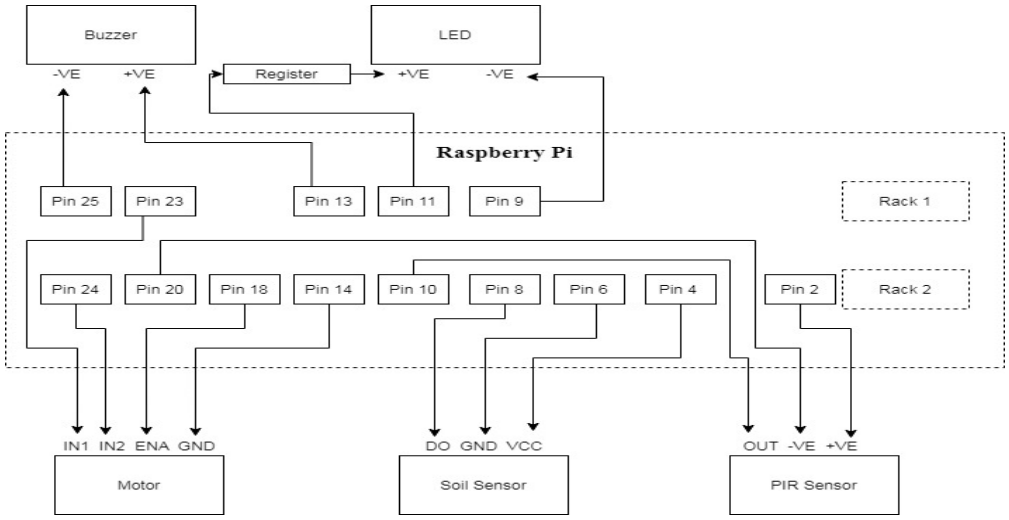


Figure 7: Hardware Design of Croptor

In above diagram we show hardware design of system in which PIR sensor +v is connected to pin 2 of raspberry pi for 5v power supply –v is connected to pin 20 of raspberry pi for ground supply and output pin of pir sensor is connected for send output to raspberry pi, soil sensor vcc is connected to raspberry pi's pin 4 for 5v power supply GND is conneceted to pin 6 for ground supply and Digital Output is connected with pin 8 for send output, motor's IN1 is connecetd to pin 23 of raspberry pi, IN2 is connected to pin 24 both for input purpose, ENA is connected to pin 18 to enable or disable and GND is connected to pin 14 for ground supply, Buzzer's –v is connected to raspberry pi's pin 25 and +v is connected to pin 13 and LED –v is connected to raspberry pi's pin 9 and +v connected via register to pin 11 for prevent raspberry pi from crash.

V. CONCLUSION & FUTURE WORK

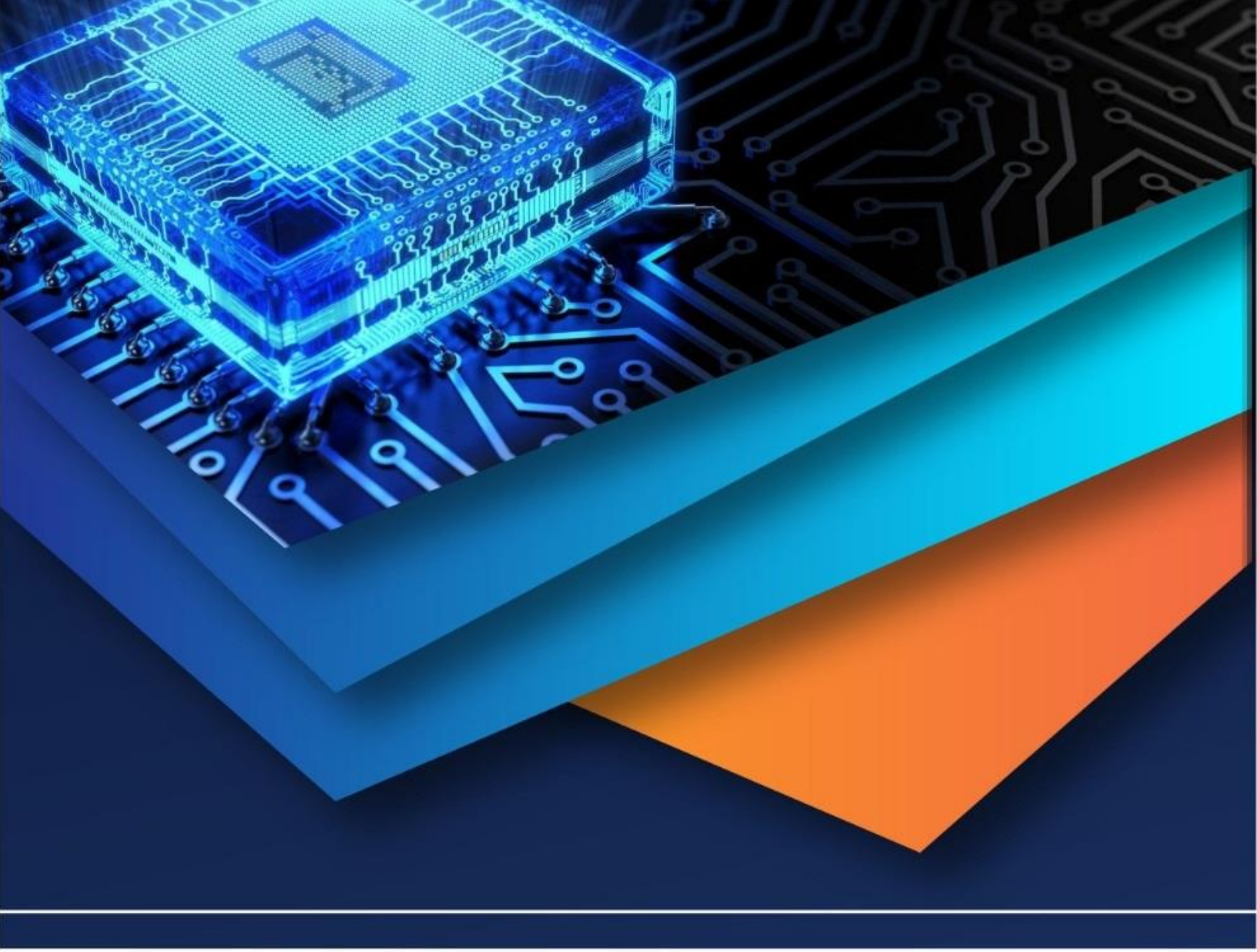
Here the sensors are fetching the real time data. We would be creating an android application on which the user can see those details from the sensors i.e. Temperature, Soil humidity & if the soil moisture goes down the threshold value the irrigation system would be initiated & as it reaches the certain level the irrigation system would stop on its own.

In future our system will detect animal or human (thief) and turn siren ON and camera will capture it's video and send to user. So user can aware about his farm's present condition.

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