**INTELLIGENT CROP PROTECTION**

**INTRODUCTION:**

Human-animal conflicts arise due to the diminishing natural resources and habitats as a result of the rise of encroachments, poaching, urbanization, and industrialization. As a result, the loss in yield due to animal attacks has been on a steady increase in the past few years. Even though agriculture is a vast sector, the average farmer would find it difficult to invest in technological solutions to prevent loss in yield, especially for security purposes. We propose a solar-powered, IoT based intelligent system that can be used to prevent crop damage due to wild animal attacks..... The proposed system can improve the yield of crops and in turn help farmers to increase their earning. This system indirectly helps the farmers to have a good sleep during the night as there is no need for them to keep patrolling their fields all through the night. This project is funded by IEEE SIGHT.

**OVERVIEW:**

Surveillance plays a major role in many fields be it at home, hospitals, schools, public places, farmlands etc. It helps us to monitor a certain area and prevent theft and also provides proof of evidence. But we tend to forget that the main enemies of such farmers are the animals that destroy the crops. This leads to a 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. This system helps us to keep away such wild animals from the farmlands

**PURPOSE:**

To intelligently monitor the temperature, humidity of your farm at fingertips by using sensors and cloud services. And also protect your farm by continuously watching it and get notified when an animal or bird enters your farm

1. Detecting the different animals and birds using IBM visual recognition service for protecting the crop from damage.
2. Whenever any birds and animals are detected the image will be captured and for keeping away them from the crop we can use text to speech service to get alert and fast2mgs to your mobile
3. Whenever there is low soil moisture the admins will be alerted and they can irrigate the crop using the mobile application(fast2sms).

**LITERATURE SERVICE:**

**EXESTING PROBLEM:**

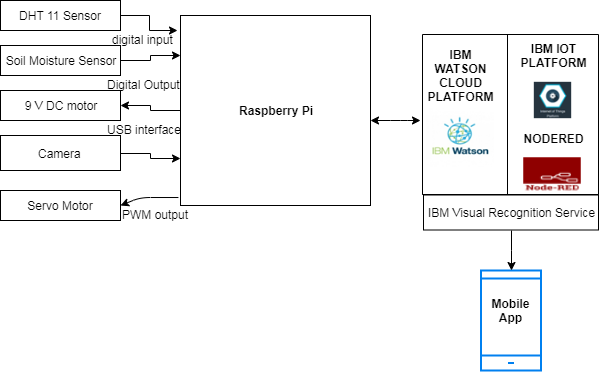
Systems don’t provide protection from wild animals, especially in such an application area. They also need to take actions based on the on the type of animal that tries to enter the area, as different methods are adopted to prevent different animals from entering such restricted areas. Also the farmers resort to the other methods by erecting human puppets and effigies in their farms, which is ineffective in warding off the wild animals, though is useful to some extent to ward off birds .The other commonly used methods by the farmers in order to prevent the crop vandalization by animals include building physical barriers, use of electric fences and manual surveillance and various such exhaustive and dangerous methods.

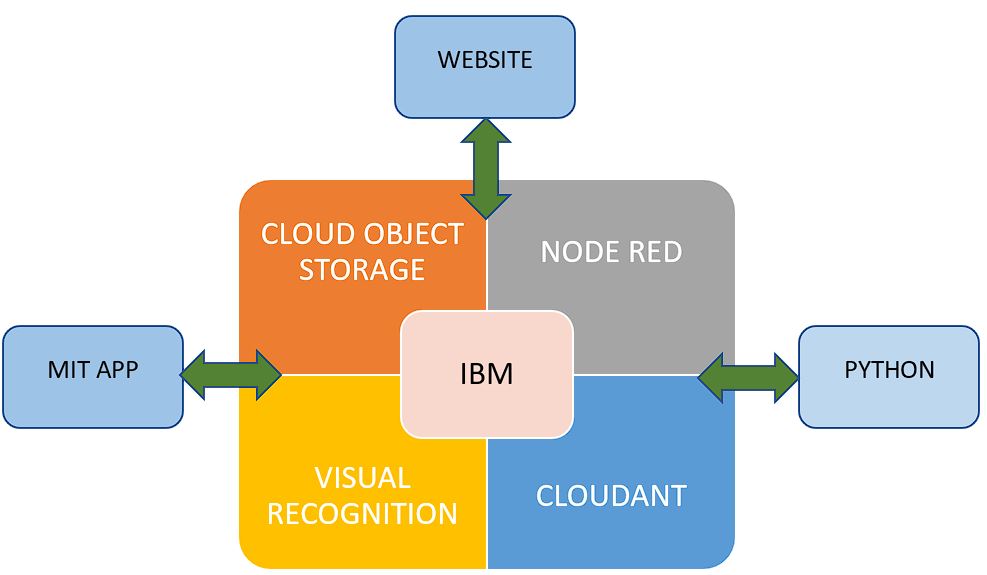
**PROPOSED SOLUTION:**

The proposed system uses IBM cloud services which form the main heart of the system. The python continuously runs the camera and sends the images to the IBM visual recognition service. If the service recognizes any animal or bird in the image then it alerts the farm owner by an SMS and also sends the captured image the mobile application. By the app we can also monitor the live temperature and humidity levels in the farm.

**THEORETICAL ANALYSIS:**

BLOCK DIAGRAM:





**SOFTWARE/HARDWARE DESCRIPTION:**

**1.** IBM Cloud Services

2. Python

3. MIT app inventor

IBM Cloud Services:

IBM provides various services required by IoT applications. It provides visual recognition service to identify the objects and living things. We have used this service to identify the animals and birds on our farm. IBM also provides cloud storage of images by cloud object storage service in which we have uploaded the images of our farm. It also provides cloudant service to store the text such as temperature and humidity values. We have also used the Node Red services provided by IBM to create a website and also to care of the flow of data.

Python:

Python is primarily used to continuously monitor the farm by the camera using cv2 package. By using the credentials of IBM service we send the images to IBM visual recognition service using python. And also send the temperature and humidity values to cloudant. We use the alert the user about the animal attack on their farm through SMS.

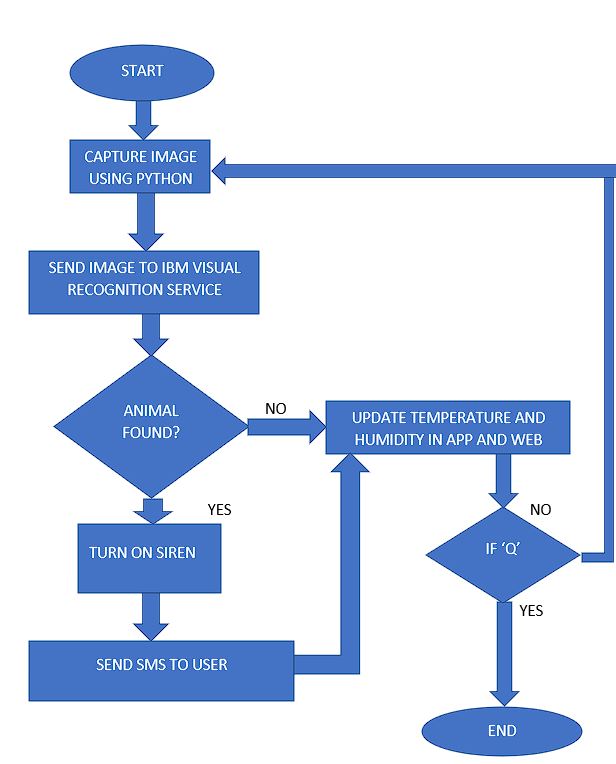
MIT app inventor:

This platform is used to create an android application. This website provides a simple block system to just drag and drop procedures to make the user feel comfortable. We have designed our app on this website which receives the temperature, humidity and also images of the farm of the user.

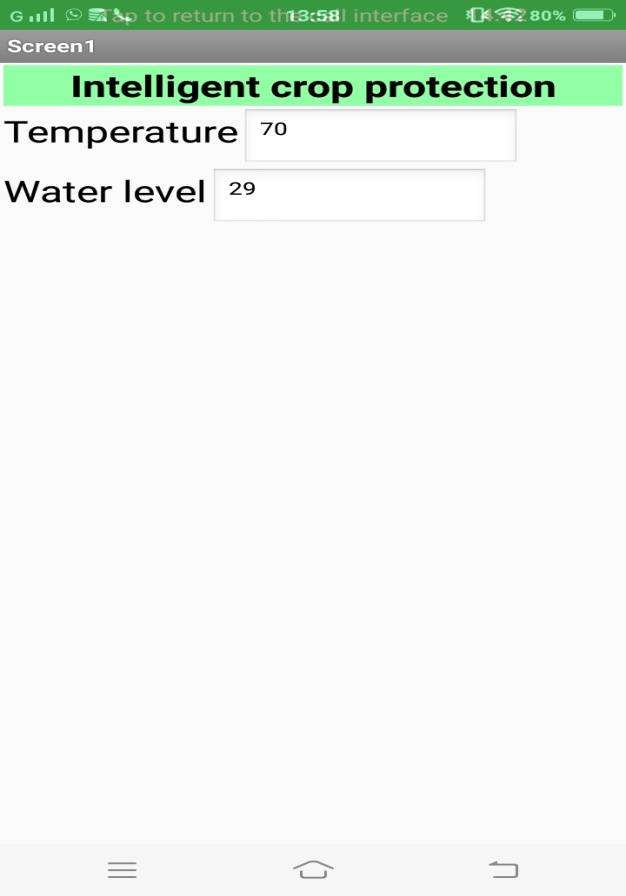
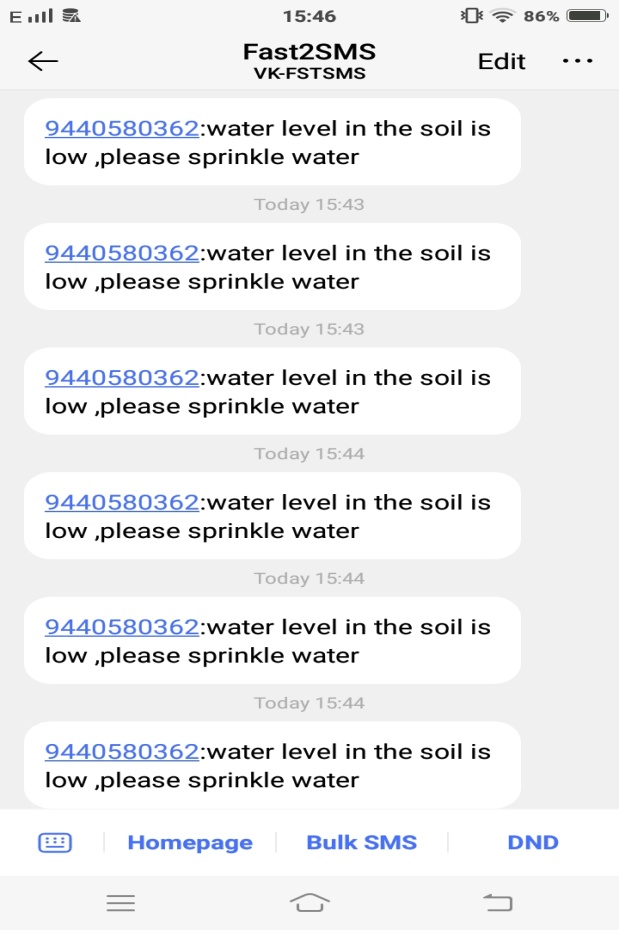
**EXPERMINTAL INVESTIGATIONS:**

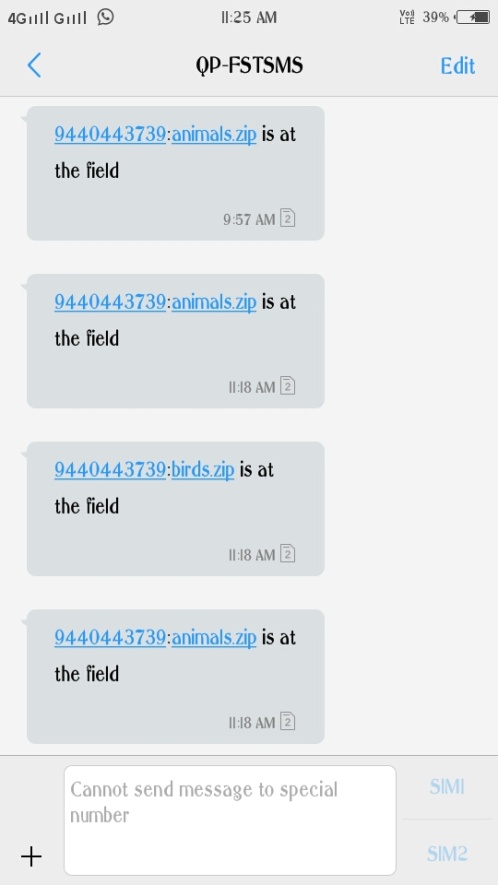
The ubiquitous deployment of mobile and sensor devices is creating a new environment called Internet of Things. The performance analysis of IoT applications encounters a lot of challenges such as interaction among a number of different technologies, various usage patterns of smart devices, numerous possible transactions etc. There are several IoT challenges and issues that need to be understood before employing the right solution to a problem that can dynamically vary with the situation. Based on certain critical situations such as IoT applications, frequent authorization and authentication are necessary and could dynamically vary, resulting in changes to the authorization of IoT devices. To address these issues, automated mutual authentication without human intervention is required.

**FLOW CHART:**

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**RESULT:**

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**ADVANTAGES :**

1. Effective, accurate and adaptive

2. Requires no human supervision

3. Economical

4. Real time monitoring

5. Causes no harm to animals and humans

**DISADVANTAGES:**

1. Required fast internet.
2. Cloud storage is costly.

**APPLICATIONS:**

1. This can be used to protect the farm.
2. It can be used as surveillance in houses.
3. To track the live temperature and humidity of an area.

**CONCLUTION:**

The problem of crop vandalization by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. Thus this project carries a great social relevance as it aims to address this problem. Hence we have designed a smart embedded farmland protection based system which is low cost, and also consumes less energy. The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. Such a system will be helpful to the farmers in protecting their orchards and fields and save them from significant financial losses and also saves them from unproductive efforts that they endure for the protection of their fields. This system will also help them in achieving better crop yields thus leading to their economic wellbeing.

**FUTURE SCOPE:**

1. In addition to providing protection this system distinguishes between an intruder and an authorized person using RFID’s.

2. We use Haar feature based cascade classifiers for object detection to distinguish between the animal and human.

3. When such intrusions occur the cameras employed are turned ON which capture an image and start recording the video for some time which will be stored on the SD card as well as stored on cloud i.e. dropbox, the land owner can then view the video on any smart device.

4. If the motion detection is due to an authorized person with a valid RFID, who is mostly a farm worker, his attendance gets recorded automatically.

5. We can design a IOT based application to provide an image and video feed to farmer on any smart device and farmer will be notified when there is an intrusion in the farm by animal along with additional information of humidity and temperature.

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APPENDIX:

import cv2  
import numpy as np  
import datetime  
import json  
from watson\_developer\_cloud import VisualRecognitionV3  
import ibm\_boto3  
from ibm\_botocore.client import Config, ClientError  
from cloudant.client import Cloudant  
from cloudant.error import CloudantException  
from cloudant.result import Result, ResultByKey  
import requests  
face\_classifier=cv2.CascadeClassifier("haarcascade\_frontalface\_default.xml")  
eye\_classifier=cv2.CascadeClassifier("haarcascade\_eye.xml")  
COS\_ENDPOINT = "[https://s3.jp-tok.objectstorage.softlayer.net](https://s3.jp-tok.objectstorage.softlayer.net/)" # Current list avaiable at <https://control.cloud-object-storage.cloud.ibm.com/v2/endpoints>  
COS\_API\_KEY\_ID = "G\_bbpn-FeZZD1zO29WhpIfYVYTTwKbXWc0FBzPVIj4wb" # eg "W00YiRnLW4a3fTjMB-odB-2ySfTrFBIQQWanc--P3byk"  
COS\_AUTH\_ENDPOINT = "<https://iam.cloud.ibm.com/identity/token>"  
COS\_RESOURCE\_CRN = "crn:v1:bluemix:public:cloud-object-storage:global:a/574e776671f7408abab5d179ac0aa6c7:0fe39ae2-2f1a-4e42-b18c-6d4c1e996798::" # eg "crn:v1:bluemix:public:cloud-object-storage:global:a/3bf0d9003abfb5d29761c3e97696b71c:d6f04d83-6c4f-4a62-a165-696756d63903::"  
cos = ibm\_boto3.resource("s3",  
    ibm\_api\_key\_id=COS\_API\_KEY\_ID,  
    ibm\_service\_instance\_id=COS\_RESOURCE\_CRN,  
    ibm\_auth\_endpoint=COS\_AUTH\_ENDPOINT,  
    config=Config(signature\_version="oauth"),  
    endpoint\_url=COS\_ENDPOINT  
)  
client = Cloudant("c50bd8d6-cabd-419a-9484-ec2fc5101e2c-bluemix", "1e1c2e03ac0376a1c7174435a75ad92d61a01baec66998ac6db78996eb520a9d", url="https://c50bd8d6-cabd-419a-9484-ec2fc5101e2c-bluemix:1e1c2e03ac0376a1c7174435a75ad92d61a01baec66998ac6db78996eb520a9d@c50bd8d6-cabd-419a-9484-ec2fc5101e2c-bluemix.cloudantnosqldb.appdomain.cloud")  
client.connect()  
database\_name = "smartsecurity"  
my\_database = client.create\_database(database\_name)  
def multi\_part\_upload(bucket\_name, item\_name, file\_path):  
    try:  
        part\_size = 1024 \* 1024 \* 5  
        file\_threshold = 1024 \* 1024 \* 15  
        transfer\_config = ibm\_boto3.s3.transfer.TransferConfig(  
            multipart\_threshold=file\_threshold,  
            multipart\_chunksize=part\_size  
        )  
        with open(file\_path, "rb") as file\_data:  
            cos.Object(bucket\_name, item\_name).upload\_fileobj(  
                Fileobj=file\_data,  
                Config=transfer\_config  
            )  
    except ClientError as be:  
        print("CLIENT ERROR: {0}\n".format(be))  
    except Exception as e:  
        print("Unable to complete multi-part upload: {0}".format(e))  
video=cv2.VideoCapture(0)  
while True:  
    check,frame=video.read()  
    gray=cv2.cvtColor(frame, cv2.COLOR\_BGR2GRAY)  
    faces=face\_classifier.detectMultiScale(gray,1.3,5)  
    eyes=eye\_classifier.detectMultiScale(gray,1.3,5)  
    for(x,y,w,h) in faces:  
        cv2.rectangle(frame, (x,y), (x+w,y+h), (127,0,255), 2)  
        cv2.imshow('Face detection', frame)  
        picname=datetime.datetime.now().strftime("%y-%m-%d-%H-%M-%S")  
        cv2.imwrite(picname+".jpg",frame)  
        multi\_part\_upload("techtycoons", picname+".jpg", picname+".jpg")  
        json\_document={"link":COS\_ENDPOINT+"/"+"techtycoons"+"/"+picname+".jpg"}  
        new\_document = my\_database.create\_document(json\_document)  
        if new\_document.exists():  
            visual\_recognition = VisualRecognitionV3(  
                '2018-03-19',  
                iam\_apikey='g2HkZiqZ3dDrwxjIQR0Guj-Cddq70UhtHNnQMN\_nPsSN')  
            with open(picname+'.jpg', 'rb') as images\_file:  
                classes = visual\_recognition.classify(  
                    images\_file,  
                    threshold='0.6',  
                    classifier\_ids='animalsandbirds\_977755542').get\_result()  
            #print(json.dumps(classes, indent=2))  
            l=json.dumps(classes, indent=2)  
            k=json.loads(l)  
            p=k['images'][0]['classifiers'][0]['classes'][0]['class']  
            print(p)  
             
            url = "<https://www.fast2sms.com/dev/bulk>"  
            querystring = {"authorization":"IoHyB4PlVJYumgFxfk0CT87tcihAnRdSqva21QebwKjNOL9G6rxOElgJ3oR0F9BCWSa4HX6MYPeGwcdA","sender\_id":"FSTSMS","message":p+" is at the field","language":"english","route":"p","numbers":"9440443739,9440580362"}  
            headers = {  
                         'cache-control': "no-cache"  
            }  
            response = requests.request("GET", url, headers=headers, params=querystring)  
            print(response.text)  
             
    for(ex,ey,ew,eh) in eyes:  
        cv2.rectangle(frame, (ex,ey), (ex+ew,ey+eh), (127,0,255), 2)  
        cv2.imshow('Face detection', frame)  
    Key=cv2.waitKey(1)  
    if Key==ord('q'):  
        video.release()  
        cv2.destroyAllWindows()  
        break

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