SPRINT 1
Data Collection and Data Pre-processing

Team ID	PNT2022TMID26635
Project Name	**IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE**

Data Collection:

➢ Data Collection is a process of gathering information from all the relevant sources to find a solution to the research problem.

➢ PIR (passive infrared) sensors utilise the detection of infrared that is radiated from all objects that emit heat. This type of emission is not visible to the human eye, but sensors that operate using infrared wavelengths can detect such activity. This sensor used to detect the animals and birds and alert to threaten them using buzzer.

Pre-processing:

➢ Data pre-processing, a component of data preparation, describes any type of processing performed on raw data to prepare it for another data processing procedure.

➢ Data can be cleaned by dividing it into equal size segment that are thus smoothed (binning), by fitting it to a linear or multiple regression function (regression), or by grouping it into cluster of similar data (clustering).

1.Introduction:

Internet of Things aim towards making life simpler by automating every small task around us. As much is IoT helping in automating tasks, the benefits of IoT can also be extended for enhancing the existing safety standards. 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.

This system also helps farmers to monitor the soil moisture levels in the field and also the temperature and humidity values near the field. The motors and sprinklers in the field can be controlled using the mobile application.

2. Problem Statement:

The purpose of this project is to detect the presence of animals and birds and to helps the farmers in protecting the crop from the animals and birds which destroy the crop. This system also helps farmers to monitor the soil moisture levels in the field and also the temperature and humidity values near the field. The motors and sprinklers in the field can be controlled using the mobile application.

If the animals and birds detected , the sensor passes the signal to adurino and it process the information to buzzer to make a noise to thearten the animals and birds and record the video of the type of animals and store in the IBM cloudant website and later checked by the user/farmers.

Animals and birds damage the crops by entering into the field and eaten the crops which being cultivated.

The Temperature,Humidity and Soil Moisture Sensors are to detect the level of these parameters that helps the farmers to understand the environment of the field.

3. Proposed Solution:

The purpose of this project is to detect the presence of animals and birds that destroys the crops and measure the environmental parameters like temperature,humidity and soil moisture.

If the motion of animals and birds detected, the sensor will send its data wirelessly to Arduino. Then, prevention system will be activated.

The system will turn the alarm/buzzer on, and records the video of the animals and store in the IBM cloudant which stores the data.

4.Theoretical Analysis:

4.1.Block Diagram:

In order to implement the solution, the following approach as shown in the block diagram is used.
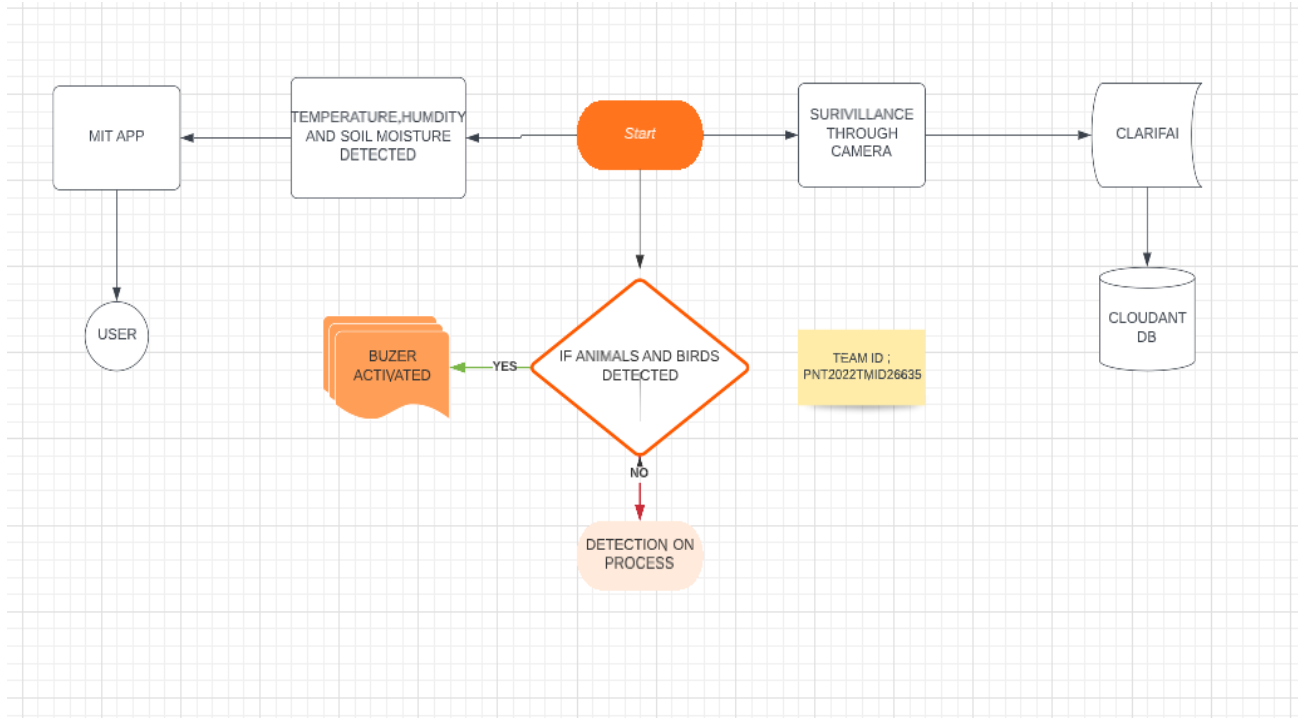
4.2Required Software Installation:

4.2.A Node-Red:

Node-RED is a flow-based development tool for visual programming developed originally by IBM for wiring together hardware devices, APIs and online services as part of the Internet of Things. Node-RED provides a web browser-based flow editor, which can be used to create JavaScript functions.
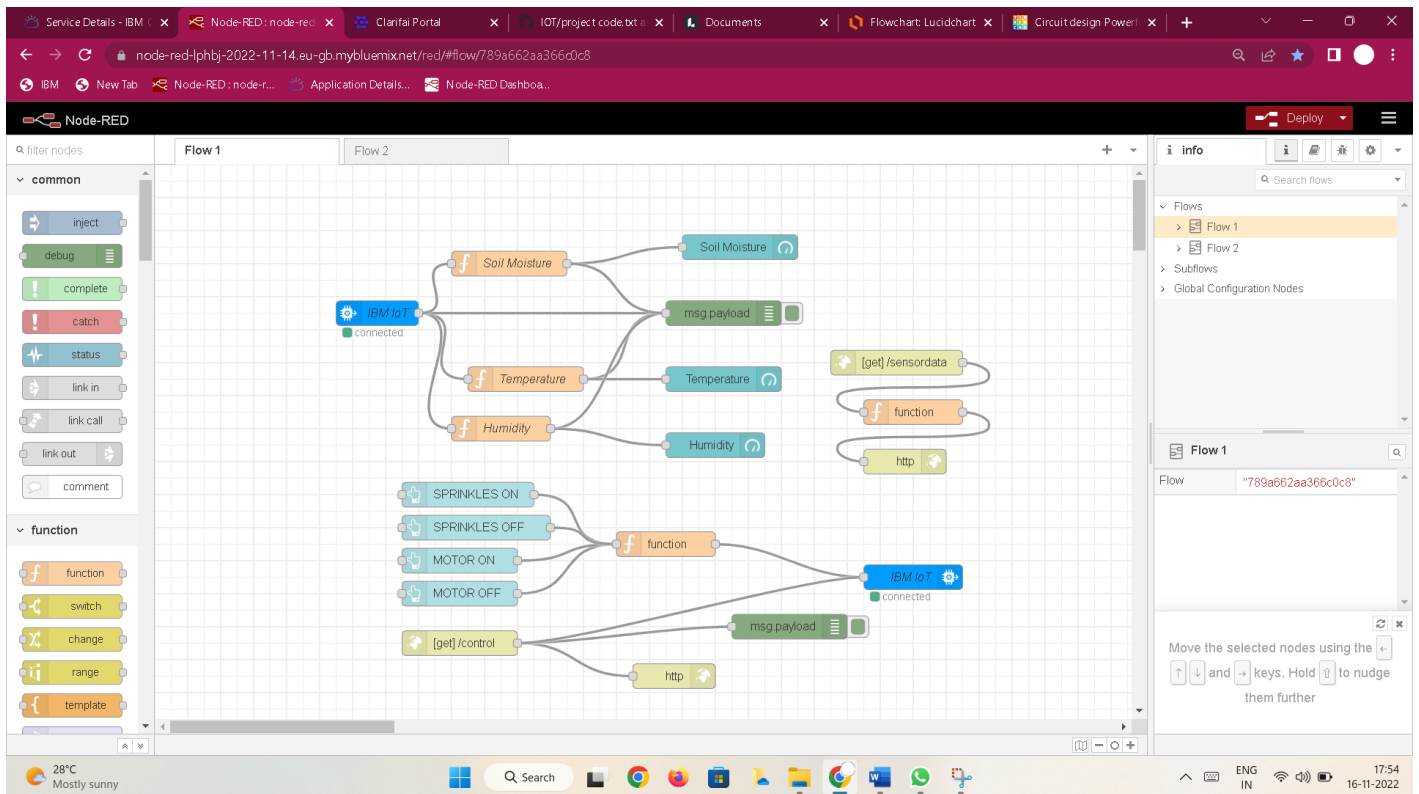
Installation of IBM IoT and Dashboard nodes for Node-Red:

In order to connect to IBM Watson IoT platform and create the Web App UI these nodes are required,

1. IBM IoT node
2. Dashboard node

4.2.B IBM Watson IoT Platform:

A fully managed, cloud-hosted service with capabilities for device registration, connectivity, control, rapid visualization and data storage. IBM Watson IoT Platform is a managed, cloud-hosted service designed to make it simple to derive value from your IoT devices.
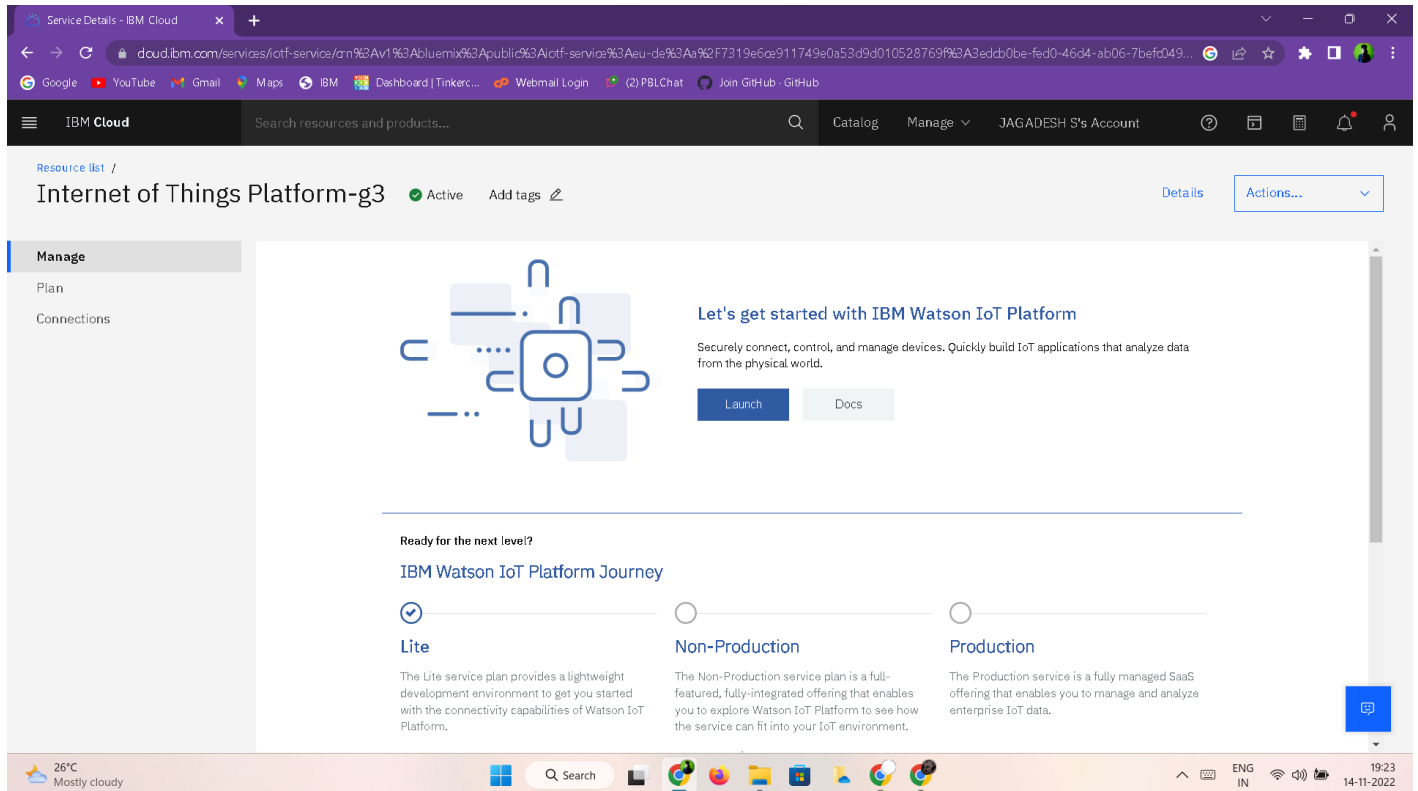
Steps to configure:

➢ Create an account in IBM cloud using your email ID

➢ Create IBM Watson Platform in services in your IBM cloud account

➢ Launch the IBM Watson IoT Platform

➢ Create a new device

➢ Give credentials like device type, device ID, Auth. Token ➢ Create API key and store API key and token elsewhere.

4.2.C Python IDE

Install Python3 compiler

Install any python IDE to execute python scripts, in my case I used Spyder to execute the code.

Code:

```python
import random

myConfig = {
    "identity": {
        "orgId": "995kq7",
        "typeId": "Test_Device_Type",
        "deviceId":"26635"
    },
    "auth": {
        "token": "o3d471A?EzrQoOU3Y_"
    }
}


def myCommandCallback(cmd):
    print("Message received from IBM IoT Platform: %s" % cmd.data['command'])
    m=cmd.data['command']
    if(m=="motoron"):
        print("*******////Motor is ON////*******")
```

```python
        elif(m=="motoroff"):
            print("******////Motor is OFF////********")
        elif(m=="sprinkleson"):
            print("******////Sprinkles are ON////********")
        elif(m=="sprinklesoff"):
            print("******////Sprinkles are OFF////********")
        else:
            print("****///WRONG command////********")


client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)

client.connect()


while True:
    temp=random.randint(-20,125)
    hum=random.randint(0,100)
    moist=random.randint(0,100)
    myData={'temperature':temp, 'humidity':hum, 'soil_moisture':moist}
    client.publishEvent(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
    print("Published data Successfully: %s", myData)
    client.commandCallback = myCommandCallback
    time.sleep(2)
client.disconnect()
```

4.3 IoT Simulator

In our project in the place of sensors we are going to use IoT sensor simulator which give random readings to the connected cloud.

The link to simulator:

https://watson-iot-sensor-simulator.mybluemix.net/

We need to give the credentials of the created device in IBM Watson IoT Platform to connect cloud to simulator.