Smart Agriculture System with Intruder Alert Using Raspberry PI

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Abstract—**Agriculture plays an important role in the development of agricultural country. In past days, farmers accustomed figure the maturity of soil and influenced suspicions to develop that to reasonably yield. Agriculture is done manually from ages. The main aim of this paper is to encourage a Smart agriculture through IOT this gives the farmer to receive Live Data (Humidity, Temperature, Soil Moisture and even the movement of animals and birds which may destroy the crops in agricultural field). The smart agriculture being proposed via this paper is combined with Raspberry Pi, several sensors and live data feed can be obtained online from using OpenCV we get e-mail. After e-mail GSM Module gets activate and sends SMS.**

Index-Terms—**Smart Agriculture, Alert, Intruder, Rasp berry pi**

I. INTRODUCTION

Agriculture is taken into consideration as a result of the supposition of life for the human species as a result of its foremost supply of raw materials and food grains. It plays a very crucial role in the enlargement of a country's economy. Growth in the agricultural sector is critical for the event of the financial condition of the country. Sadly, several farmers still using the standard ways of farming that finally end up in lower crop yielding. However, where automation had been imposed and people had been substituted by automatic machinery, the yield has been bettered. Then there is having to be compelled to enforce fashionable science and technology inside the agriculture sector for increasing the yield. The gathered information provides the knowledge about various environmental conditions those in turn helps to analyze the system. observing atmosphere conditions is not adequate & a complete focus to improve the productivity of the crops. The productivity depends on different conditions to a great extent. Moreover, when the crop starts growing savage animals and birds starts attacking the field. There is a conjointly chance of thieving once the crop is at its harvest stage. The aim at creating agriculture with intrusion alert using IoT includes good management which incorporates temperature, wetness maintenance, and intrusion detection within the field.

Agricultural country desires some innovation in the field of agriculture. Farm lands and plantations area unit typically terribly giant scale running into many acres and in most cases fencing these giant expanses of land will be prohibitively overpriced and really nerve-wracking. Farmers thus resort to building fences victimization sticks and ropes and these offer the solely security live they will adopt. These security measures area unit trivial and really ineffective as intruders will simply jump over them and take out with as a lot of crops as they will carry them while not the data of the house owners, particularly once such fences area unit engineered around dark crevices. Wireless detector Networks (WSNs) empower observation & dominant of corresponding physical environments from remote space with higher potency and accuracy. This work presents the look and therefore the Implementation of WSNs for farm observation and security, that is simple to install. It is a microcontroller-based circuit to observe and management intrusion by notify the farm owner once the use of buzzer on the farmland in order to scare intruders. The system is implemented with the aim of getting the most plant growth and yield. This work is actuated by completely different views regarding farming security. The security lives used by farmers in building fences victimization sticks and ropes as the solely security measure, which may be terribly nerve-wracking and time overwhelming, and in flip limit farmers from farming on a giant scale. the

restrictions of associate degreed as they solely send attentive to the farm owner on sensing intrusion while not raising a buzzer 1st before alerting the farmer. several intruders that could be birds, associate degreeimals can get frightened and leave the farm area right away a buzzer gets on. This may help the farmer to reduce the strain of going to the field right away oncereceiving associate degree alert since associate degree normal buzzer will chase several animals away.

II. LITERATURE SURVEY

D. Jeevanand constructed designing of a networked video capture system applying Raspberry Pi. The arranged system works on capturing video and categorizing with networked systems with alerting the administration person via SMS alarm as demanded by the client. Their classification was designed to work in actual time situations and situated on Raspberry Pi.

Sneha Singhd and his organization declared IP Camera Video Surveillance setup applying Raspberry Pi hi tech. The department aimed at declining a system which pick-up real-time images and spread them in the display using TCP/IP.

Mahima F. Chauhan and Gharge Anuradha put on to design and establish an actual-time video surveillance system situated on an embedded subserve Raspberry PI Board. Their system has cheap, has good openness and portability, and is easyto maintain and upgrade. Thus, this application system implements better security solutions.

S. Jeevitha,DrS.Vengateshkumar has accustomed an overview on "A Study on Sensor based Animal Intrusion Alert System applying Image Processing Techniques". This is directed by having a wireless sensor for posting an automated alert message to the main land owners and forest management.

Wahidur Rahman, Elias Hossain, Rahabul Islam, Harun-Ar-Rashid, Nur-A-Alam, Mahmodul Hasan has treated on "actual time and modest IoT based cultivation using raspberry Pi" reverse on the application of IoT implement Farming, especially for the people who needed a smart way of agriculture. It focuses on actual time conclusion with productive use of cheapest security system. The appearance of this research along Sensor data monitoring using soil moisture sensor which is responsible for mapping moisture of the field and Temperature and humidity

sensor which is responsible for reaching out to the present climate.
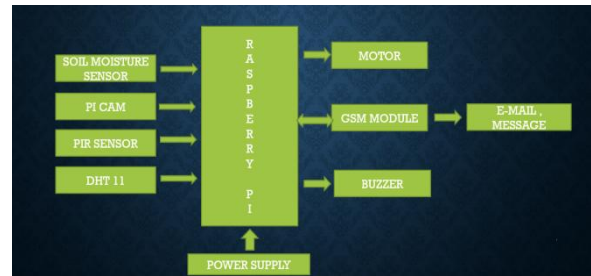
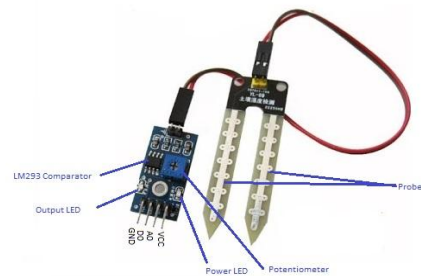## III. BLOCK DIAGRAM

Fig.1. Block Diagram

Fig.2. Soil Moisture Sensor

The Soil Moisture Sensor is to measure the amount of water content in the soil & in similar materials. This sensor is easily operated and the twolarge, exposed leads function as probes for the sensor, together acting as a rheostat. If the water content within the soil is more, it means the excessive conductivity between the pads and can generate a lower resistance, and therefore the next signal out. The working of this sensor is ruined by placing the sensor into the earth and the status of the water content within the soil are often reported within the variation of a percent.

Fig.3. Pi Camera

This framework utilizes a 5MP Raspberry Pi Camera Module Rev 1.3. With the Raspberry Pi 3B+, you may need to use any USB webcam. This camera module is ideal for Raspberry Pi projects which require a little measure of room. The top-quality

camera module takes superb photos and can likewise record video, making it ideal for drones or a reconnaissance activity. For extra computations, the Raspberry Pi 3B+ constantly gets signal from the 5MP camera module. It's normally used in picture handling, AI,and security projects.
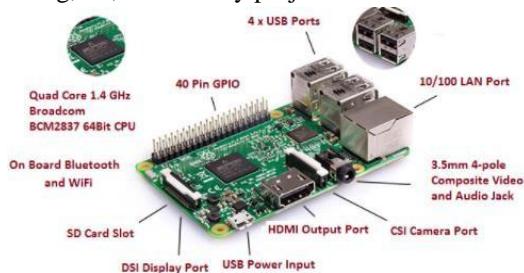

Fig.4. Raspberry PI -3B+

The Raspberry Pi 3B+ model, which has a 64-cycle quad center processor, is the latest expansion to the Raspberry Pi 3 line. It's a little PC board containing a CPU, GPU, USB ports, I/O pins, WIFI, Bluetooth, USB, and organization boot abilities, and it can do a few capacities like a standard PC. Itbeats the past age as far as speed, interactive media execution, memory, and network. It's a charge card estimated microcontroller that runs our product, gathers information from associated peripherals, and makes a move dependent on the Raspberry Pi's characterized conditions. It has a quad-center CPU that can approach 1.5 GHz, just as another video center VI 3D unit that approaches 500 MHz. On-board memory is accessible in sizes from 1 GB to4GB.

Fig.5. 5V Pump Motor

The DC Plastic Mini submersible pump is ideal for most applications involving transport of water from one place to another specially from lower level to higher level as shown in below Figure.5: 5V Pump Motor. A quality submersible pump that operates on voltages anywhere from 3v to 9v, the best voltage range being 3-6v. The body of the pump is totally sealed so on to not let any water in through the cracks, even near the wire opening. But as another

security measure, its generally suggested to seal off the wire opening area of the pump using some Hot Melt Glue Gun. The connector end of the wire should be kept out of water. There are two openings on the pump, a little one on the side and one facing upwards. The side opening is that the inlet, while the latter is that the outlet.

Fig.6. GSM MODULE

GSM is a modem with stands for Global System for Mobile communication. At different frequency bands, it is used as open & digital cellular technology. GSM technology was evolved by using TDMA technique for the purpose of communication. Reduction of data can be done by GSM & the client information is sent through two different channels with respect to time. By using SIM it is differentiated from ordinary mobile to GSM Module to find out the network. Through GSM international roaming became popular. It differs from its forerunner, which made the signals to transmit digitally which results in the development of second generation in telecommunication. Comparing with the previous technologies, it is inbuilt with advanced features, and it reached rapidly throughout the world.

Fig.7. DHT 11

The DHT11 is a general, low-price digital temperature and humidity sensor and gives the output in digital form.

Fig.8.PIR Sensor

PIR stands for Passive Infrared Sensor. This sensor allows you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, economical, low-power, easy to use. These sensors play an major role in the IoT system as they are the whole and sole mechanism required for proper functioning of the system. These sensors collect real time data continuously from where it was placed. The data collected from these sensors are sent to the Raspberry Pi. In control section, that is in the Raspberry Pi the data from the sensors are received and the received data is then analyzed by the Raspberry Pi and then passes the signal to the devices which it was connected to.

Fig.9.Buzzer

A piezo ringer is a sound flagging gadget with a piezo component and a swaying circuit inside that waves the piezo metal base plate and makes sound at a foreordained recurrence when a voltage distinction is applied. Conservative pin terminal sort piezo signal with a 4 KHz yield is one of the highlights. Direct connection on printed circuit sheets is conceivable in light of the fact that to the pin type terminal construction. These are high-dependability piezo ringers that can be utilized in an assortment of electronic gadgets.The artistic plate contracts or grows when current is applied to the ringer. The encompassing plate vibrates because of changing this. That is the sound you're hearing. The speed of the vibrations changes as the recurrence of the bell changes, changing the pitch of the subsequent sound.

Fig.10. L293D Motor Driver

It is an IC device. It is used to drive motors in required direction. It consists of 16 pins and it can control a set of two DC motors at a time in any direction. This IC work on the basic principle of H-bridge. This H-bridge is used to flow the voltage in both directions. It receives the signal from microcontroller and transmit that signal to the motors. It consists of two voltage pins one is for working of L293D motor and the other for apply voltage to move the motors.
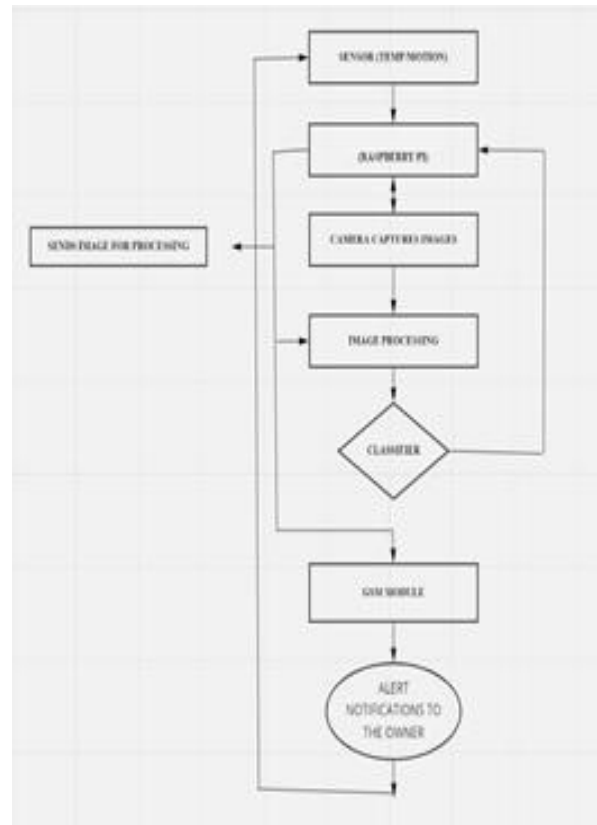
IV. IMPLEMENTATION

Figure.11. Flow Chart

The first phase, thePIR will detect the human & animal movement and activate the camera through Raspberry Pi. In the next phase, the Raspberry Pi will receive the captured image and it sends the image through GSM and also sends the alert message to the farmer

The detection of Animal intrusion is classified in three stages:

 1. On-field – PIR Sensor & Camera Module.
 2. Processing and execution Unit – Raspberry Pi
3. Communication and Alerting Unit – Image& Alert SMS through IOT.

V. ADVANTAGES

- It helps in increasing of Production
- It is low budget method
- It provides the high-quality crop production
- Water Conservation
- Accurate farm and Field evaluation
- Improved livestock farming

VI. APPLICATIONS

- Soil Moisture Monitoring
- It is used for Soil Nutrient Analysis
- Precision Farming
- Protection of field from animals
- Real time monitoring of crop fields
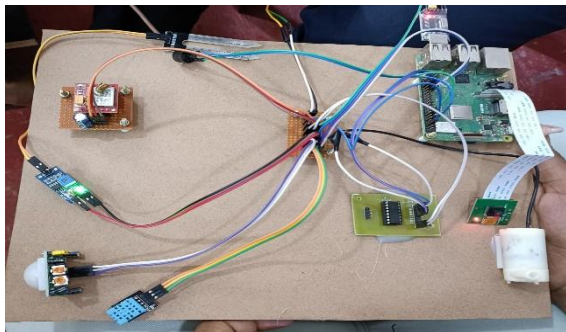- Automatic alert system for the farmer

VII. RESULT
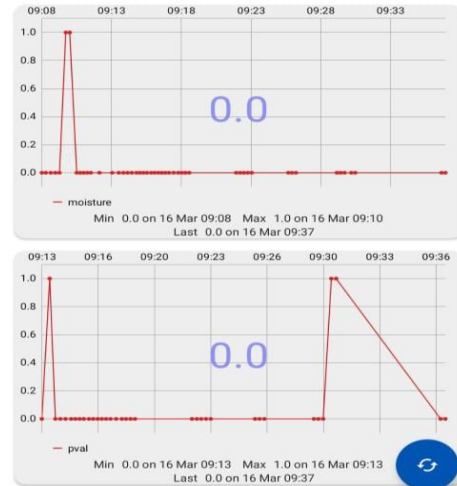

Figure.12. Connections of the Block Diagram

Figure.13. Monitoring various sensors Information using IOT

VIII. CONCLUSION

Better improvement of production in crop is a major requirement in the countries like India, where the majority people depend on agriculture for their livelihood. Enforcing smart irrigation system using IOT in the field can surely help to increase the yield of the crops and overall product. The system also provides cost effective method which can be carried out by the farmers easily. The system also consumes less power and reduces water consumption to a great extent. So, this is very useful in areas where the availability is a major problem. The system also provides a method for intruder detection which is a primary reason for reduction in crops. Using of Raspberry Pi over Microcontrollers will give more speed of response and design flexibility.

IX FUTURE SCOPE

In order to automate the critical farming process by "Smart Agriculture System", it enables us to monitor the climatic variables and different soil components, automating the irrigation system and controlling the supply of fertilizers and pesticides. The farmer will apprehend earlier concerning the negative climate things. The usage of IOT for farming can be extended in addition to other tasks in farming together with farm animal management, fireplace detection and climate manage.

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