IOT BASED SMART CROP PROTECTION SYSTEM FOR AGRICULTURE

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INTRODUCTION

PROJECT OVREVIEW:

An intelligent crop protection system 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.

PURPOSE:

Our main purpose of the project is to develop intruder alert to the farm, to avoid losses due to animal and fire. These intruder alerts protect the crop that damaging that indirectly increase yield of the crop. The develop system will not harmful and injurious to animal as well as human beings. Theme of project is to design an intelligent security system for farm protecting by using embedded system.

LITERATURE SURVEY

EXISTING PROBLEM:

The existing system mainly provides the surveillance functionality. Also these systems don't provide protection from wild animals, especially in such an application area. They also need to take actions based on the type of animal that tries to enter the area, as different methods are adopted to prevent different animals from entering restricted areas. The other commonly used method by farmer in order to prevent the crop canalization by animals include building physical barriers, use of electric fences and manual surveillance and various such exhaustive and dangerous method.

REFERENCES:

- Balaji Bhanu, Raghava Rao, J.V.N. Ramesh and Mohammed Ali hussain, "Agriculture Field Monitoring and Analysis using Wireless Sensor Networks for improving Crop Production", Eleventh International Conference on Wireless and Optical Communications Networks (WOCN).2014.

- 2. Harshal Meharkure, ParagYelore, SheetalIsrani,"Application of IOT Based
    - System for Advance Agriculture in India", International Journal of innovative Research in Computer and Communication Engineering(IJIRCCE) Vol. 3, Issue11, pp. 10831-10837, 2015.

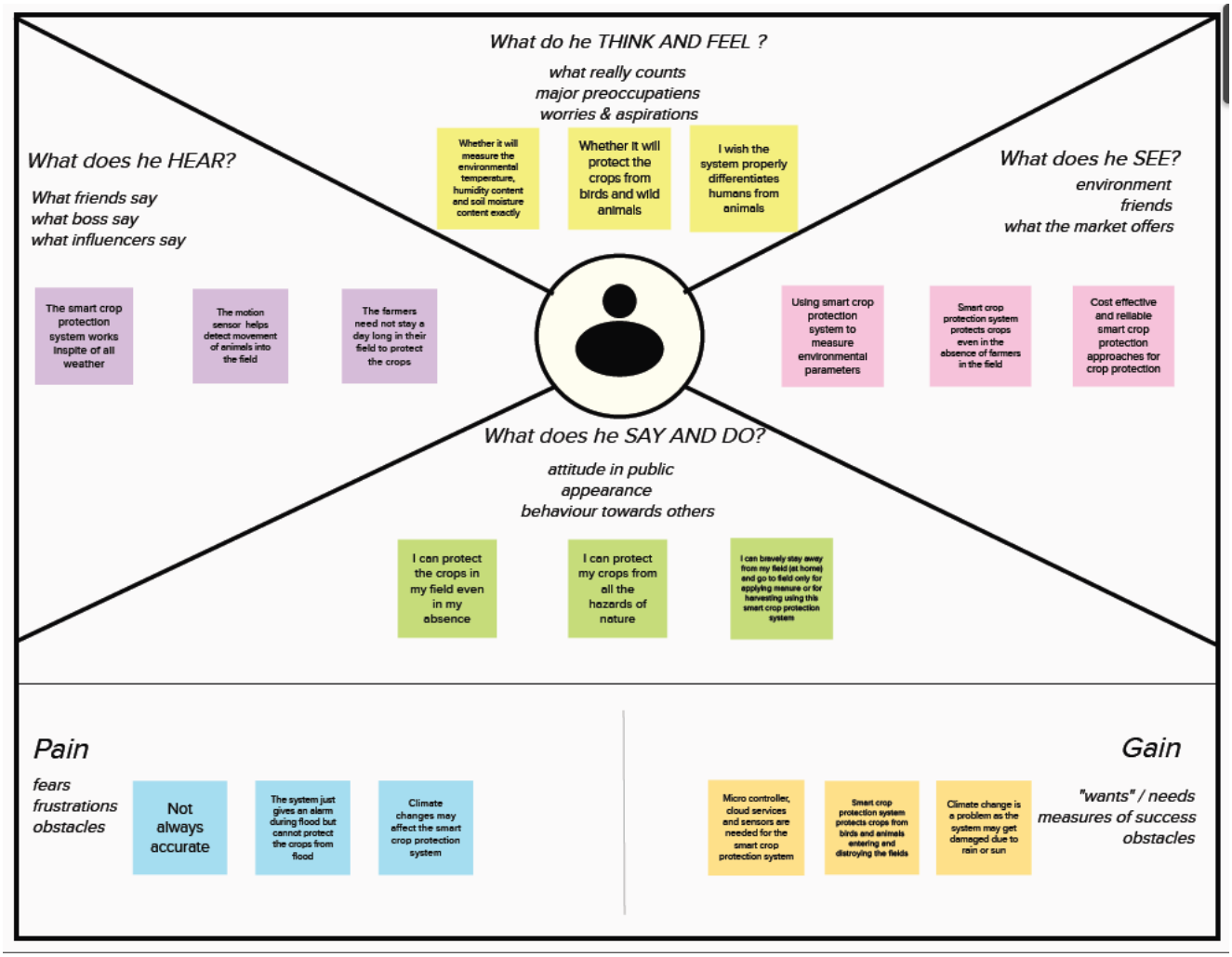
    - LIU Dan, Cao Xin, Huang Chongwei, JI LiangLiang, "Intelligent agent greenhouse environment monitoring system based on IOT technology",International Conference on Intelligent Transportation, Big Data &Smart City, 2015.

PROBLEM STATEMENT DEFINITION STATEMENT

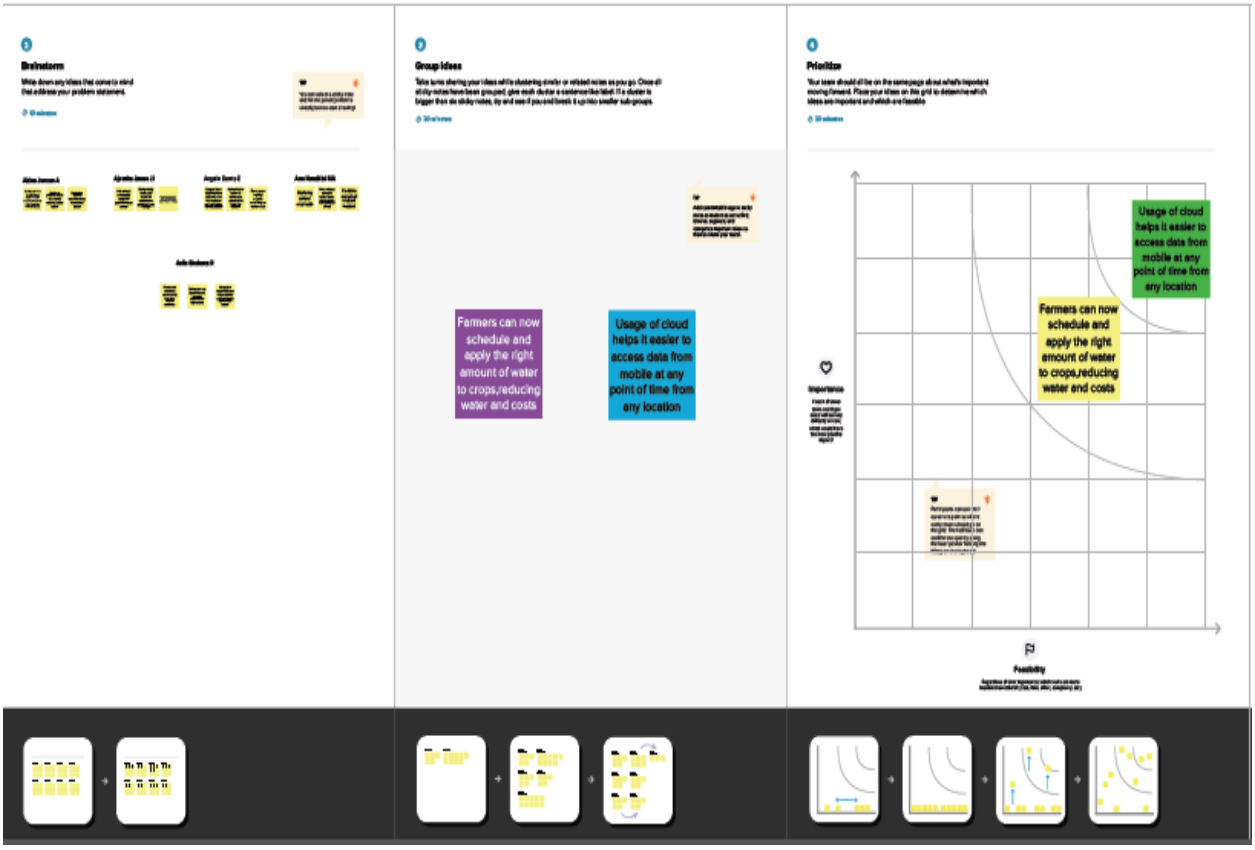
In the world economy of many Country dependent upon the agriculture. In spite of economic development agriculture is the backbone of the economy. Crops in forms are many times ravaged by local animals like buffaloes, cows, goats, birds and fire etc. this leads to huge loss for the farmers.it is not possible for farmers to blockade to entire fields or stay 24 hours and guard it. Agriculture meets food requirements of the people and produces several raw materials for industries. But because of animal interference and fire in agricultural lands, there will be huge loss of crops. Crops will be totally getting destroyed.

IDEATION AND PROPOSED SOLUTION

EMPATHY MAP CANVAS:



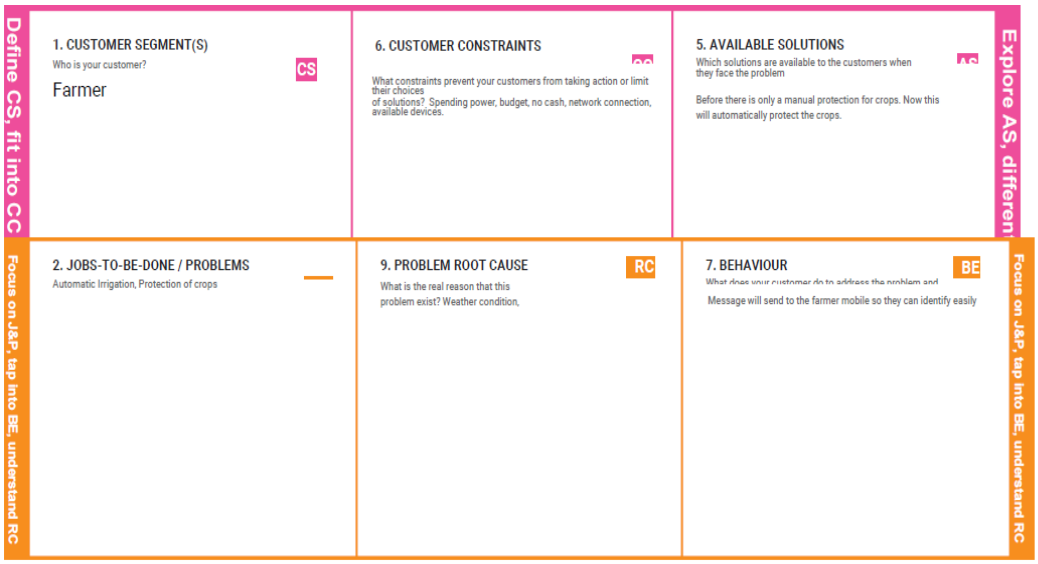
IDEATION AND BRAINSTORMING:

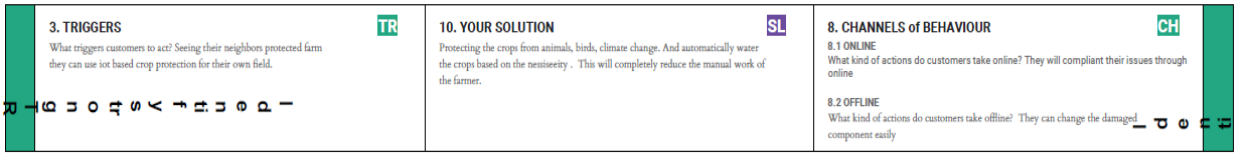


PROPOSED SOLUTION:

S.No.	Parameter	Description
•	Problem Statement (Problem to be solved)	Crops in farms are 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.
•	Idea / Solution description	Here we propose an automatic crop protection system from animals. This system uses a motion sensor to detect wild animals approaching near the field.
•	Novelty / Uniqueness	Motion sensor, Temperature sensor, Humidity sensor, Moisture sensor, Alarm, GSM.
•	Social Impact / Customer Satisfaction	Crop protection combines strategies, tools, and products that protect against various pests. These include diseases, viruses, weeds, and insects. All of them can significantly lower or even kill plants. The best decision is to control the situation by reducing the risks rather than deal with the problem's consequences.
•	Business Model (Revenue Model)	Monitor the crop 24/7, Avoid animals, Check the weather condition, Alert the farmer.

PROBLEM SOLUTION FIT:





REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENT:

Functional Requirements:

Following are the functional requirements of the proposed solution.

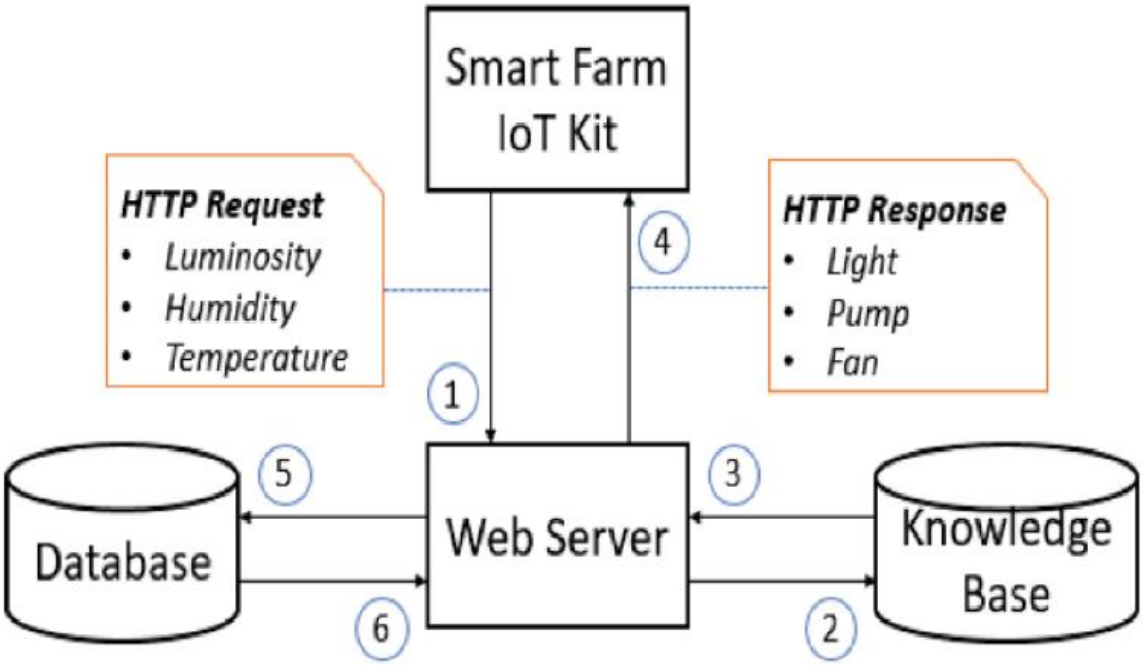
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Safety of production	The Smart protection system defines that this project help to farmer for the protection of a farm.The IOT device is used to indicate the farmer by a message while someone enter into the farm and we are used SD card module that helps to store a specified sound to fear the animals.
FR-2	Real time monitoring.	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.
FR-3	Eliminate man power	This eliminates the man power, it monitor the system 24/7 and sends an immediate response by message if there is any problem.
FR-4	Fast communication	This system uses a motion sensor to detect wild animals approaching near the field and smoke sensor to detect the fire. In such a case the sensor signals the microcontroller to take action. The microcontroller now sounds an alarm to woo the animals away from the field

Non-functional Requirements:

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	IoT device verifies that usability is a special and important perspective to analyze user requirements, which can further improve the design quality. In the design process with user experience as the core, the analysis of users' product usability can indeed help designers better understand users' potential needs in gas leakage monitoring, behavior and experience.
NFR-2	**Security**	It helps to prevent from material loss and human injuries
NFR-3	**Reliability**	IOT Based Crop Protection System against Birds and Wild Animal Attacks Smart crop protection system from wild animals using ArduinoSmart Crop Protection System from Animals and Fire using Arduino.
NFR-4	**Performance**	This system uses a motion sensor to detect wild animals approaching near the field and smoke sensor to detect the fire. In such a case the sensor signals the microcontroller to take action.
NFR-5	**Availability**	By developing and deploying resilient hardware And beautiful software we empower business to manage leakaging

PROJECT DESIGN

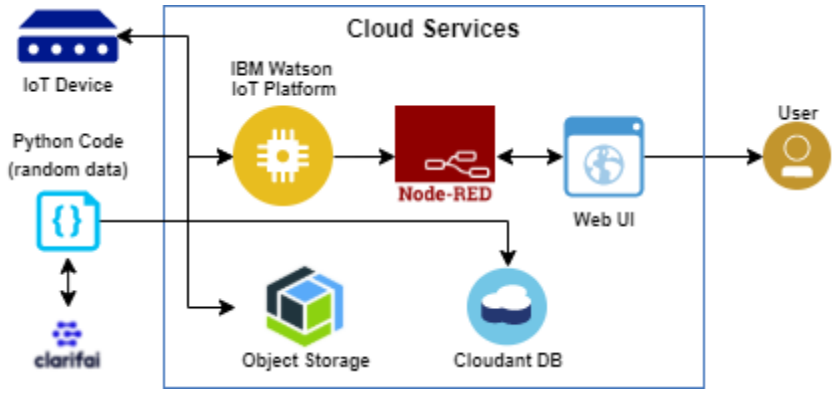
DATA FLOW DIAGRAM:



USER STORIES:

User Type	Functional requirement	User story number	User story/task	Acceptance criteria	Priority	Release
Customer (Mobile user, Web user, Care executive, Administrator)	Registration	USN-1	As a user, I can register for the application by entering my mail, 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
	Dashboard	USN-3	As a user, I can register for the application through internet	I can register & access the dashboard with Internet login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can confirm the registration in Gmail	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can login with my id and password	High	Sprint-1

SOLUTION AND TECHNICAL ARCHITECTURE:



COMPONENTS & TECHNOLOGIES

S. N 0	COMPONENTS DESCRIPTION	TECHNOLOGY
1	User Interface How the user interacts with the application e.g., Web UI, Mobile App.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2	Application Logic-1 The logic for a process in the application.	Python
3	Application Logic-2 The logic for a process in the application.	IBM Watson IoT service.
4	Application logic-3 The logic for a process in the application.	IBM Watson Assistant.

TABLE-2:
APPLICATION CHARACTERISTICS:

	S.NO CHARACTERISTICS DESCRIPTION	TECHNOLOGY
1	Open-Source Frameworks List the open-source frameworks used.	The technology of the Open Source framework.
2	Security Implementations Sensitive and private data must be protected from their production until the decision making and storage stages.	e.g., Node-Red, Open weather App API, MIT App Inventor, etc
3	Scalable Architecture scalability is a major concern for IoT platforms. It has been shown that different architectural choices of IoT platforms affect system scalability and that automatic real time decision-making is feasible in an environment composed of dozens of thousand.	Technology used.
4	Availability Automatic adjustment of farming equipment is made possible by linking information like crops/weather and equipment to auto-adjust temperature, humidity, etc.	Technology used.

CODING

```
import wiotp.sdk.device
import time
import random
myConfig={
"identity": (
"orgId": "gagtey",
"typeId": "GPS",
"deviceId":"12345"},
"auth": {
"token": "12345678"
}}
def myCommandCallback (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()
def pub (data):

client.publishEvent (eventId="status", msgFormat="json", data=myData, qos=0,
print("Published data Successfully: %s", myData)
while True:
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.sleep(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 = myCommandCallback
client.disconnect()
```

PROJECT PLANNINGAND SCHEDULING

SPRINT PLANNINGAND ESTIMATION:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint	**Total Story Points**	**Duration**	**Sprint Start Date**	**Sprint End Date (Planned)**	**Story Points Completed (as on Planned End Date)**	**Sprint Release Date (Actual)**
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Velocity:
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

RESULTS

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.

ADVANTAGES AND DISADVANTAGES

Advantage:

Controllable food supply. you might have droughts or floods, but if you are growing the crops and breeding them to be hardier, you have a better chance of not straving. It allows farmers to maximize yields using minimum resources such as water,fertilizers.

Disadvantage:

The main disadvantage is the time it can take to process the information.in order to keep feeding people as the population grows you have to radically change the environment of the planet

CONCLUSION:

A IoT Web Application is built for smart agricultural system using Watson IoT platform, Watson simulator, IBM cloud and Node-RED

FUTURE SCOPE

In the future, there will be very large scope, this project can be made based on Image processing in which wild animal and fire can be detected by cameras and if it comes towards farm then system will be directly activated through wireless networks. Wild animals can also be detected by using wireless networks such as laser wireless sensors and by sensing this laser or sensor’s security system will be activated.