PROJECT

IOT BASED ON SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

(SMART CROP PROTECTION USING IOT SIMULATOR)

TEAM NO	1
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ABSTRACT:

Agriculture is done in every country from ages. Agriculture is the science and art of cultivating plants. Agriculture was the key development in the rise of sedentary human civilization. Agriculture is done manually from ages. As the world is trending into new technologies and implementations it is a necessary goal to trend up with agriculture also. But now due to migration of people from rural to urban there is hindrance in agriculture. So to overcome this problem we have proposed an IOT and smart agriculture system.

Where IOT plays a very important role in agriculture, IOT sensors are capable of providing information about agriculture fields. This IOT based Agriculture monitoring system makes use of wireless sensor networks that collects data from different sensor deployed at various nodes and sends it through the wireless protocol. And it is powered by Arduino. It consists of temperature sensor, humidity sensor, water level sensor, PIR sensor and GSM module. When the IOT based agriculture monitoring system starts it checks the water level, humidity and moisture level. It sends SMS alert to the phone about the levels of the water. And controlling these parameters are through any remote device or internet services and the

operations are performed by interfacing sensor, Wi-Fi, camera with micro controller. This concept is created as a product and given to the farmer's welfare.

INTRODUCTION:

Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds etc. This leads to huge losses for the farmer. Due to over population, it occurs a deforestation this results in shortage of food, water and shelter in forest areas. So, animal’s interference in residential areas is increasing day by day which affects human life and property causes human animal conflict but as per nature’s rule every living creature on this earth has important role in eco-system.

Elephants and other animals coming in to contact with humans, impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, houses and other assets, injuring and death of humans. So here we propose automatic crop protection system from animals. This is a microcontroller-based system using PIC family microcontroller. These systems use a motion sensor to detect wild animal approaching near the field. In such a case the

sensor Signal the microcontroller to take action. Traditional methods used by farmers are given below.

PROJECT OVERVIEW:

The main of this project is to help farmers automate their farms by providing them with a Web App through which they can monitor the parameters of the field like Temperature, soil moisture, humidity and etc., and control the equipment like water motor and other devices remotely via internet without their actual presence in the field.

Farmers are to be present at farm for its maintenance irrespective of the weather conditions. They have to ensure that the crops are well watered and the farm status is monitored by them physically. Farmer have to stay most of the time in field in order to get a good yield. In difficult times like in the presence of pandemic also they have to work hard in their fields risking their lives to provide food for the country.

In order to improve the farmer's working conditions and make them easier, we introduce IoT services to him in which we use cloud services and internet to enable farmer to continue his work remotely via internet. He can monitor the field parameters and control the devices in farm.

B.PURPOSE:

The problem of wild life attack on crops i.e., crop Vandalization is becoming very common in the states of Tamil Nadu, Himachal Pradesh, Punjab, Haryana, Kerala and many other states. Wild animals like monkeys, elephants, wild pigs, deer, wild dogs, bison, nilgais, estray animals like cows and buffaloes and even birds like parakeets cause a lot of damage to crops by running over them, eating and completely vandalizing them. This lead to poor yield of crops and significant financial loss to the owners of the farmland. This problem is so pronounced that sometimes the farmers decide to leave the areas barren due to such frequent animal attacks.

2. Literature review

[1] A system using sensors that monitor different conditions of environment like water level, humidity, temperature etc., the processor along with IC-S8817BS and wireless transceiver module with Zigbee protocol is used. The field condition is sent to the farmer via mobile text messages and email from the experts. With this system Sensor node failure and energy efficiency are managed. Zigbee technology is used which sometimes lack in range of communication.

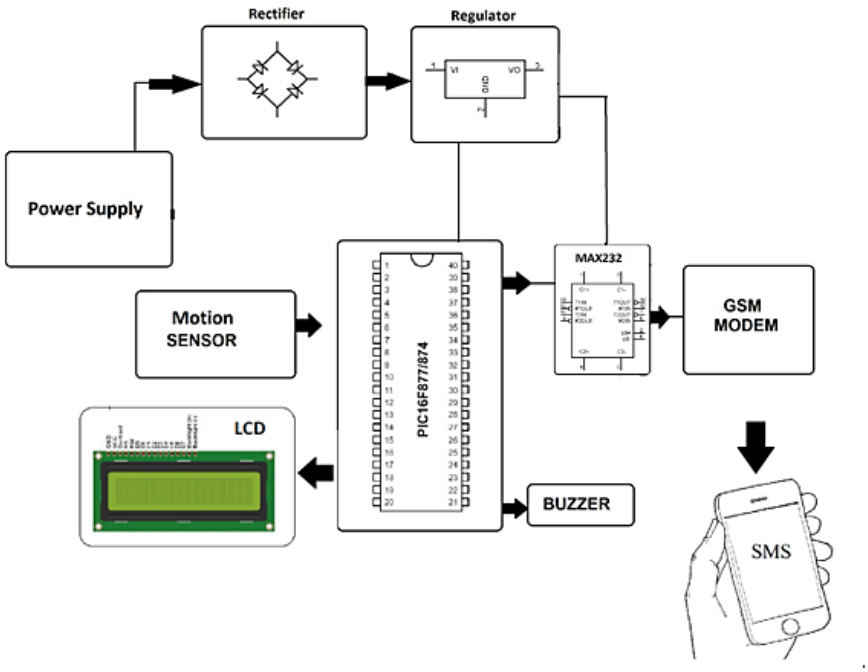
[2] A system is proposed for intelligent agriculture greenhouse monitoring system based on Zigbee technology. The system performs data acquisition, processing, transmission and reception functions. The aim of their experiments is to realize greenhouse environment system, where the of system efficiency to manage the environment area. and reduce the money and farming cost and also save energy.

[3] IOT technology here is based on the B- S structure andcc2530 used like processing chip to work for wireless sensor node and coordinator. The gateway has Linux operating system and cortex A8 processor act as core. Overall the design realizes remote intelligent monitoring and control of greenhouse and also replaces the traditional wired technology to wireless, also reduces manpower cost.

[4] A system is proposed for plant growth which can be monitored using thermal imaging technique. Here the irrigation temperature distribution measurement (ITDM) technique has been implied. In real time the thermal images comprising of both low and high temperature ITDM values gives better irrigation. Thermal imaging can provide temperature value of all pixels in the field when compared to thermometry which only provides an average.

BLOCK DIAGRAM:

2.1BLOCK DIAGRAM:



LIST OF COMPONENTS:

S.NO	NAME OF THE COMPONENTS	QUANTITY
1	PIC Microcontroller	1
2	GSM Module	1
3	Motion sensor	1
4	Buzzer	1
5	Rectifier	1
6	Regulator	2
7	LCD Display	1

2.2 REFERENCES

[1] ArturFrankiewicz; RafałCupek.” Smart Passive Infrared Sensor - Hardware Platform “Year: 2013 IECON 2013 - 39th Annual Conference of the IEEE Industrial Electronics Society Pages: 7543 – 7547

[2] Discant, A. Rogozan, C. Rusu and A. Bensrhair, “Sensors for Obstacle Detection” 2007 30th International Spring Seminar on Electronics Technology (ISSE), Cluj-Napoca, 2007, pp. 100-105. doi: 10.1109/ISSE.2007.4432828 Volume:01 Pages:859-862, DOI:10.1109/ICCSNT.2015.7490876, IEEE Conference Publications.

[3] Mustapha, Baharuddin, AladinZayegh, and Rezaul K. Begg. “Ultrasonic And Infrared Sensors Performance in A Wireless Obstacle Detection System” Artificial Intelligence, Modelling and Simulation (AIMS), 2013 1st International Conference on. IEEE, 2013.

[4] Padmashree S. Dhake, Sumedha S. Borde, “Embedded Surveillance System Using PIR Sensor”, International Journal of Advanced Technology in Engineering and Science, www.ijates.com Volume No.02, Issue No. 03, March 2014.

2.3 PROBLEM STATEMENT DEFINITION

Farmers are to be present at farm for its maintenance irrespective of the weather conditions. They have to ensure that the crops are well watered and the farm status is monitored by them physically. Farmer have to stay most of the time in field in order to get a good yield. In difficult times like in the presence of pandemic also they have to work hard in their fields risking their lives to provide food for the country.

3. IDEATION OR PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS

3.2 IDEATION OR BRAIN STORMING

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- **10 minutes** to prepare
- **1 hour** to collaborate
- **2-8 people** recommended

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

10 minutes

A **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

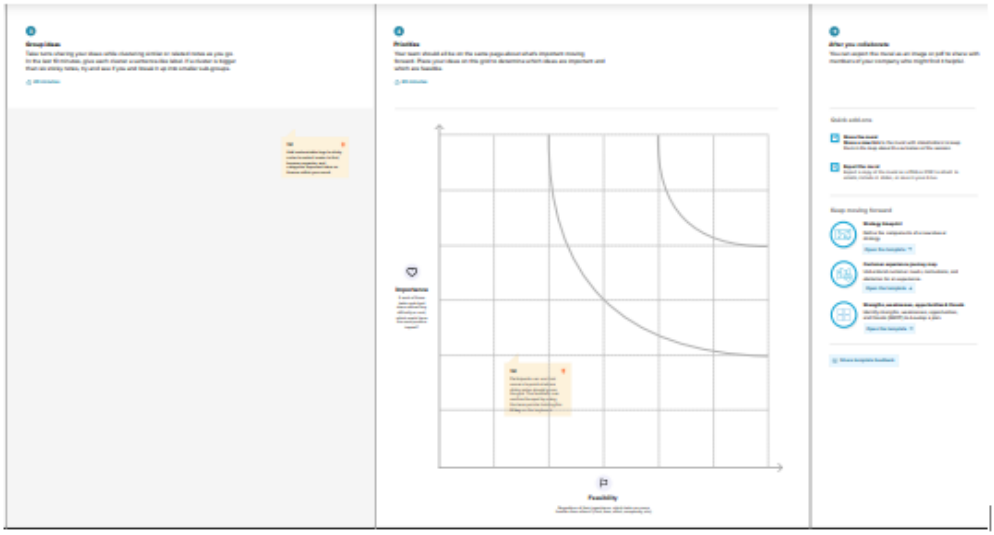
How might we [your problem statement]?

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

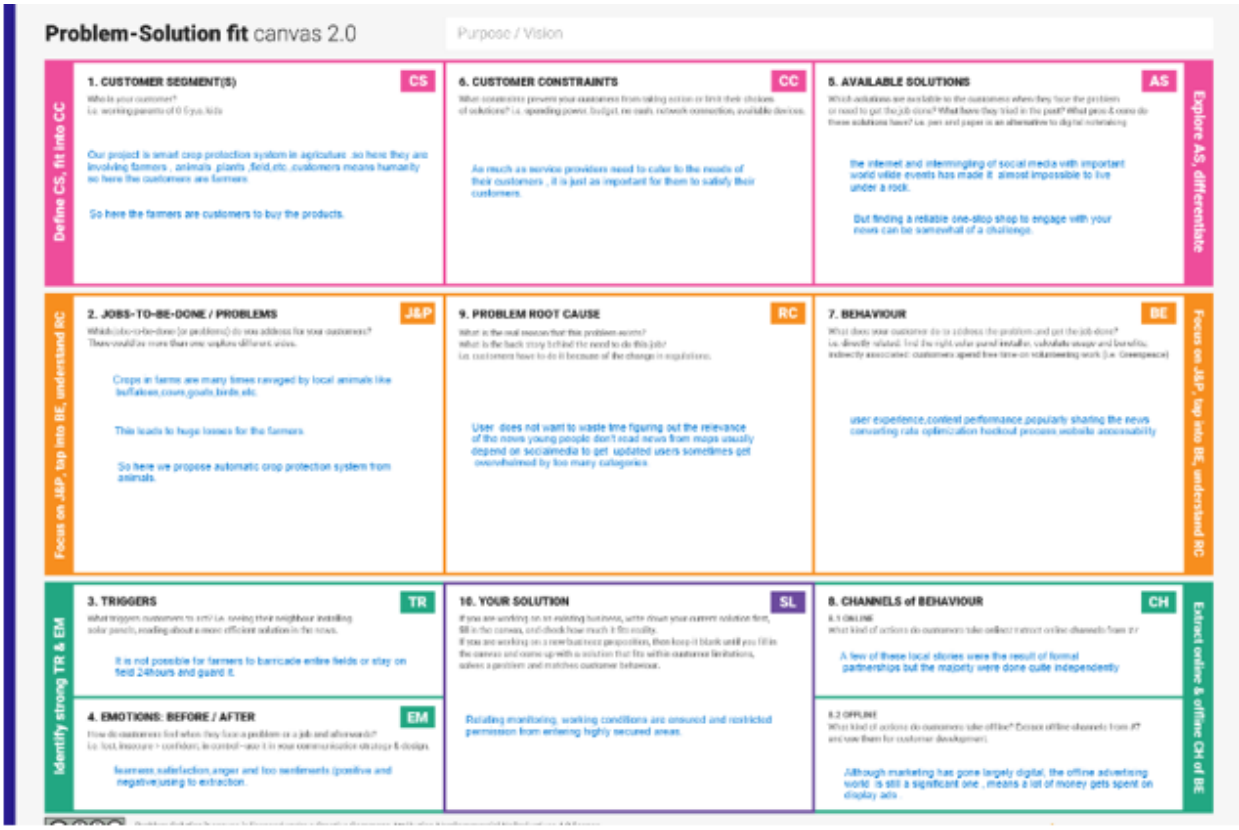


3.3 PROPOSED SOLUTION:

SI.NO	Parameter	Description
1.	Problem Statement (Problem to be solved)	Crops in farms are many times ravaged by local animals like buffaloes, cows, goats, birds etc.... This leads to huge losses for the farmer.
2.	Idea / Solution description	Here we propose automatic crop protection system from animals. This is the microcontroller-based system using PIC family microcontroller. These system use a motion sensor to detect wild animal approaching near the field.
3.	Novelty / Uniqueness	Certain cultural practices can prevent or reduce insect crop damage. These include destination of crop residues, deep plowing, crop rotation , use of fertilizers, strip cropping, irrigation, and scheduled planting operation.
4.	Social Impact / Customer Satisfaction	They is steady increase in smart phone apps available to improve farmer's decision making with respect to crop protection . While current studies have focused on smart phone adoption in general and farmer's general willingness to pay for crop protection smart phone apps, none have focused on the initial adoption decision. In traditional farming methods , it was a mainstay for the farmer to be out in the field, constantly monitoring the land and condition of crop.
5.	Business Model (Revenue Model)	Smart crop protection system is the International Journal of Latest Engineering Science(IJLES) DOI:10.51386/25816659/ijles-v4i4101 E-ISSN:2581-6659 Volume:04 Issue:04

6.	Scalability of the Solution	Integration might be the use of crop residue to increase animal protection , and the use of manures to increase crop protection. Integration is a way of maximizing outputs (food for the family, farm protect for sale , etc.)and minimizing input(purchase, labour)

3.4 PROBLEM SOLUTION FIT



4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENT:

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Sensor	Dozens of sensors are available today, but the five most important sensors for the maintenance professional are **vibration, gas, temperature, humidity, and security sensors**.
FR-2	User Registration	Registration through Form Registration through Gmail Registration through Linked IN
FR-3	User Confirmation	Confirmation via Email Confirmation via OTP

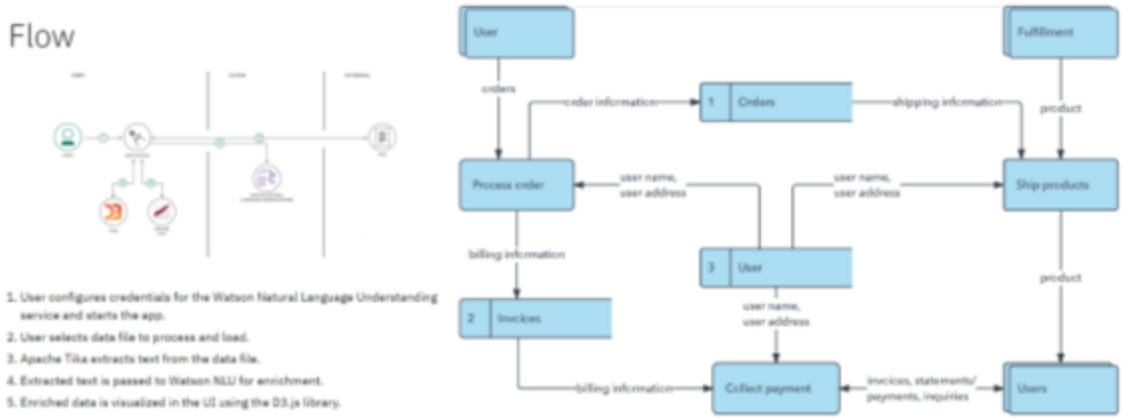
4.2.NON FUNCTIONAL REQUIREMENT:

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Indicates how effectively and easy users can learn and use a systems.
NFR-2	**Security**	Assures all the data inside the system or its part will be protected against malware attacks or unauthorized access.
NFR-3	**Reliability**	Specifies the probability of the software performing without failure for a specific number of users or amount of time.
NFR-4	**Performance**	Deals with the measure of the systems response time under different load conditions.
NFR-5	**Availability**	Describes how likely the system is accessible for a user at a given point in a time.
NFR-6	**Scalability**	Assesses the highest workloads under which the system will still meet the performance requirements.

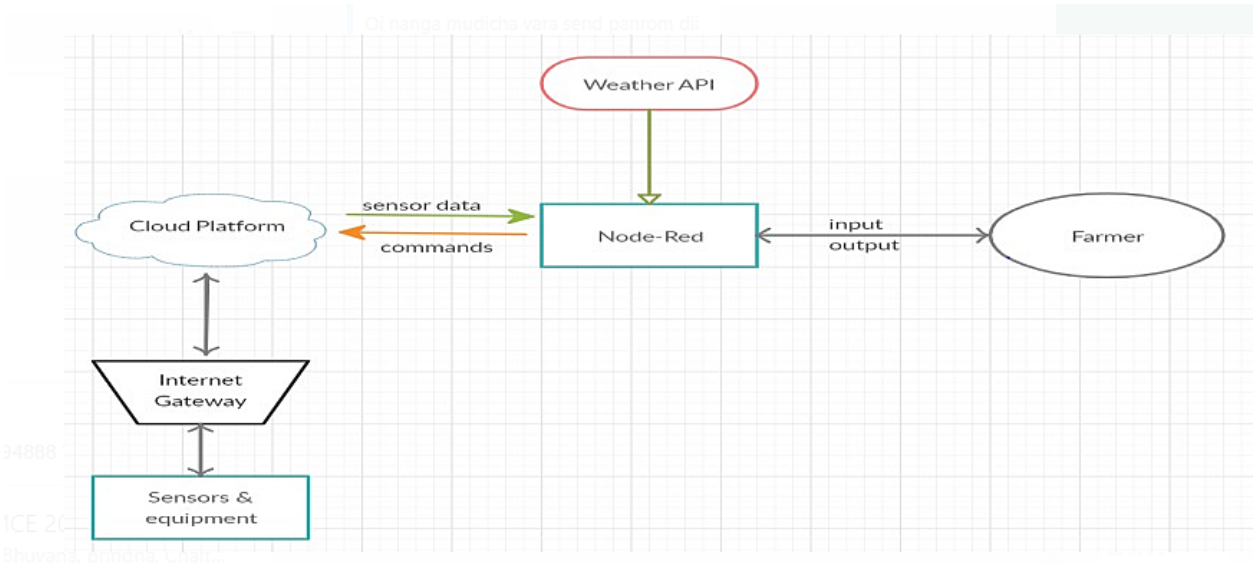
5. DESIGN

5.1 DATA FLOW DIAGRAM

Data Flow Diagrams: A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.
Example: DFD Level 0 (Industry Standard)



SOFTWARE BLOCK DIAGRAM:



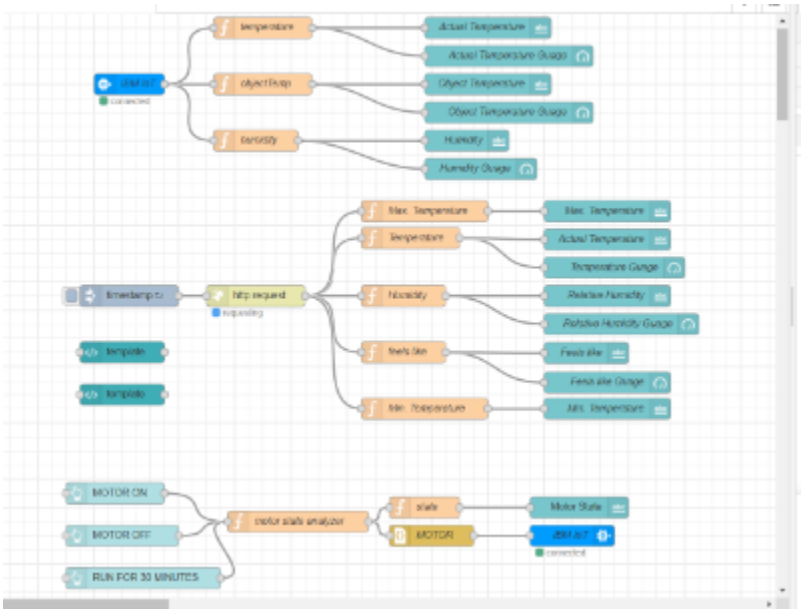
5.2 USER STORY

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with	Low	Sprint-2
				Facebook Login		
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-6	As a user , i can use the mail application by sensing the animals detection	Facebook Login	High	Sprint-1
Customer (Web user)	Login	USN-7	As a user, i can use the facebook application registration the application process	Get OTP from the registered mobile number	Medium	Sprint -2
Customer Care Executive	Detection	USN-8	As a user get the all the information about the smart crop protection system in agriculture	Through facebook	Medium	Sprint -2
Administrator	Sensors	USN-9	As a user to protect the animals and crops	Through mobile	High	Sprint-1

6. PROJECT PLANNING & SCHEDULING

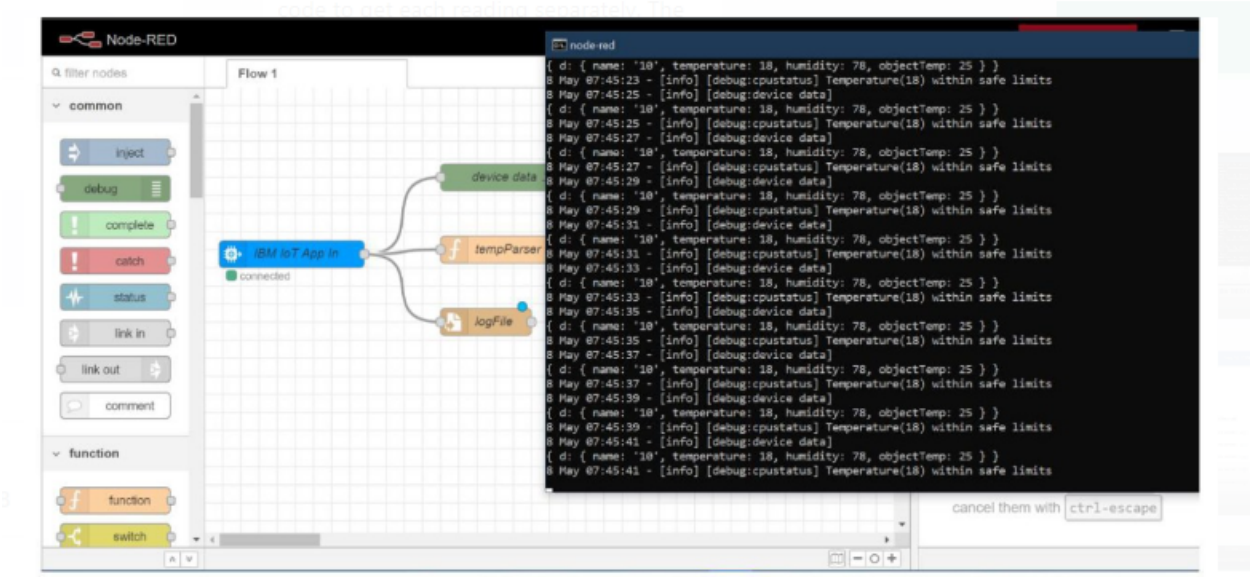
6.1 SPRINT PLANNING

HOME UI:



6.2 SPRINT DELIVERY SCHEDULE

NODE RED CONSOLE:



Data received from the cloud in Node-RED console

7. METHODS AND MATERIALS

A. PIC MICROCONTROLLER:

PIC (usually pronounced as "pick") is a family of Microcontroller made by Micro Technology, derived from the PIC1650 originally developed by General Instrument's Microelectronics Division. The name PIC initially referred to Peripheral Interface Controller,] and is currently expanded as Programmable Intelligent Computer. The first parts of the family were available in 1976; by 2013 the company had shipped more than twelve billion individual parts, used in a wide variety of embedded systems. Early models of PIC had read-only memory (ROM) or field-programmable EPROM for program storage, some with provision for erasing memory. All current models use flash memory for program storage, and newer models allow the PIC to reprogram itself. Program memory and data memory are separated. Data memory is 8-bit, 16-bit, and, in latest models, 32-bit wide. Program instructions vary in bit-count by family of PIC, and may be 12, 14, 16, or 24 bits long. The instruction set also varies by model, with more powerful chips adding instructions for digital signal processing functions.

B.BUZZER

- Rated Current* : ≤30Ma
- Sound Output at 10cm* :≥85dB
- Resonant Frequency : 2300±300Hz
- Tone : Continuous

A buzzer is a loud noise maker. Most modern ones are civil defense or air- raid si- rens, tornado sirens, or the sirens on emergency service vehicles such as ambulances, police cars and fire trucks. There are two general types, pneumatic and electronic.

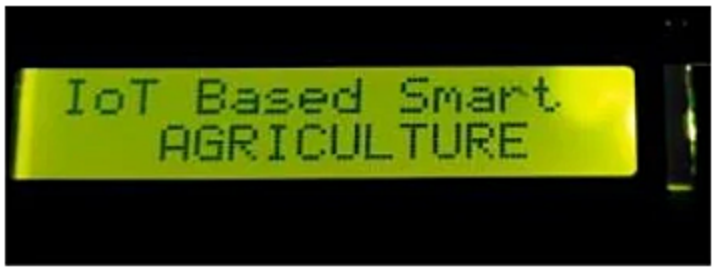
A **buzzer** or **beeper** is an audio Signaling device, which be mechanical, electromechanical, or piezoelectric (*piezo* for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

While technological advancements have caused buzzers to be impractical and undesirable, there are still instances in which buzzers and similar circuits may be used.

C.GSM MODULE:

GSM stands for Global System for Mobile Communications. It is a standard set devel- oped by the European Telecommunications Standards Institute (ETSI) to describe pro- tocols for second generation (2G) digital cellular networks used by mobile phone . A Modem is a device which modulates and demodulates signals as required to meet the communication requirements. It modulates an analog carrier signal to encode digital information, and also demodulate such a carrier signal to decode the transmitted information.

D.LCD (16*2 DISPLAY)



LCD means liquid crystal. A 16x2 LCD display is very commonly used device, where each character is represented with 5x8 pixel matrix. It operates at 4.7V-5.3V. it consist of 16 pins.

8. PROJECT

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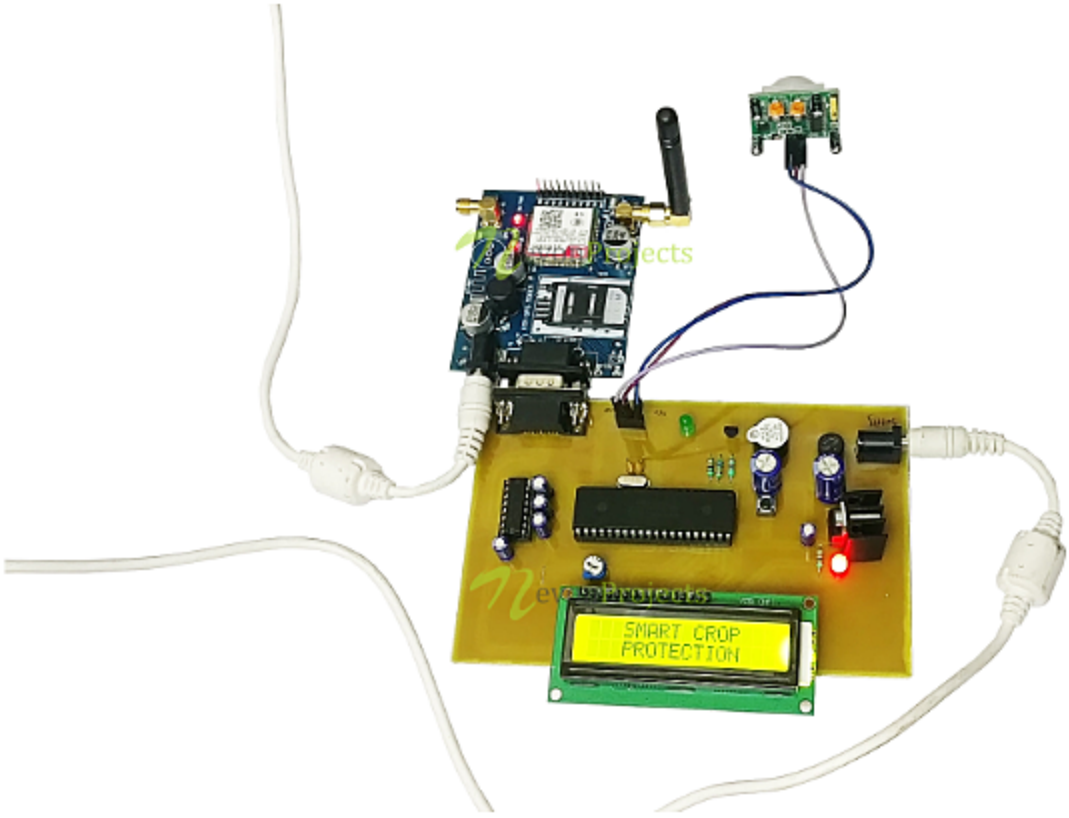

9.ADVANTAGES AND DISADVANTAGES:

ADVANTAGES:

- Farms can be monitored and controlled remotely.
- Increase in convenience to farmers.
- Less labour cost.
- Better standards of living.

DISADVANTAGES:

- Lack of internet/connectivity issues.
- Added cost of internet and internet gateway infrastructure.
- Farmers wanted to adapt the use of WebApp

10.FUTURE SCOPE

To help monitor crop fields using sensors and by automating Irrigation systems.

11. APPENDIX

PROJECT LINK

https://drive.google.com/file/d/1smWhRHGw1IgaO2TplrujMx0ptiSStGsO/view?usp=drivesdk

12. CONCLUSION

The problem of crop vandalization by wild animals and fire has become a major social problem in current time. It requires urgent attention as no effective solution exists till date for this problem. Thus, this project carries a great social relevance as it aims to address this problem. This project will help farmers in protecting their orchards and fields and 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.