IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

A PROJECT REPORT

Submitted by

NABESHA FATHIMA A	**[724019104016]**
JUWAIRIYA M.F	**[724019104007]**
RASHIDHA BEGAM I	**[724019104018]**
SHAFYA N	**[72401914021]**
SALEEHA S	**[724019104020]**

in partial fulfillment for the award of the degree of

BACHELOR OF ENGINEERING

IN

COMPUTER SCIENCE AND ENGINEERING

DHAANISH AHMED INSTITUTE OF TECHNOLOGY

COIMBATORE

ANNA UNIVERSITY: **CHENNAI 600 025**

NOVEMBER - 2022

ANNA UNIVERSITY::CHENNAI 600 025

BONAFIDE CERTIFICATE

Certified that this project report "**IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE** " is the bonafide work of "**NABESHA FATHIMA.A [724019104016] JUWAIRIYA.MF [724019104007] RASHIDHA BEGAM.I [724019104018] SHAFYA.N [724019104021] SALEEHA.S [724019104020]**" who carried out the project work under my supervision

SIGNATURE
Dr.R.Vadivel
HEAD OF THE DEPARTMENT
Department Of Computer
Science And Engineering
Dhaanish Ahmed Institute
Of Technology
Coimbatore 641105

SIGNATURE
Mrs.Indhumathi M.E
SUPERVISOR
Department Of Computer
Science And Engineering
Dhaanish Ahmed Institute
Of Technology
Coimbatore 641105

Submitted for the university project Viva-voce held on _____

Internal Examiner External Examiner

ACKNOWLEDGEMENT

The success of a work depends on a team and cooperation. We take this opportunity to express our gratitude and thanks to everyone who helped us in our project.

We would like to thank our beloved Chairman **Alhaj K Moosa** for his academic interest shown towards the students, by providing us excellent facilities and the constant support.

We express our deep gratitude and sincere regards to our beloved and honourable Principal **Dr.KG Parthiban M.E, Ph.D.,** for providing us excellent and encouragement during the course of study and project.

We owe a genuine gratitude to **Dr. R. Vadivelu** Head, Department of Computer Science and Engineering for his encouragementand inspiration.

We are grateful to **Mrs. Indhumathi M.E.** Assistant Professor, Department of Computer Science and Engineering, and Internal Guide for his valuable support and guidance.

We are thankful to laboratory technicians of our department for their kind help during our courses of project work.

Special thanks to our beloved family and friends for their sacrifices, timelyadvices and a lot more that cannot be expressed in words.

ABSTRACT

The smart crop protection for agriculture in IOT.This describes the overview of various researches on smart crop protection system.We have a lot of technology that can protect the farm 24*7 those systems and technique we are discussing in this paper.We have different types of technology that can help to secure the farm.We have seem Arduino and raspberry pi based Farm protection system.But those sysytems have different methodology and platform for that and the cost of those are not affordable with the farmer.Our main to design a system that can help to farmer to help to protect his farm from,animals with getting harm to them.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF ABBREVATIONS

IOT	-	Internet Of Things
MIT	-	Massachusetts Institute Of Technology
OTP	-	One Time Password
JS	-	Javascript
WAN	-	Wide Area Netwok
FR	-	Functional Requirements
NFR	-	Non Functional Requirements
GSM	-	Global System For Mobile Communication
LCD	-	Liquid Crystal Display
SMS	-	Short Message Service
MQTT	-	MQ Telemetry Transport

CHAPTER-1
INTRODUCTION

1.1 Project Overview

IOT based Smart Crop Protection. The Overview of our Project is to Safeguard the farm from climatic changes like soil erosion, landslide, and birds, animals etc,.So, that we are making a IOT based project to protect the farm from climatic changes and haunting animals. For that we are just making a cloud based project and placing IOT based sensor. over which it will produce sounds and notification and provide results on IOT- MIT app. From which we can protect our farm. And it will provide better yield for us.

1.2 Purpose

- The main purpose of our project is to protect the farm from climatic changes animals, birds , pests.
- And to make the crop to grow better and provide better yield.

CHAPTER-2

LITERATURE SURVEY

2.1Existing problem

"Food" is the important thing,which is needed for everyone to survive in this world.For that farmers are doing their own part in a effective manner,during which they have to face some problems such as:

- There are 'increasing pressures from climate change,soil erosion and biodiversity loss and from consumers' changing tastes in food and concerns about how it is produced.
- And the natural world that farming works with-plants,pests and diseases-continue to pose their own challenges beyond that they have to,
- Stay resilient against global economic factors.
- Inspire young people to stay in rural areas and become future farmers.
- The effects of climate change affect farmers ability togrow the found we all need,Increasingly volatile weather and more extreme events-like floods and droughts-change growing seasons,limit the availability of water,allow weeds,pests and fungi to thrive,and can reduce crop productivity.

2.2 References

- https://smartinternz.com/assets/docs/Smart%20Home%20Automation%20using%20IBM%20cloud%20Services%20(1).pdf
- https://smartinternz.com/assets/docs/Smart%20Home%20Automation%20using%20IBM%20cloud%20Services%20(1).pdf
- https://openweathermap.org/
- https://smartinternz.com/assets/docs/Sending%20Http%20request%20to%20Open%20weather%20map%20website%20to%20get%20the%20weather%20forecast.pdf
- https://www.youtube.com/watch?v=cicTw4SEdxk
- https://smartinternz.com/assets/docs/Smart%20Home%20Automation%20using%20IBM%20cloud%20Services%20(1).pdf
- https://github.com/rachuriharish23/ibmsubscribe

2.3 Problem Statement Definition

Agriculture is one of the Area which required urgent attention and advancement for high yield and efficient utilization of resources.In this paper an approach of smart crop monitoring is presented through Internet of things (IOT).

A 4 Level framework is proposed namely sensing devices, sensor data level, base station level, edge computing and cloud data level for smart crop monitoring.

In this project, farm is going to get protected from humidity, temperature, and animals. With the help of IOT cloud module.The agricultural form is been monitored with the help of MIT app and then, the data will be collected and stored it in cloud.It will monitor and sense the humidity level and movement of animals and will send the message as notification to the user.

CHAPTER-3
IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

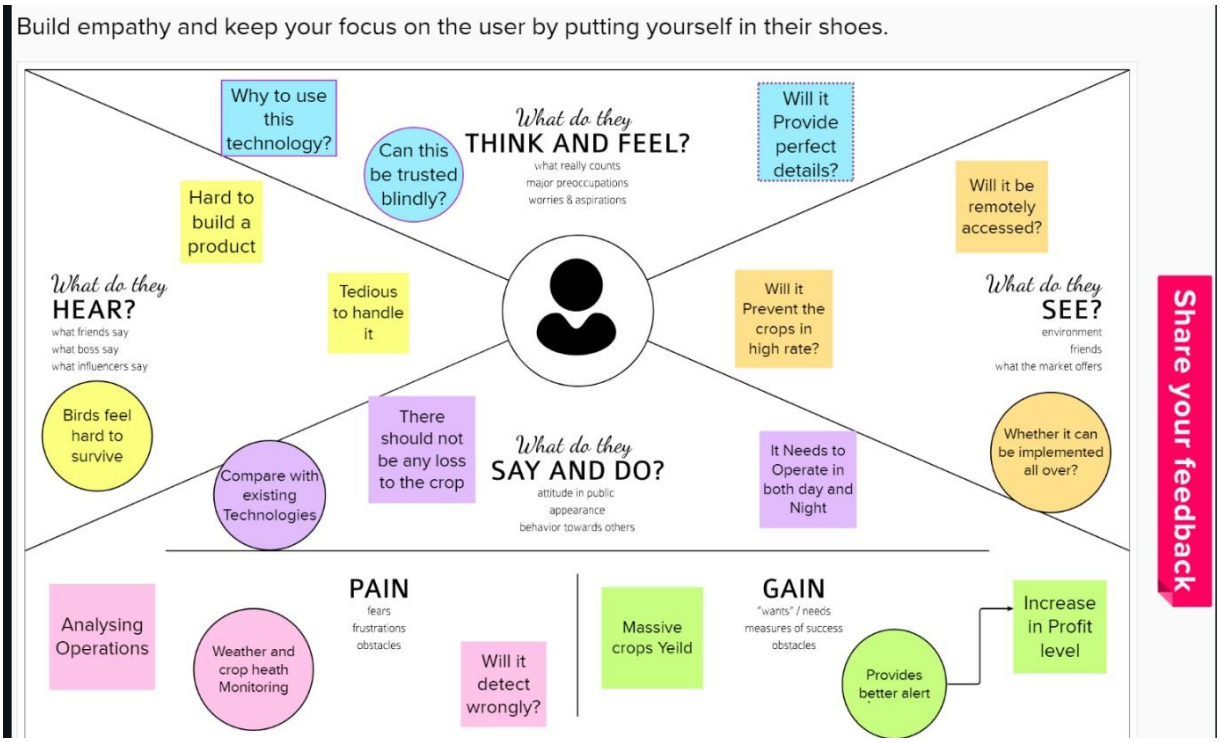


Fig 3.1.1 Empathy Map Canvas

What do they think and feel?

As its name may imply, smart farming is the use of technology in animal agriculture, and

it’s something that’s been around since the Industrial Revolution. The biggest difference between then and now, though? “Motorized devices are being replaced withIOT”.

What do they hear?

Smart farming is about using the new technologies which have arisen at the dawn ofthe Fourth Industrial Revolution in the areas of agriculture and cattle production to increase production quantity and quality, by making maximum use of resources andminimizing the environmental impact.

What do they see?

Smart farming is a management concept focused on providing the agricultural industry with the infrastructure to leverage advanced technology – including big data, the cloud and the internet of things (IoT) – for tracking, monitoring, automating and analyzing operations.

What do they say and do?

- The aim of this technology is to **make the most of all the data** collected by various tools, by converting them into real **sources of information** in order to thendefine ways of simplifying agricultural work. It also allows for **accurate and predictive analysis** of all situations that may affect the farms, such as weather conditions (temperature, humidity, etc.) and sanitary or economic situations, for example. This makes it easier to organize the supply of energy, water, livestock feed and fertilizer.

- In its most advanced form, smart farming facilitates the exchange of information between different farms, creating a real network of connected farms accessible from a smartphone or a computer.

3.2 IDEATION & BRAINSTORM

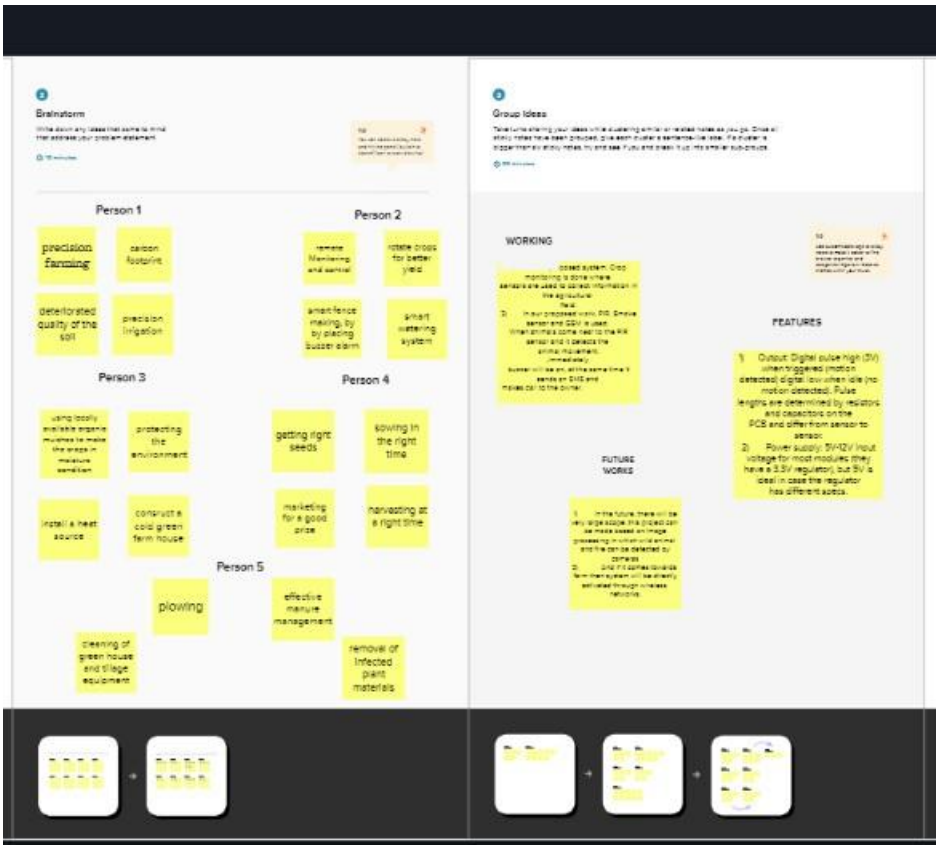


Fig.3.2.2 Brainstorm of group ideas

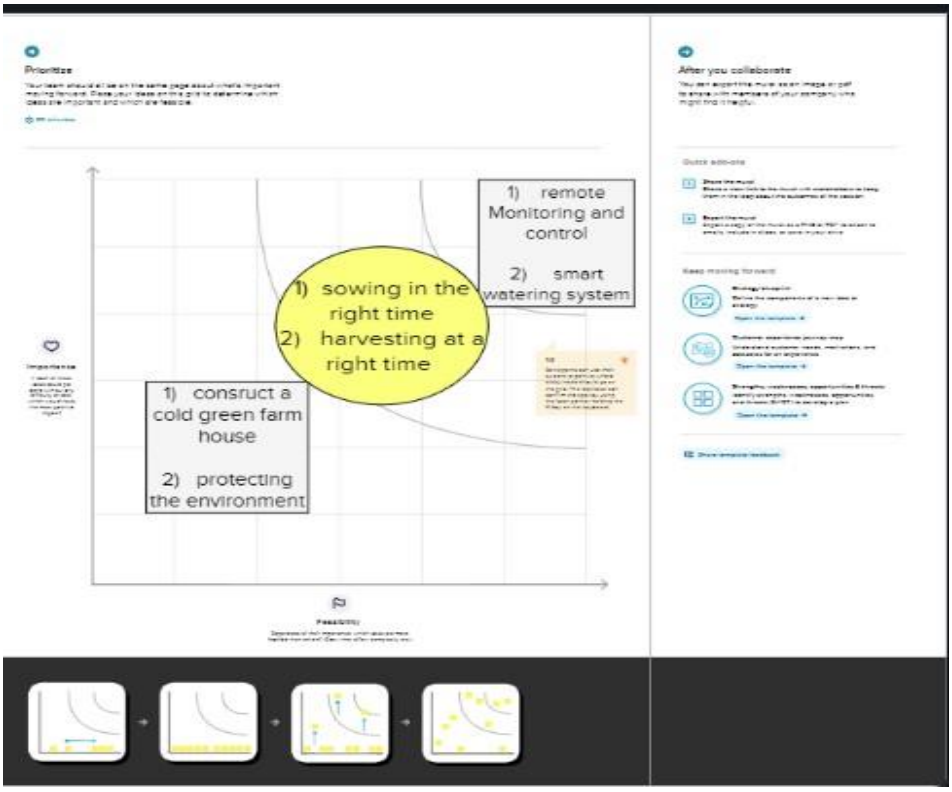


Fig 3.2.3 Prioritize

..

3.3Proposed Solution

S.No	Parameter	Description
1.	Problem Statement(problem to be solved)	Crop protection from animals and pests,for better yield of crops.
2.	Idea/Solution description	Making a fence,which helps in identitfying the animals and pests,by buzzer alarm.
3.	Novelty/Uniqueness	Improve productivity,crop variety improvement,crop protection management.
4.	Social impact/Customer Satisfaction	Good export of products ,high profit,increase in brand loyalty.
5.	Brand Model(Revenue Model)	High production, livestock and crops,direct sales and advertising.
6.	Scalability	By incorporating integrated pests and insect management,by creating smart fence with buzzer alarm and irrigation.

Table 3.3.1 Proposed System

3.4Problem Solution fit

Fig 3.4.1 Problem Solution fit

CHAPTER-4

REQUIREMENT ANALYSIS

4.1Functional requirements

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR.NO	Functional Requirements	Sub Requiremnet(Story/Sub-Task)
FR-1	User Registration	Registration through form Registration through Gmail Registration through Linked IN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Certification Requirements	Regulation rules Profession wide
Fr-4	Authorization	Healthcare provider User group
FR-5	Business rules	Decision making Marketing
FR-6	External interfaces	Wide Area Network Screen Layouts

Table 4.1.1 Functional Requirements

4.2Non-Functional requirements

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non Functional Requirements	Description
NFR-1	Usability	Use of fertilizers,Irrigation and scheduled planting operation
NFR-2	Security	Crops Could be protected from tehse diseases using pesticides and biocontrol agents.
NFR-3	Reliability	Reducing deforestation,conserving natural resources and curbing soil erosion.
NFR-4	Performance	Agricultural productivity depends on the quality of seeds with which farmers sow their fields.
NFR-5	Availability	Farming methods requires growers appropriate protection strategy and training.
NFR-6	Scalability	Application of sensors and automated irrigation practices can help monitor agricultural land.

Table 4.2.1 Non-Functional Requirements

CHAPTER-5
PROJECT DESIGN

5.1 Data Flow Diagrams

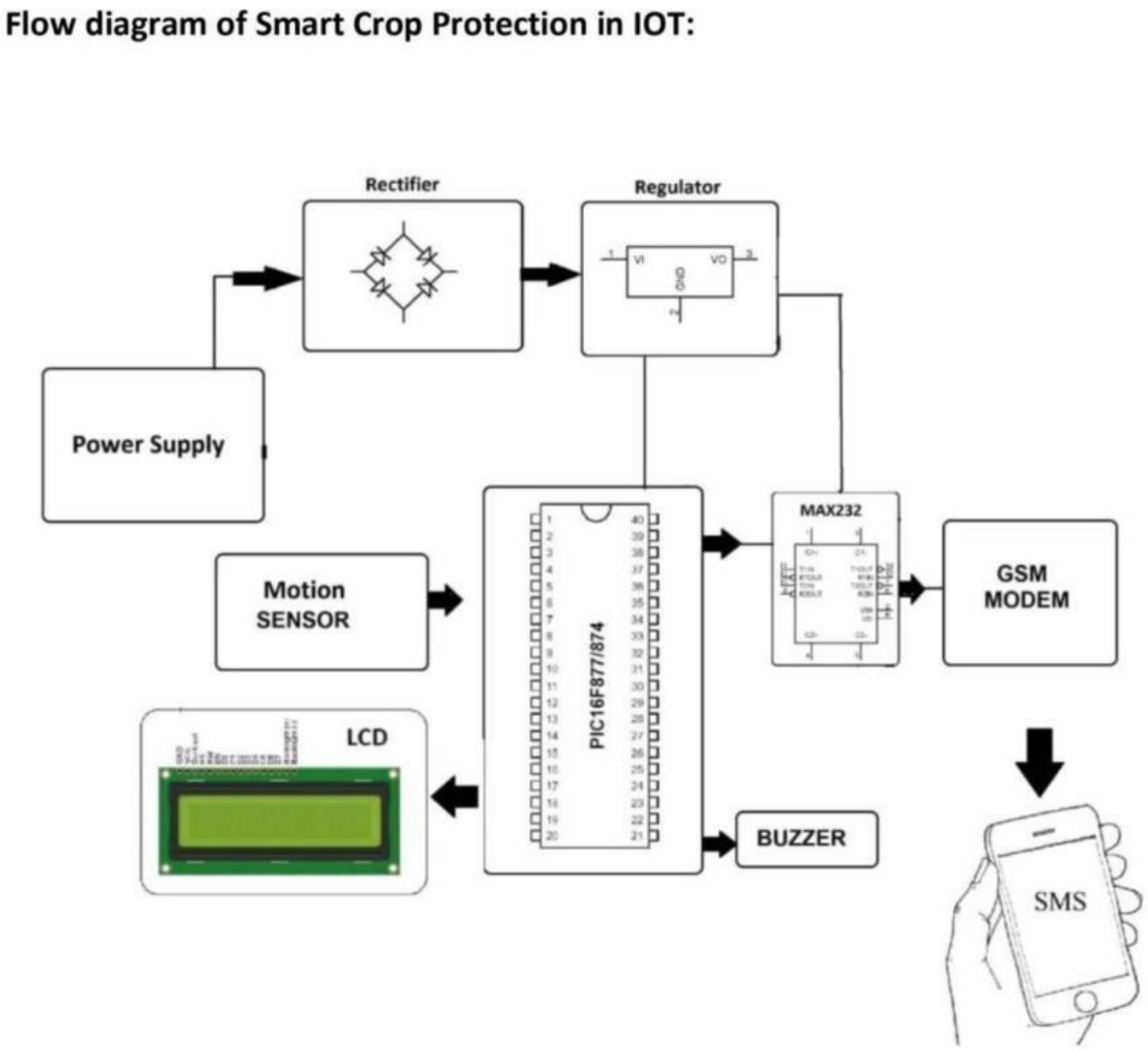


Fig 5.1.1 DFD Of Smart Crop Protection in IOT

5.2 Solution & Technical Requirements

SOLUTION ARCHITECTURE:

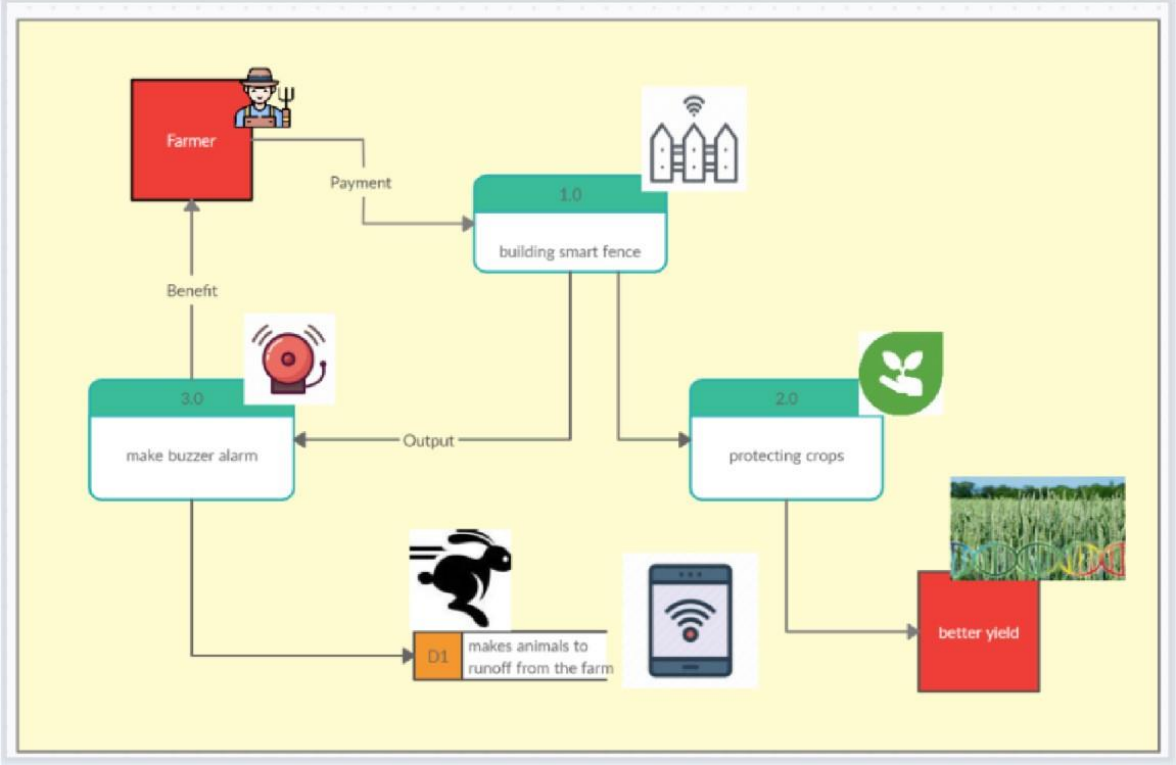


Fig 5.2.1 Solution Architecture

TECHNICAL ARCHITECTURE:

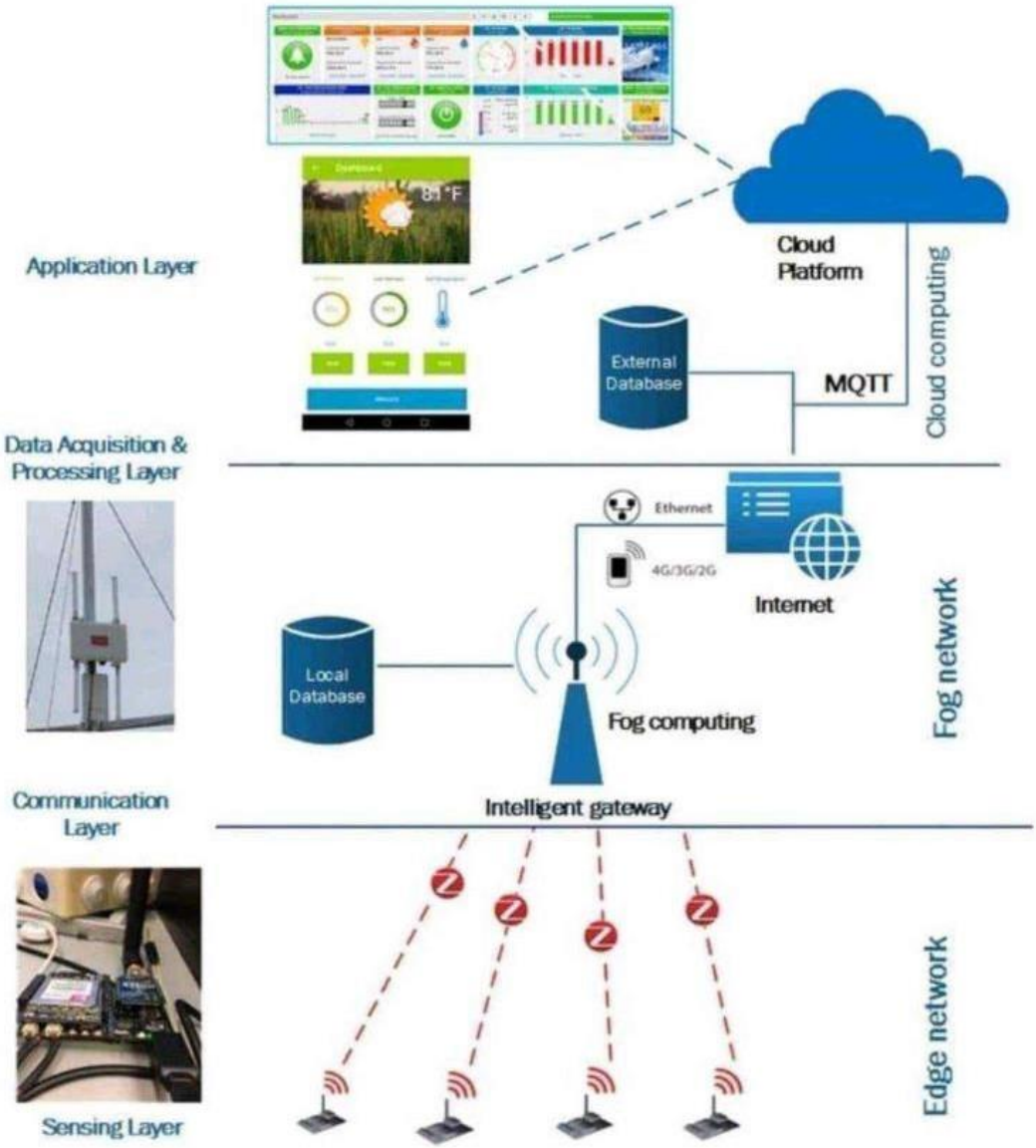


Fig 5.2.2 Technical Architecture

5.3 User Stories

User Type	Functional Requirements(Epic)	User Story Number	User Story/Task	Accepatance Criteria	Priority
Customer (Mobile User)	Download the database	USN-1	As a user I can register for the application entering my email,password and confirming my password	I can access my account/dashboard	High
	Register	USN-2	As a user I can register for the application by entering my email,password and confirming my password	I can receive confirmation email and click confirm	High
	Login	USN-3	As a user I will receive confirmation email once I have registered for the application	I can register an d access the dashboard with facebook login	Low
	Upload the image	USN-4	As a user I must upload the image to identify the problem and works on it		Medium
Customer	The functional requirements are same as	Same as mobile user	Same as mobile user	Same as mobile user	High when compare

Table 5.3.1 User Stories

CHAPTER-6
PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning & Estimation

Use the below template to create product backlog and sprint schedule

Sprint	Functional Reqiurement (Epic)	User Story Number	User Story/Task	Story Point	Priority	Team Members
Sprint-1	Registration	USN-1	As a user ,I can register for the application by entering my email,password and confirming my password.	2	High	Rashidha Begam Shafya
Sprint-2		USN-2	As a user,I will receive confirmation email once I have registered for the application	1	High	Saleeha
Sprint-3		USN-3	As a user I can register for the application through facebook	2	Low	Juwairiya
Sprint-4	Dashboard	USN-4	As a user I can register for the application through Gmail	2	Medium	Nabeesha

Table 6.1.1 Sprint Planning & Estimation

6.2 Sprint Delivery Schedule

Sprint	Total Story Point	Duration(days)	Sprint Start date	Sprint Date end planned	Story Points Completed	Sprint Release date
Sprint-1	20	6	24 Oct 2022	29 Oct 2022	25	29 Oct 2022
Sprint-2	20	6	31 Oct 2022	05 Nov 2022	15	30 Oct 2022
Sprint-3	20	6	7 Nov 2022	12 Nov 2022	14	6 Nov 2022
Sprint-4	20	6	14 Nov 2022	19 Nov 2022	20	7 Nov 2022

Table 6.2.1 Sprint delivery Schedule

6.3Reports from JIRA

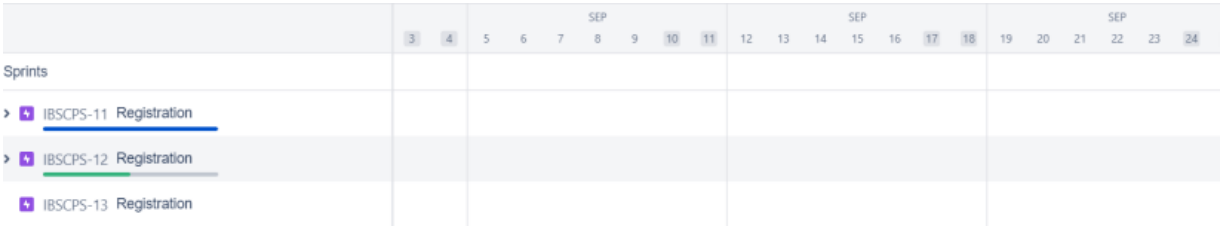


Fig 6.3.1 Reports from JIRA

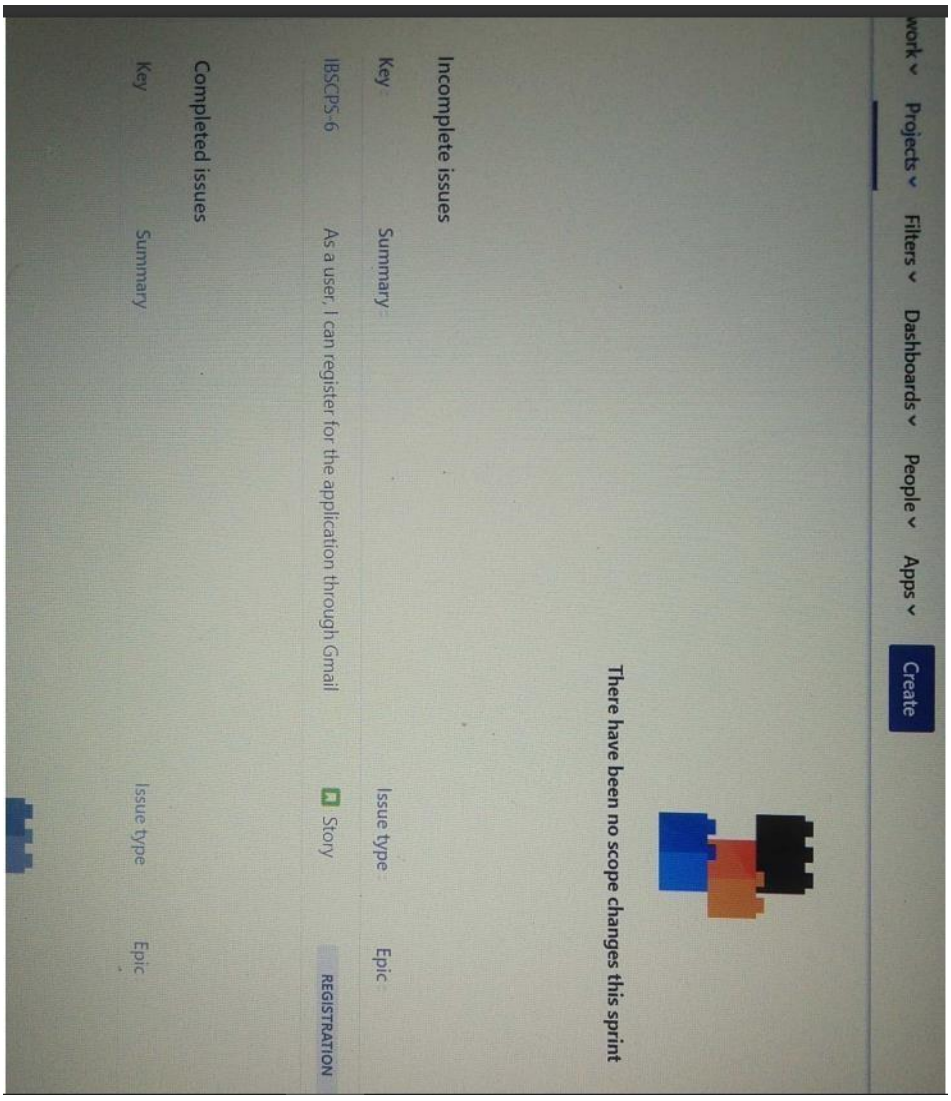


Fig 6.3.2 Output of Report

CHAPTER 7

CODING & SOLUTIONING

7.1 FEATURE 1

7.1.1 User Module

As members of an IoT ecosystem, users modify about their needs and desires, and provide feedback within a networked intelligence to manually progress their individual ability to rule the actuators of the system at their service. User device means a mobile or other handheld device.

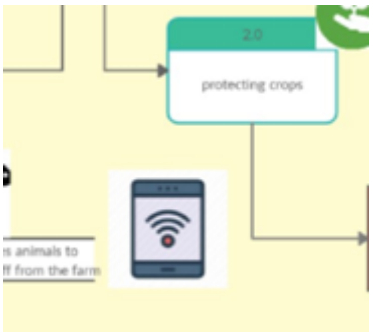


Fig 7.1.1 User Module

Program:

```
import time

import sys

import ibmiotf.application # to install pip install

ibmiotfimport ibmiotf.device

#Provide your IBM Watson Device Credentials

organization = "hrodmj" #replace the ORG ID

deviceType = "NODEMCU1"#replace the

Device type widevіceId = "12345"#replace

Device ID
```

```
authMethod = "token"

authToken = "kp1234" #Replace the authtoken


def myCommandCallback(cmd): # function for

Callbackprint("Command received: %s" %

cmd.data)

if cmd.data['command']=='motoron':

print("Motor On IS RECEIVED")

elif

cmd.data['command']=='motoroff':

print("Motor Off IS RECEIVED")

if cmd.command == "setInterval":

if 'interval' not in cmd.data:

print("Error - command is missing

required information: 'interval'")else:

interval = cmd.data['interval']elif

cmd.command == "print":

 if 'message' not in cmd.data:

print("Error - command is missing required information: 'message'")

else:

output=cmd.data['message']

print(output)

deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-
method":authMethod, "auth-token": authToken}
```

deviceCli =

ibmiotf.device.Client(deviceOptions)

#.....

except Exception as e:

print("Caught exception connecting device: %s" %

str(e))sys.exit()

Connect and send a datapoint "hello" with value "world" into the cloud as an event of type"greeting" 10 times

deviceCli.connect(

)while True:

deviceCli.commandCallback =

myCommandCallback# Disconnect the device and

application from the cloud deviceCli.disconnect()

7.2 FEATURE 2

7.2.1 Sensing Module

Sensors and modules (having extra electronic circuitry along with sensor) are Electronic devices that detect and respond to some type of input from the physical environment..Sensors play a pivotal role in the internet of things (IoT). They make it possible to create an ecosystem for collecting and processing data about a specific environment so it can be monitored, managed and controlled more easily and efficiently.

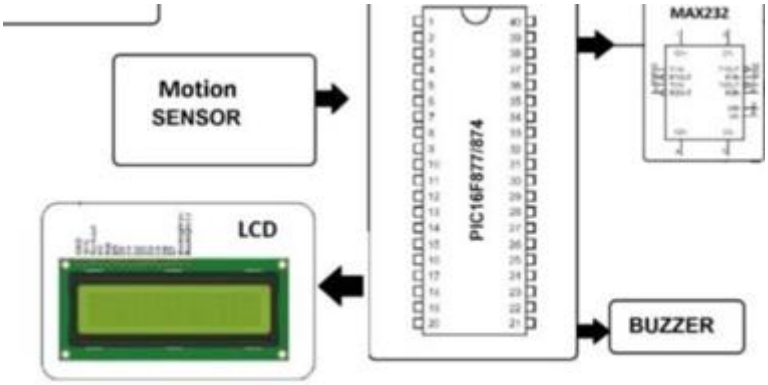


Fig 7.2.1 Sensing Module

Program:

LocationData

```
importwiotp.sdk.deviceimport
time importrandom

myConfig={"identity":(
"orgId":"gagtey",
"typeId":"GPS",":
{
"token":"12345678"
}}
```

```
defmyCommandCallback(cmd):
print ("Message received from IBM IoT Platform: %s"
%cmd.data['command']) m-cmd.data['command']
client=wiotp.sdk.device.DeviceClient
(config=myConfig,logHandlers=None)client.connect()defpub(data):


client.publishEvent (eventId="status",
msgFormat="json",data=myData,qos=0,print("PublisheddataSuccessfully:
%s",myData)whileTrue:
myData={'name': 'Train1', 'lat': 17.6387448,
'lon':78.4754336)pub
(myData)time.sleep(3)
#myData('name': 'Train2', 'lat': 17.6387448, 'lon':78.4754336)
#pub (myData) #time.sleep (3)
myData={'name':'Train1','lat':17.6341908,'lon':
78.4744722)pub
(myData)time.sle
ep(3)
myData={'name': 'Trainl', 'lat': 17.6340889, lon':
78.4745052)pub(myData)time.sleep(3)
myData={'name': 'Trainl', 'lat': 17.6248626, 'lon':
78.4720259)pub(myData)time.sleep(3)
myData={'name': 'Trainl', 'lat': 17.6188577, 'lon': 78.4698726)pub (myData)
time.sleep (3) myData={'name': 'Train1', 'lat':17.6132382,'lon':
78.4707318)pub
(myData)time.sleep(3)
client.commandCallback
myCommandCallbackclient.disconnect()
```

QRSCANNERCODE:

Import cv2importnumpy as

np importtime

Importpyzbar.pyzbaraspyzbar

fromibmcloudant.cloudant_v1importCloudantV1fromibmcloudantimport CouchDbSessionAuthenticatorfrom ibm_cloud_ sdk_core.authenticators importBasicAuthenticator

authenticator= BasicAuthenticator ('apikey-v2-16u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz','b0ab119f45d3e6255eabb978

serviceCloudant V1 (authenticator-authenticator)service.set_service_url('https://apikey-v216u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz:b0ab119f45d3e6255eabb978e7e2f0 cap= cv2.VideoCapture (0)fontcv2.FONTHERSHEYPLAINwhile True:

framecap.read()

decodedobjectspyzbar.decode (frame)for obj in

decodedObjects: #print("Data", obj.data) a-

obj.data.decode('UTF-8')

cv2.putText(frame,"Ticket",(50,50),font,2,

(255,0,0),3)#print

(a)

try: response = service.get_document (db='booking,doc_id=a)

get_result()

print (response) time.sleep(5)

exceptExceptionase:

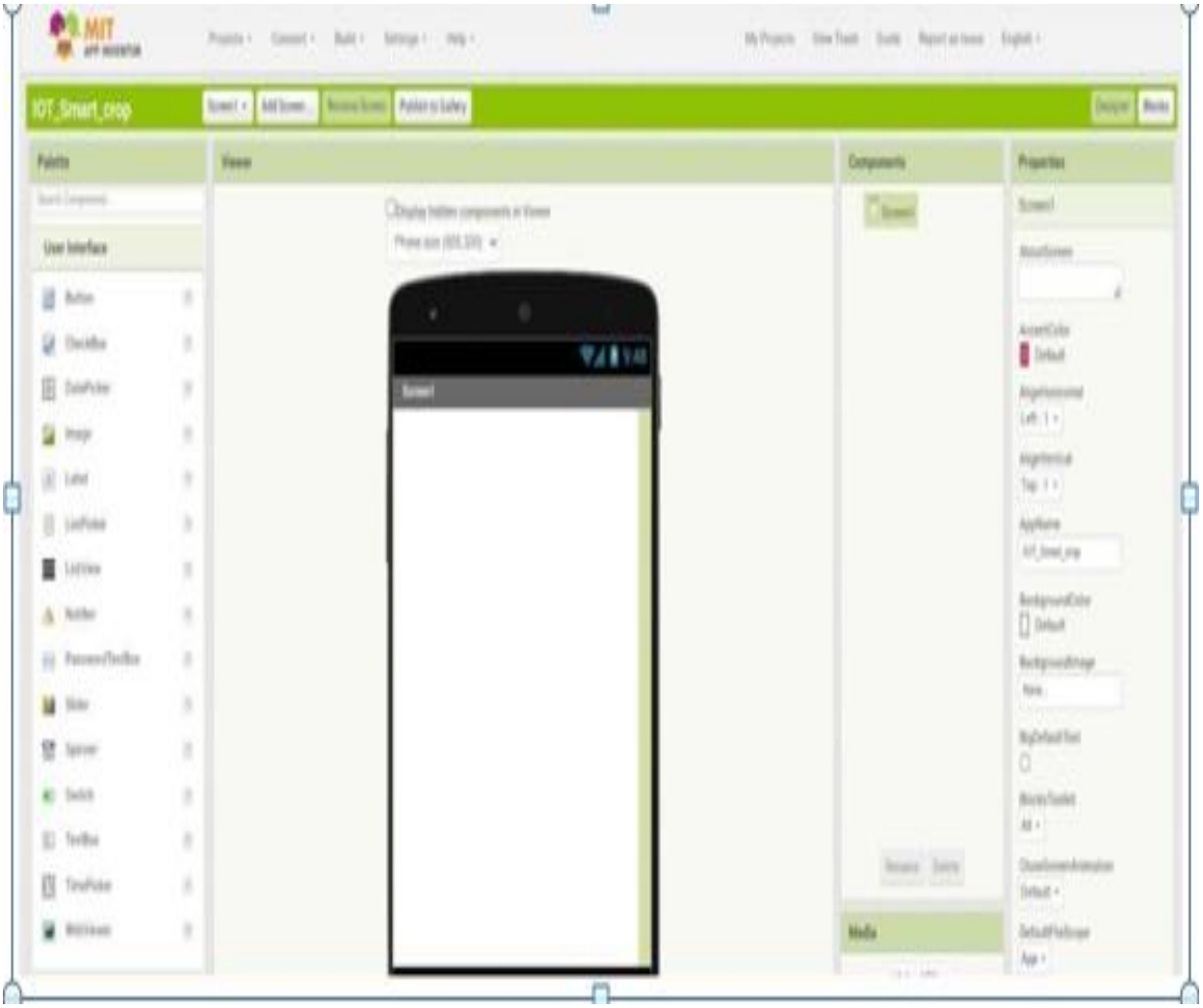
print ("Not a Valid Ticket")time.sleep (5)

cv2.imshow("Frame",frame) if cv2.waitKey(1)

&0xFF==ord('q'):

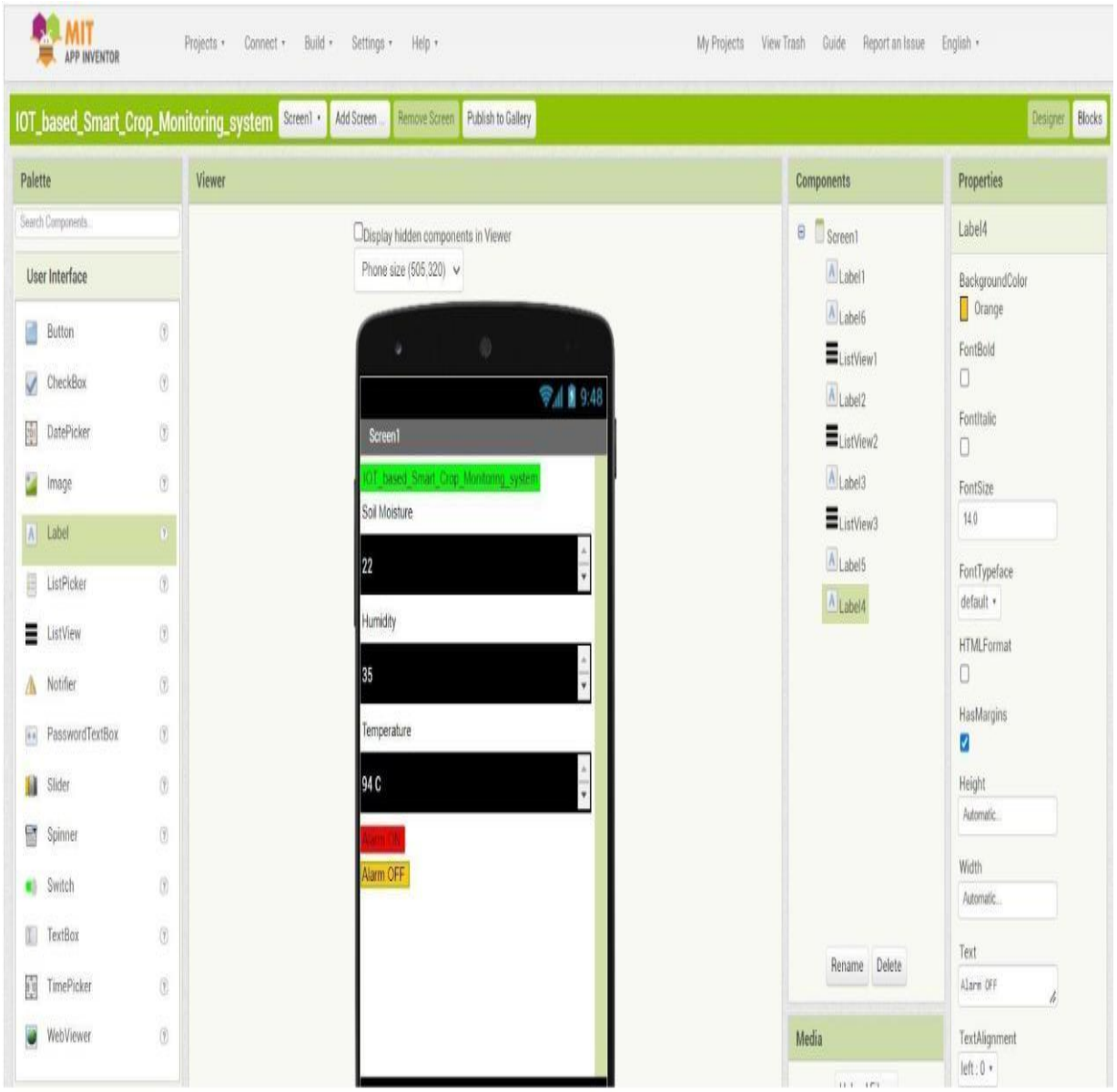
breakcap.release()cv2.

MIT app inventor to design the app:



7.2.2 MITappinventor to design the app

Customizing the app interface to display the values



7.2.3 Customizing the app interface to display the values

CHAPTER-8

TESTING

8.1 Test Cases

Defect Analysis

It shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
ByDesign	11	4	2	2	19
Duplicate	1	1	2	0	4
External	2	3	0	1	6
Fixed	10	2	3	20	35
Not Reproduced	0	0	2	0	2
Skipped	0	0	2	1	3
Won’t Fix	0	5	2	1	8
Totals	24	15	13	25	77

Table 8.1.1 Defect Analysis

.

CHAPTER-9

ADVANTAGES & DISADVANTAGES

Advantages

- Sensors in agriculture invented to meet the increasing demand for food with minimum resources. Such water, fertilizer and seeds.
- They are easy to operate and easy to maintain.
- Sensors are cheaper in price and best in quality.
- They can used for measuring pollution and global warming for their field and crops.

Disadvantages

- Farms are located in remote areas and are farm from access to the internet.
- A farmer needs to have access to crop data reliabily at anytime from many location, so connection issues would cause an advanced monitoring system to be useless.
- High cost equipment needed to implement IOT in agriculture is high.

CHAPTER-10

CONCLUSION:

. Thus the IOT based Smart Crop protection has been build successfully with the help of MIT app.Node JS and the output has been tested and verified using fundamental objective is to provide a fantastic answer to this problem, so that losses incurred will be minimized and farmers will have an accurate crop yield. As it is now not feasible for farmers to barricade whole fields or remain on area 24 hours and defend it this gadget makes use of a movement sensor to observe wild animals imminent next to lock up to the sector. Here it is presented an integrative method by the Internet of Things for smart Agriculture in an industrial level based on low powers campaigns and MATLAB is mostly used for the aim of technical computing and expressed in acquainted mathematical notation. But here in this paper Python, which is a high-level programming language is considered. It can run on all of the working methods so it is efficient than MATLAB which is used earlier. As it is now not feasible for farmers to barricade whole fields or remain on area 24 hours and defend it.So, this gadget makes use of a movement sensor to observe wild animals imminent next to lock up to the sector. It consists of all the kinds of sensors, regulator, actuators required and raspberry pi as a coronary heart in this paper. In the proposed system on Raspberry Pi, all sensors are mounted together in a single phase when compared to the other systems, it is specially designed to be simple to learn and really really easy to implement.It helps to preserve stretch and cash by reducing human labor .

CHAPTER-11

FUTURE SCOPE

The future of Smart protection starts and proceeds with technological adjustments. Like every other industry, to proceed, the waste management industry needs to become digitized and data-driven to advance its work field. The future is smart and competitive! Especially for businesses, they are required to be one step ahead of their competitors. When smart waste management solutions are applied over time, the data is collected. These data in hand sensors can be used to identify fill patterns, optimize driver routes and schedules, and reduce operational costs. These sensors' cost is steadily decreasing, making smart bins more feasible to implement and more attractive to companies or city leaders. When we say that the future is smart,it also means that it is practical. The selection of the containers minimizes the need fortrash collection crews. The amount of labor and time spent on collection processes is minimized, and ultimately it's profitable. In addition to hardware, the time spent is reduced for management and reduced by using easy to use compact and comprehensive platforms and mobile apps for both ends of the waste management processes.

CHAPTER-12

APPENDIX

SOURCE CODE

Program:

LOCATIONDATA:

```
importwiotp.sdk.deviceimport
time importrandom
myConfig={"identity":(
"orgId":"gagtey",
"typeId":"GPS",
"deviceId":"12345"},"auth"
:{
"token":"12345678"
}}
defmyCommandCallback(cmd):
print ("Message received from IBM IoT Platform: %s"
%cmd.data['command']) m-cmd.data['command']
client=wiotp.sdk.device.DeviceClient
(config=myConfig,logHandlers=None)client.connect()defpub(data):
```

client.publishEvent (eventId="status",
msgFormat="json",data=myData,qos=0,print("PublisheddataSuccessfully:
%s",myData)whileTrue:

myData={'name': 'Train1', 'lat': 17.6387448,
'lon':78.4754336)pub

(myData)time.sleep(3)
#myData('name': 'Train2', 'lat': 17.6387448, 'lon':78.4754336)

#pub (myData) #time.sleep (3)
myData={'name':'Train1','lat':17.6341908,'lon':
78.4744722)pub

(myData)time.sle
ep(3)
myData={'name': 'Trainl', 'lat': 17.6340889, lon':
78.4745052)pub(myData)time.sleep(3)
myData={'name': 'Trainl', 'lat': 17.6248626, 'lon':
78.4720259)pub(myData)time.sleep(3)
myData={'name': 'Trainl', 'lat': 17.6188577, 'lon': 78.4698726)pub (myData)
time.sleep (3) myData={'name': 'Train1', 'lat':17.6132382,'lon':
78.4707318)pub

(myData)time.sleep(3)
client.commandCallback =
myCommandCallbackclient.disconnect()

QRSCANNERCODE:

```
Import cv2importnumpy as
np importtime
Importpyzbar.pyzbaraspyzbar

fromibmcloudant.cloudant_v1importCloudantV1fromibmcloudantimport
CouchDbSessionAuthenticatorfrom ibm_cloud_ sdk_core.authenticators
importBasicAuthenticator

authenticator= BasicAuthenticator ('apikey-v2-
16u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz','b0ab119f45d3e
6255eabb978

serviceCloudant V1 (authenticator-
authenticator)service.set_service_url('https://apikey-
v216u3crmdpkghhxefdikvpssoh5fwezrmuup5fv5g3ubz:b0ab119
f45d3e6255eabb978e7e2f0 cap= cv2.VideoCapture
(0)fontcv2.FONTHERSHEYPLAINwhile True:
framecap.read()


decodedobjectspyzbar.decode (frame)for obj in
decodedObjects: #print("Data", obj.data) a-
obj.data.decode('UTF-8')
cv2.putText(frame,"Ticket",(50,50),font,2,

(255,0,0),3)#print

(a)

try: response = service.get_document
(db='booking,doc_id=a).get_result()

print (response) time.sleep(5)
```

exceptExceptionase:

print ("Not a Valid Ticket")time.sleep (5)

cv2.imshow("Frame",frame) if cv2.waitKey(1)

&0xFF==ord('q'):

breakcap.release()cv2.destroyAll

Windows ()client.disconnect()

Github Link

https://github.com/IBM-EPBL/IBM-Project-47713-1660801759

Demonstration Link

https://drive.google.com/file/d/1g6p7eg6HIOERET9dG5nUAwKeOuY97G3/view?usp=sharing