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SMART CROP PROTECTION SYSTEM FROM ANIMALS AND AUTOMATIC PLANT WATERING SYSTEM USING NODEMCU

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ABSTRACT

Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds etc. This leads to huge losses for the farmers. It is not possible for farmers to barricade entire fields or stay on field 24 hours and guard it. So here we propose automatic crop protection system from animals. this system uses a motion sensor to detect wild animals approaching near the field. In such a case the sensor signals the micro controller to take action. The micro controller now sounds an alarm to woo the animals away from the field as well as sends SMS to the farmer so that he may know about the issue and come to the spot in case the animals don't turn away by the alarm. This ensures complete safety of crops from animals thus protecting the farmer's loss. watering is the most important cultural practice and most labor intensive task in daily greenhouse operation. Watering systems ease the burden getting water to plants when they need it. Knowing when and how much to water is two important aspects of watering process. To make the gardener works easily, the automatic plant watering system is created. There have a various type using automatic watering system that are by using sprinkler system, tube, nozzles and other. This system uses NODE MCU. It is programmed in such a way that it will sense the moisture level of the plants and supply the water if required. This type of system is often used for general plant care, as part of caring for small and large gardens. Normally, the plants need to be watered twice daily, morning and evening. So, the micro controller has to be coded to water the plants in the greenhouse about two times per day. However for most people it becomes challenging to keep them healthy and alive. This system automation is designed to be assistive for the University Park. This system hopes that through this prototype people will enjoy having plants without the challenges related to absent or forgetfulness.

KEYWORDS

Node MCU, GSM Module, Moisture Sensor, PIR Sensor, Arduino IDE

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1. INTRODUCTION

The greatest crisis in modern day and age is a great disparity in the agricultural sector turnover. The great losses incurred in agriculture: material losses or financial losses– most of them are attributed to crop health and quality. If the crops are determined to benot up to par, this may result in a loss. In order to prevent this, we need to maintain the quality of crops and keep them at maximum health. On a practical basis, this is nearly impossible for a farmer who has large lands to observe and maintain. However, this is currently being managed manually. There is a danger in this; many of the labourers are preferring to work at white collar jobs, and as a result, there is a large deficiency in manpower. This makes automated farming a necessary part of the future. The greatest cause for the crops being not on par is improper irrigation (other than natural calamities).If the irrigation issues are resolved, most of the problem is solved. Hence this is the pinnacle point that needs to be renovated with technology. Automating this part of the process will be extremely beneficial to farmers. The Smart crop and automated plant irrigation system willhelp to reduce the work load on farmers, and help to keep the farmlands well irrigated at all times. Most of the farmers all over the world suffer to maintain their crops with properwatering methods and animal intrusion, but find themselves helpless. This system will help farmers irrigate their lands and protect it from animals single-handedly, without the need of additional manpower. its user friendly simple circuitry will make the user feel comfortable in using this system. The user only needs to install the circuit and sensors and connect the pump and alarm to the circuit and its complete. The system will start functioning upon power-up, and will need no trigger to keep it running.

2. LITERATURE SURVEY

G.Sneha Nahatkar has proposed a home embedded security system which evaluates the development of a low-cost security system using small PIR (Piezoelectric Infrared) sensor built around a microcontroller with ultra- low alert power.PIR sensor detects the presence of individuals not at thermal equilibrium with the surrounding environment. On detecting the presence of any unauthorized person, it triggers an alarm & calls to a predefined number through a GSM module. After the MCU sends the sensor signals to the embedded system, the program starts the Web camera which captures the images that can be viewed and analyzed later.

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[Hriday Chawla, Praveen Kumar March 15,2019] This research paper is about the automatic water planting system using a moisture sensor which senses the humidity level of the soil. Depending on the moisture or humidity level of the soil, water pump is being set on or off. This research is being done using Arduino on Arduino ide. This research has increasing demands in agriculture sector. Using this system farmer can easily monitor usage of water according to crops they use. By using this method, they can cultivate crops more easily and it reduces the labor. It also helps to maintain the health of the crops and also increase the production by farmers. In this research, we also tested this system on soil for few days and noted its effective results.

Nattapol Kaewmard et al., 2014 describe the design of an automated irrigation system using WSN including soil moisture sensor, air temperature sensor and air humidity sensor in order to collect environmental data and controlling the irrigation system. By using smart phone, the irrigation system uses values to turn on/off the solenoid valve. The irrigation system control water by sending and receiving control commands from smart phone application via the internet. Result shows that proposed AIS is useful, cost effective and provides better performance than conventional system.

3. IMPLEMENTATION

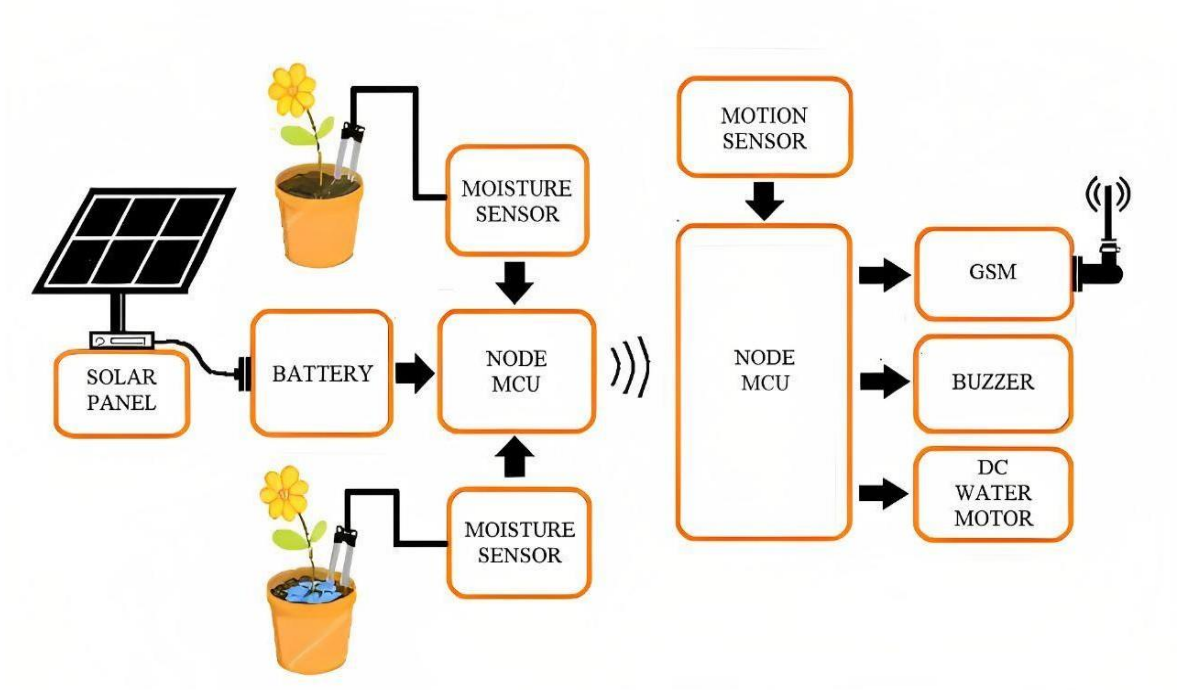

Figure: Block Diagram of Smart Crop Protection and Automatic plant Watering System

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The system architecture comprises a power supply, Node MCU, GSM Modem, PIR sensor, soil moisture sensor, Buzzer and dc water motors.

Fig shows the architecture diagram of crop protection and automatic watering model which contains node MCU which is a low cost microcontroller used for connecting PIR sensor and GSM for sending SMS to the owner in case of a field breach happens, and a Soil moisture sensor is connected to node MCU which is used to measure the soil moisture level and compare it with the predefined threshold value, if the moisture value is greater than or equal to the threshold level then node MCU turns on the dc water motors

INTERFACING HARDWARE

Interfacing Node MCU with GSM Modem:

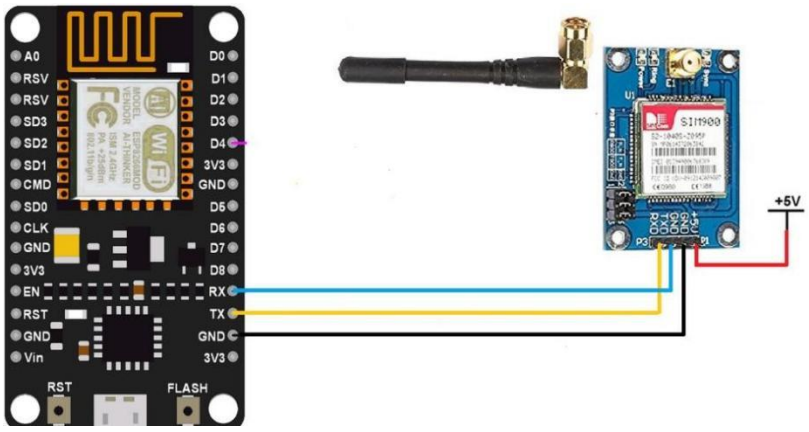

Figure: Interfacing Node MCU with GSM Modem

GSM SIM 900 Modem is connected to the Node MCU by connecting its transmitter pin (TX) to the receiver pin (RX) that is 27th pin of the Node MCU and its receiver pin (RX) to the transmitter pin (TX) that is 28th pin of the Node MCU.

GSM is powered by 5v dc power supply connected to its VCC pin and ground to the GND pin that is 29th pin of node MCU.

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Interfacing Node MCU with PIR Motion Sensor:

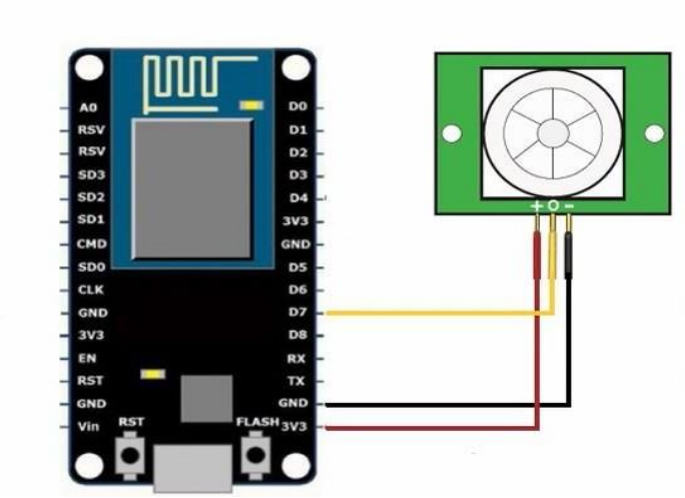

Figure: Interfacing Node MCU with PIR Sensor

Most PIR modules have a **3-pin** connection at the side or bottom. The pinout may vary between modules so check the pinout carefully! Power is usually 3-5v DC input.

The circuit connections are made as follows:

1. VCC pin of the HC-SR501 is connected to +3v of the Node MCU.
2. Output pin of the HC-SR501 is connected to Digital pin D7 of the Node MCU.

Interfacing Node MCU with Soil Moisture Sensor:

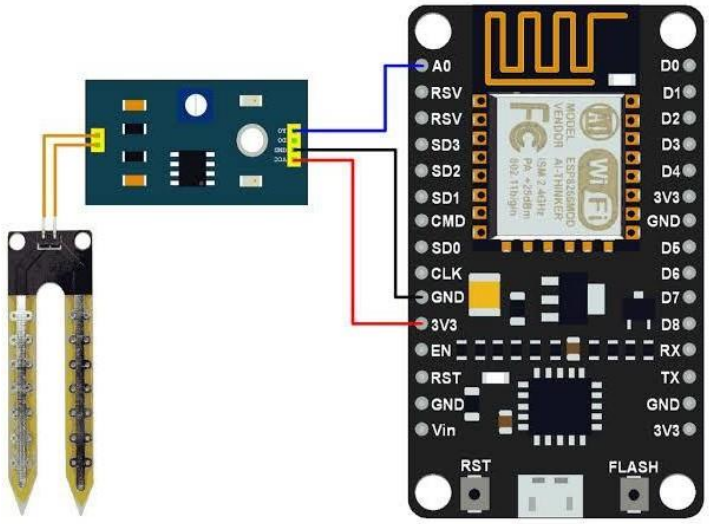

Figure: Interfacing Node MCU with Soil Moisture Sensor

Connect the two pins of the moisture sensor to the two pins on the Amplifier circuit using jumper wires.

1. Connect the VCC from the Amplifier to the 3.3V pin on the Node MCU.

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2. Connect the GND pin to the ground (GND) pin on the Node MCU.
3. Connect the Analog pin to the A0 pin on the Node MCU.

Flow chart

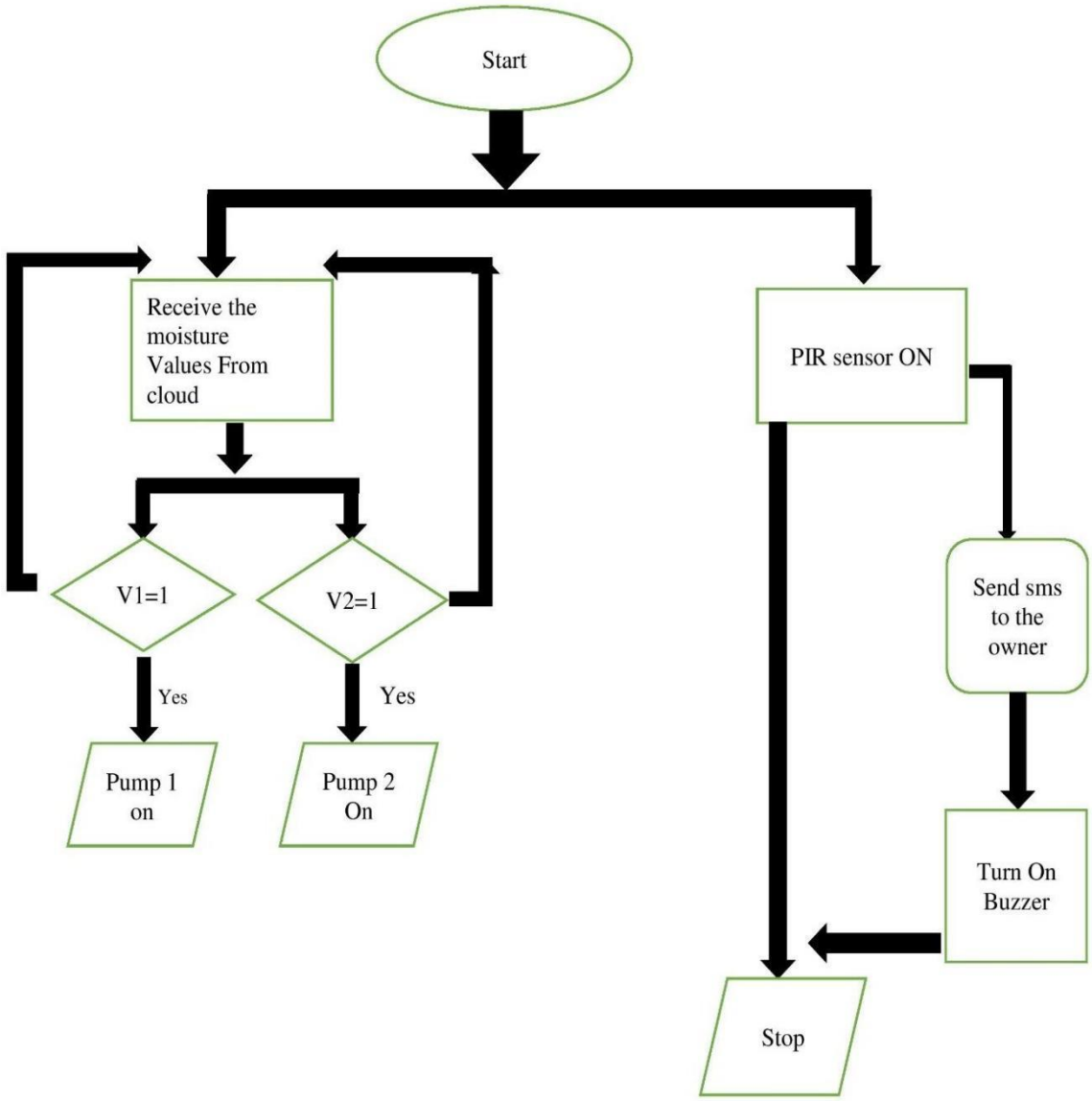

Fig: Flow Chart Block 1

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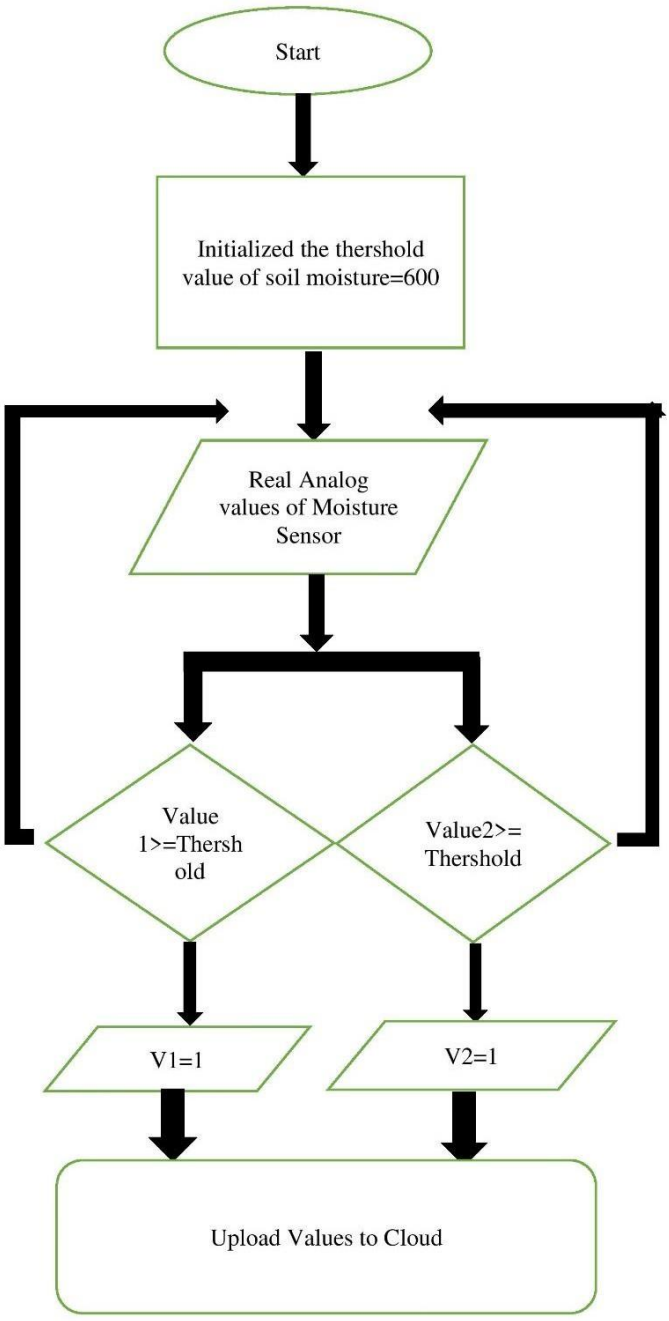

Fig: Flow Chart Block 2

3. RESULTS

The goal of this project was to create a smart, low-cost technology that protects crops from animals and prevent crop damage because of irregular watering. This program aided in the live tracking of soil moisture and motion detection in the fields. In case the soil in the feild is dry or an animal entered the field the necessary actions will be taken like turning on the water

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pumps to increase moisture content in soil and send SMS to the Predefined Mobile number of Owner informing him about the animal intrusion etc.

The core component of system, which processes all Operations, is the Node MCU. The entire action is controlled by reading the values of Soil Moisture Sensor and value of PIR Sensor. When Soil Moisture Sensor value is greater than or equal to the denoted threshold (600) level then water pumps will be turned on, and when some motion is detected by the PIR sensor the output of the pir sensor will be given to Node MCU, which then sends SMS to the predefined mobile number of Owner like (YOUR FIELD IS BREACHED) and turns on the Alarm in Field to drive the animals out of feild.

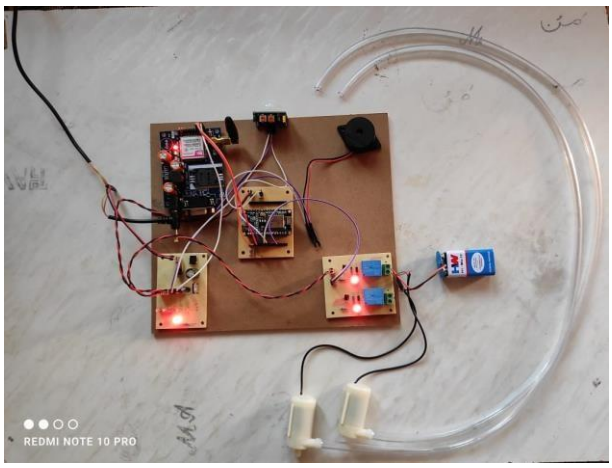

Figure: Prototype of Smart Crop Protection from Animals and Automatic Plant Watering System Using NODE MCU (Block 1)

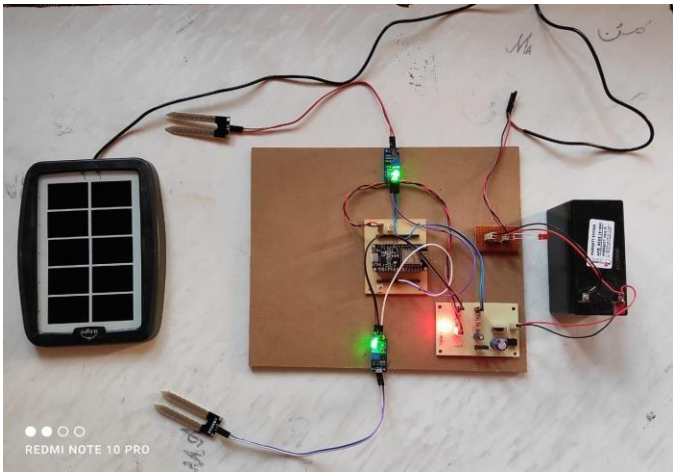

Figure: Prototype of Smart Crop Protection from Animals and Automatic Plant Watering System Using NODE MCU (Block 2)

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In this the values of soil moisture level are transmitted from Node MCU that is connected to the soil moisture sensor to the Operating Node MCU which is at main power supply through cloud/internet. The main operating Node MCU will get another input from PIR sensor when motion is detected. An SMS is sent to the owner and Water pumps are turned on.

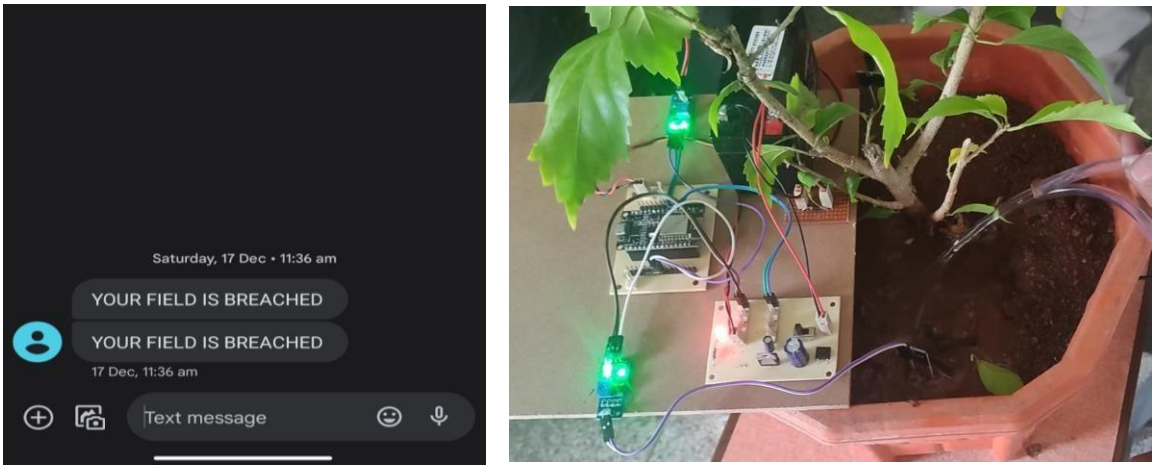

Figure: Recieved SMS Indicating Intrusion of Field and Automatic water Pump control

4. CONCLUSION AND FUTURE SCOPE

Conclusion

Farmers encounter severe animal threats in rural parts of India. It requires urgent attention as no effective solution has come into use till date for this problem. Hence, this venture conveys an incredible social significance as it intends to resolve this issue. Although the project does not completely do the needful by reducing the problems faced by the farmers, but it ensures farmers to not suffer from the loss of crops by alerting them in prior about the attack of animals.

Future Scope

- This System can be further extended for house safety Monitoring.
- For Smart Gardening can be possible with few more components.
- We can interface this system to a web page to get faster updates and easy to give commands to system from long distance.

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