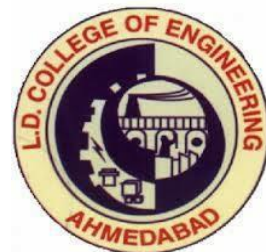




GUJARAT TECHNOLOGICAL
UNIVERSITY



Affiliated:
L.D. COLLEGE OF
ENGINEERING,
AHMEDABAD

A Report On

“BIRD DETECTION & REPELLENT SYSTEM ”

Under Subject Of

FINAL YEAR PROJECT (UDP)
B.E. IV Year, Semester – 8th

(Electronics & Communication Engineering)

Submitted By

NAME	ENROLLMENT NO:
KACHHADIYA JEMIN BHARATBHAI	160280111032
PANDYA HET AJAYBHAI	160280111050
MANSURI ADIL MUSTAKBHAI	160280111043

CERTIFICATE

This is to certify that the dissertation entitled “BIRD DETECTION & REPEL” has been carried out by Jemin Kachhadiya, Pandya Het & Adil Mansuri under my guidance in fulfillment of the degree of Bachelor of Engineering in Electronics & Communication (7th& 8th Semester) of Gujarat Technological University, Ahmedabad during academic year 2019-2020.

ASST. PROF. ABHAY UPADHYAY (INTERNAL GUIDE) DEPARTMENT)	PROF. MIHIR SHAH (HEAD OF
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Date: 10th May, 2020

Place: LDCE, Ahmedabad

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ABSTRACT

- We can use it in Aircrafts, windfarms, farms etc.
- More accurate cause we use image processing.
- Not harmful for bird it just repel birds.
- The device is totally eco-friendly.
- Less maintenance.
- Secured as well as can be operated in any conditions.

This project is totally based on helping hand to environment. With this project we can contribute to avoid plane accidents cause of birds, also we can help where they all killed because of the windmills, or the crop of the farmers which is destroyed because of the birds. Because of the windmills so many birds are killed every year so we are planning to save their life and also human life by avoiding plane accidents..

INTRODUCTION

Here our main focus is on the use of laser light which keeps the birds away so because of those laser lights they stay away from the windmills, farms, air-ports etc. So we are going to use that type of laser lights and Arduino. For this we are going to use computer/laptop, Arduino, camera, laser lights, servo motor etc.

Locations

India is a large country and there are so many farms, windmills, airports and many other places where this problem is happening. Mostly in the wind farms so many birds are killed every year so for protect them and balancing the environment cycle is our duty. So for that we are making this project for the benefits of the environment and the living things on the earth. Because if there are any problems in the cycle of environment so then ultimately there are so many bad effects on the human beings also so that's why it is our duty to save them and protect the whole earth. In the California this major problem is there of bird killing because of the windmills so there also we can implement this project.

Planning

The main thing for the mapping and planning in the vast country like India is to see the places of windmills, farms and the airports that where they are located. So we are able to plan accordingly. So we can calculate that how many components in the circuits which we are going to use in the windmills which are mainly near the sea. So we also have to watch that the engineers who are working there they should know how to operate on the circuits that how they work. So according to they know how to operate on those circuits when to put them on ON mode and when to put on OFF mode.

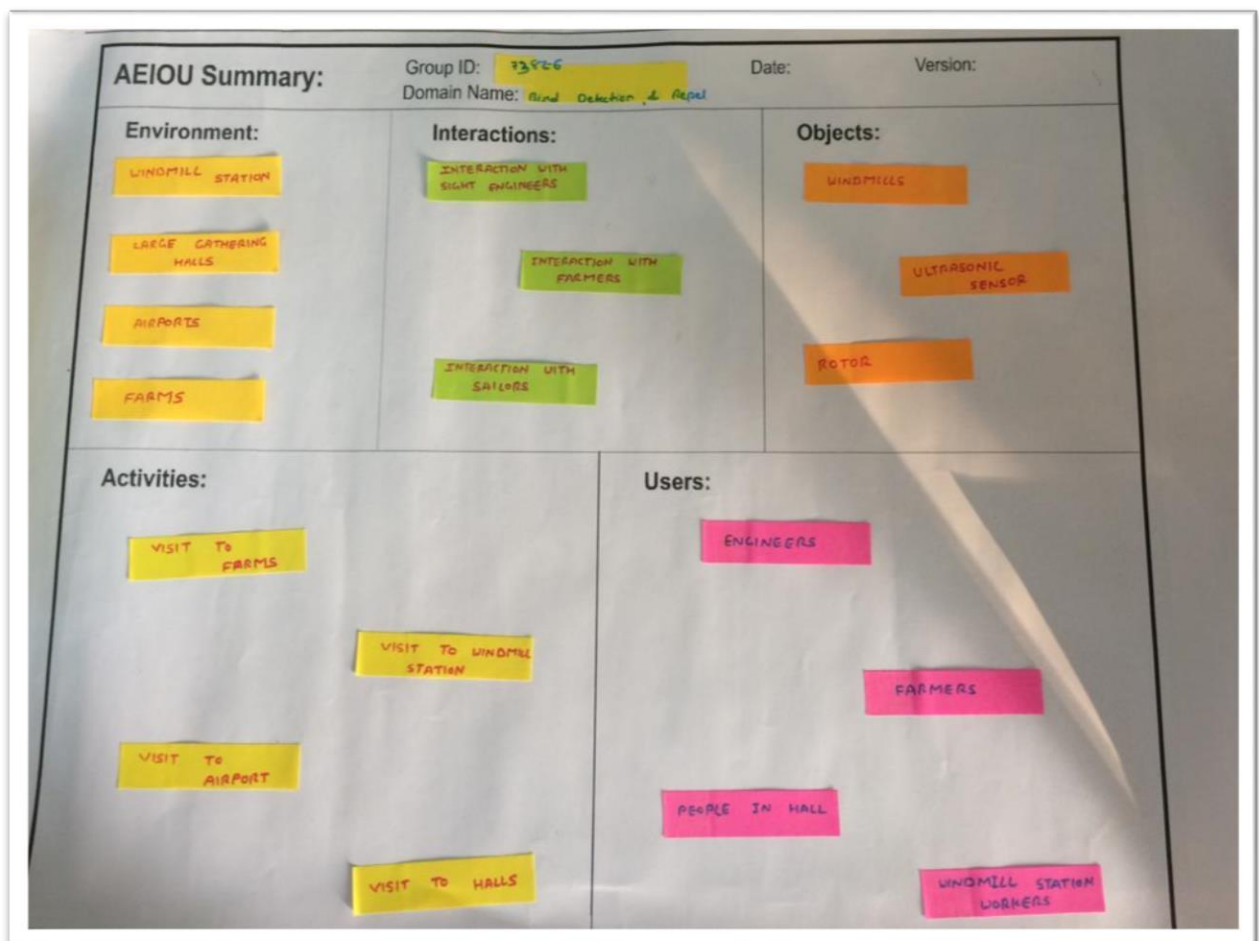
Synchronization

Here the concept of the synchronization is to put the circuit on the working mode and detect the birds from some distance and catching them in frame from camera if it is bird then it sends the signals to the Arduino and which keeps them away and this all processes should be synchronized.

DESIGN: ANALYSIS, DESIGN METHODOLOGY AND IMPLEMENTATION STRATEGY.

1. AEIOU CANVAS

This is 1st canvas providing basic information related to product. In this environment related information is adding and how product is effecting environment and surrounding. Interaction provide information to whom product is effected such as people, industries, customer who are going to use it and many more. Object related to components which going to use in this product. Activity also included how it was going to use in our daily life and in what purpose it going to use. It related to enjoyment, transportation, house hold use and many other. Users it is also one point in this canvas who are going to implement it in daily life or in any place. This canvas gives beginning idea of canvas how to start and should be in mind for developing this project.



- It is in the environments like windmill station, large gathering halls, airports and farms.
- We were interacted with the sight engineers, farmers and also with sailors.
- The objects we are using are windmills, ultrasonic sensor, rotor etc.
- We visited farms, windmills, airports and halls.
- The users of this projects are engineers, farmers etc.

2. Empathy Mapping

This is 2nd canvas in which how it is use and user related information is given. In this canvas, we have provided information regarding stackholders of Object Detection and Repelling. In this activity is carried out through object detection and repelling. In this advantages and disadvantages is given in form of story. This canvas gives idea of importance by advantages and disadvantages of product.

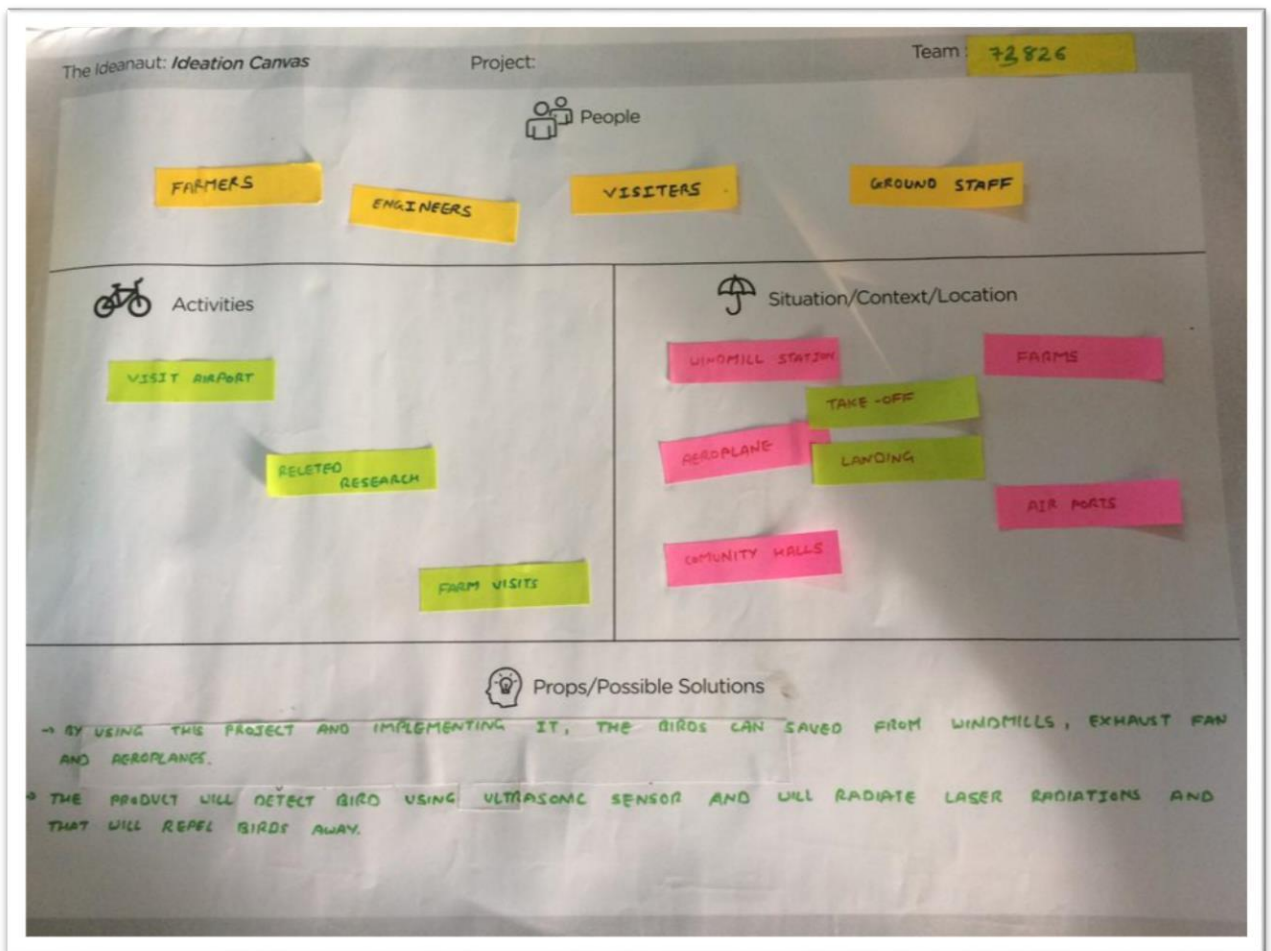
Design For BIRDS DETECTION AND REPEL		Design By - 160190111050 - 160190111043
Date 15/10/2019		Version
USER	STAKEHOLDERS	
BIRDS FARMERS ENGINEERS	GOVERNMENT PRIVATE FIRMS FARMERS	
ACTIVITIES		
PREPARED THE VIRTUAL MODEL CONCEPTUALIZED MODEL VISIT TO WINDMILL SIGHT VISIT TO FARMS STUDIED RELEATED PROBLEMS		
STORY BOARDING		
HAPPY => Once I was flying to UAE and it was about 320 and the time duration was 30 minutes. I was equipped with latest sensor for birds repelling. A birds flock was about to hit the engine but the sensor successfully repelled the birds away. By this many birds were saved.		
HAPPY => By implementing this product in the farm, the birds which were damaging the crops and that for crops are fertilized so even the birds were harming themselves by eating these fertilized crops. Even the crops were saved by the birds. So that here the birds are saved from fertilized crop eating and farmers are also happy for the crops being saved.		
SAD => Once we had a group picnic with hostel friends and visited a windmill station at Kitchi and we seen there a flock of birds hit the rotating windmill blades and many birds were killed there.		
SAD => I have seen the birds eat the birds but flock of birds, damaging the crops on the farmer. The crops were were recently sowed and were heavily damaged by the flock of birds. It was a heavy damage done with the whole farms.		

This sheet provides you the following details;

- The users which are birds, farmers and also the human beings for saving the environment.
- The stake holders of this project are government on the airports, private firms& government on the windmills, farmers in the fields.
- In the activities we were prepared virtual model of this project.
- We studied related problems by visiting the windmill sites and the farms

3. Ideation Canvas

This is 3rd canvas in which we get basic idea of project. In this project we get idea of how people are correlated to the project. In this how people are going to use this product in day to day life. In which activity they are going to use it in day to day life. At what situation people are going to use it in daily life. In this canvas possible solution is find out and how and at place it is useful. In this canvas the basic idea about our project is formulated in which people ,activity, location and possible solution are shown which throw light over whole project.



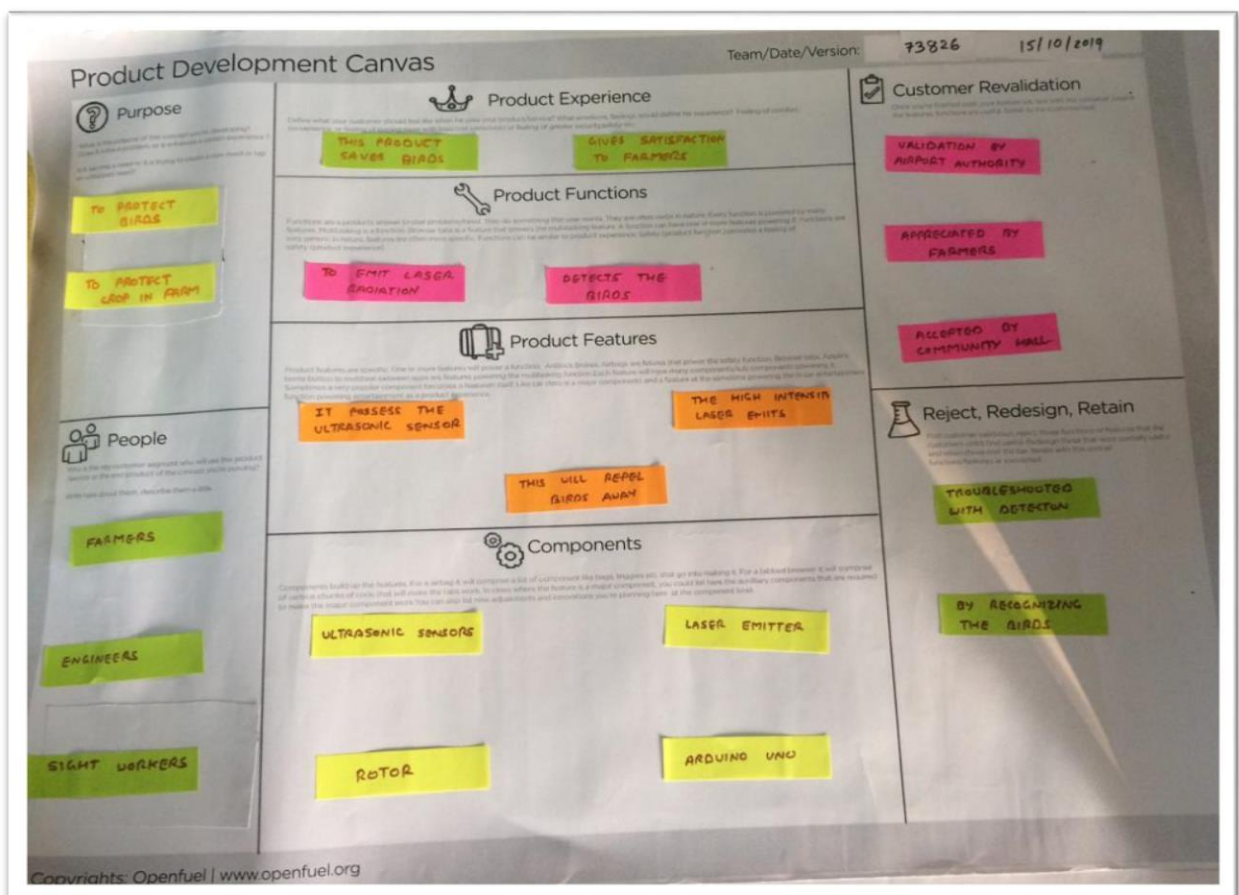
Here what we done in ideation canvas:

- First of all, we short listed people who can get benefits of our project. They are Farmers, Visitors, Engineers etc.
- Then in activities we developed a conceptual idea and based on that we can process further our idea.

- Now it's time to short list location, situation and here we discuss about how it can implement in aeroplane, farms, windmill and airport.
- Possible solutions of this problem are, we can solve problem of bird heating by radiating lasers.

4. Product Development Canvas

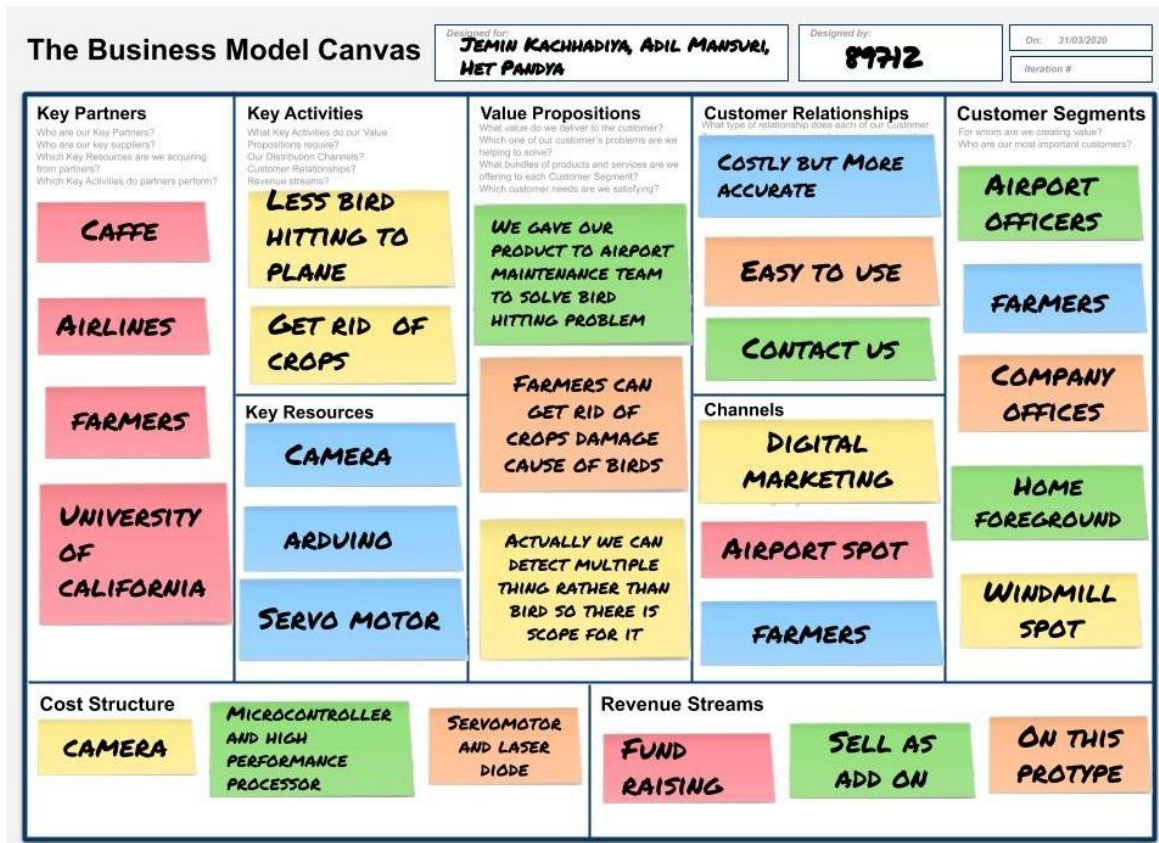
This canvas is 4th which is related to product development of product. In this canvas, development of our project and its analysis is carried out. This canvas gives basic idea regarding function of object detection and repelling. This canvas also gives information of components are going to use in laser detection and repel system. This canvas also elaborates the functions of this device. This also give information of customer revalidation. Also give information which is good and bad things in this project. This canvas also gives information of product experience. This canvas gives us product development related all activities



- The purpose is to save birds from aeroplanes, windmills etc. and crop in the farms.
- The functions of this project are emitting the laser against the birds.
- It contains laptop, servo motor, Arduino, camera etc.

- Farmers, engineers and the persons who are working in the air-ports and the travellers who are in the airports they all are in the periphery of this project.

5. Business Model Canvas:



The business canvas model is shown above.

It highlights the main features of our projects such as key partners and, key activities.

The cost of the project and value which is being hold the project in the market.

It shows the customer relations and the customer segments.

IMPLEMENTATION:

- The main implementation we are going to do is in the wind farms which are located nearby the sea shore and also on some area they are on the mountains.
- We are also going to implement it in the engine part of the aeroplane and where the fans of engine are there with the use of laser.
- We are also going to do it in the farms in the fields with the use of laser lights.

Architectural Overview:

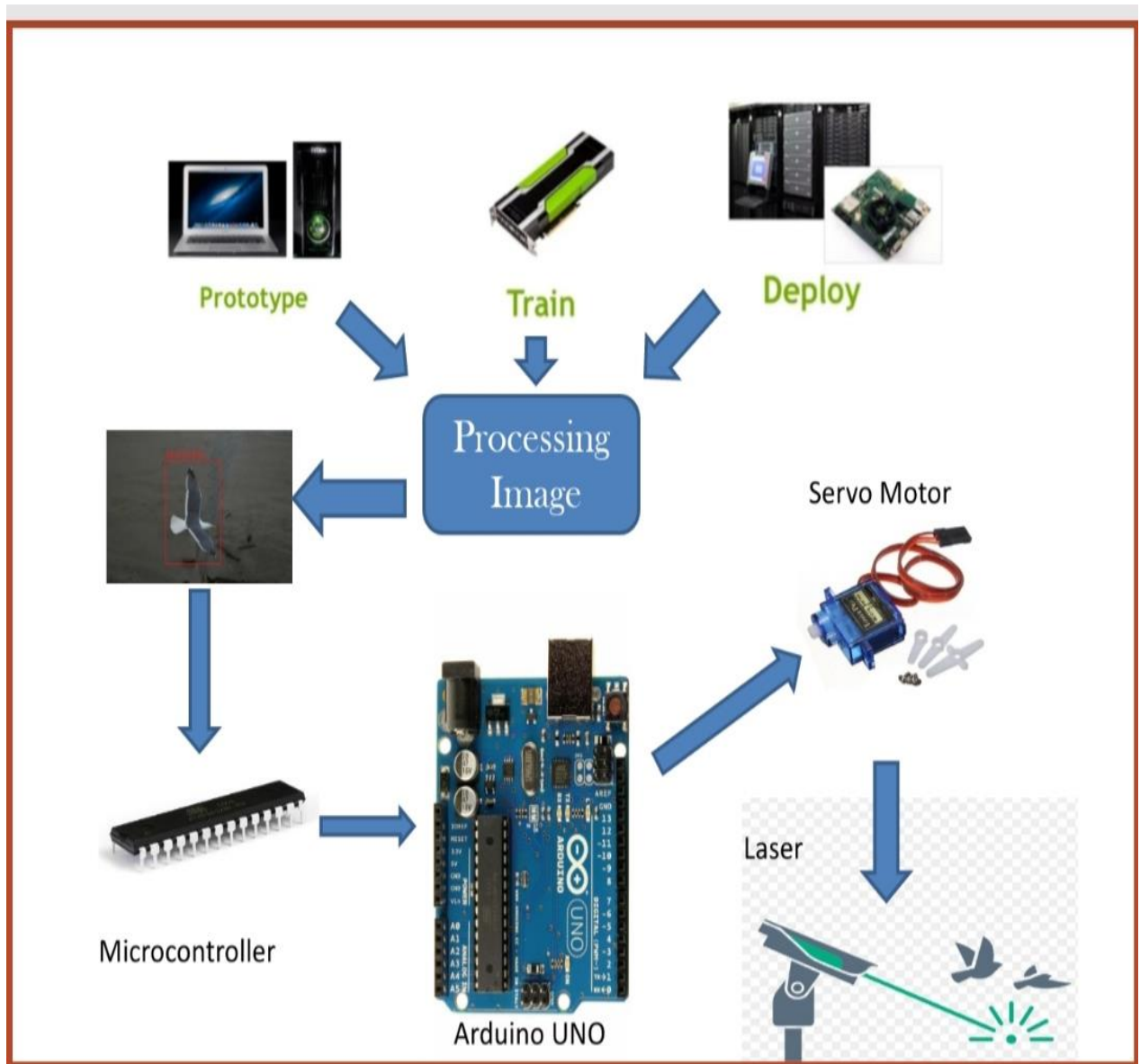


Fig.2

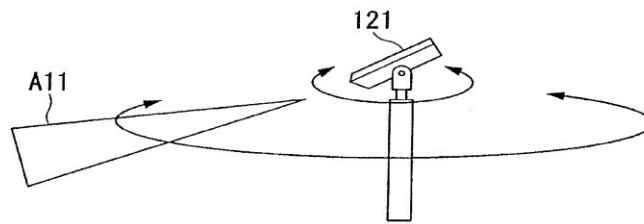
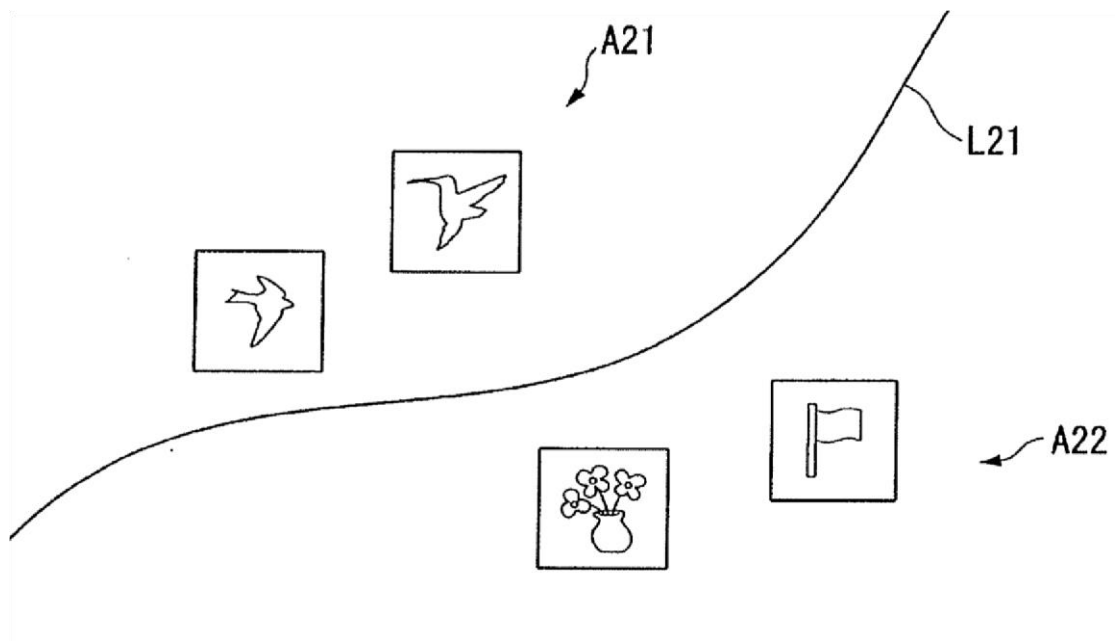
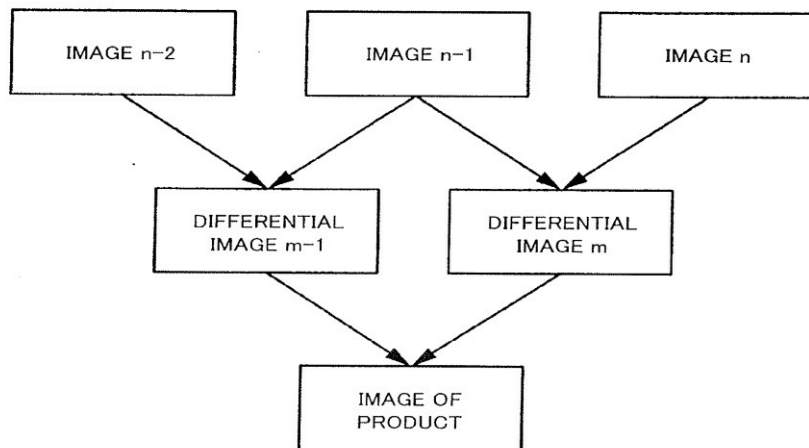
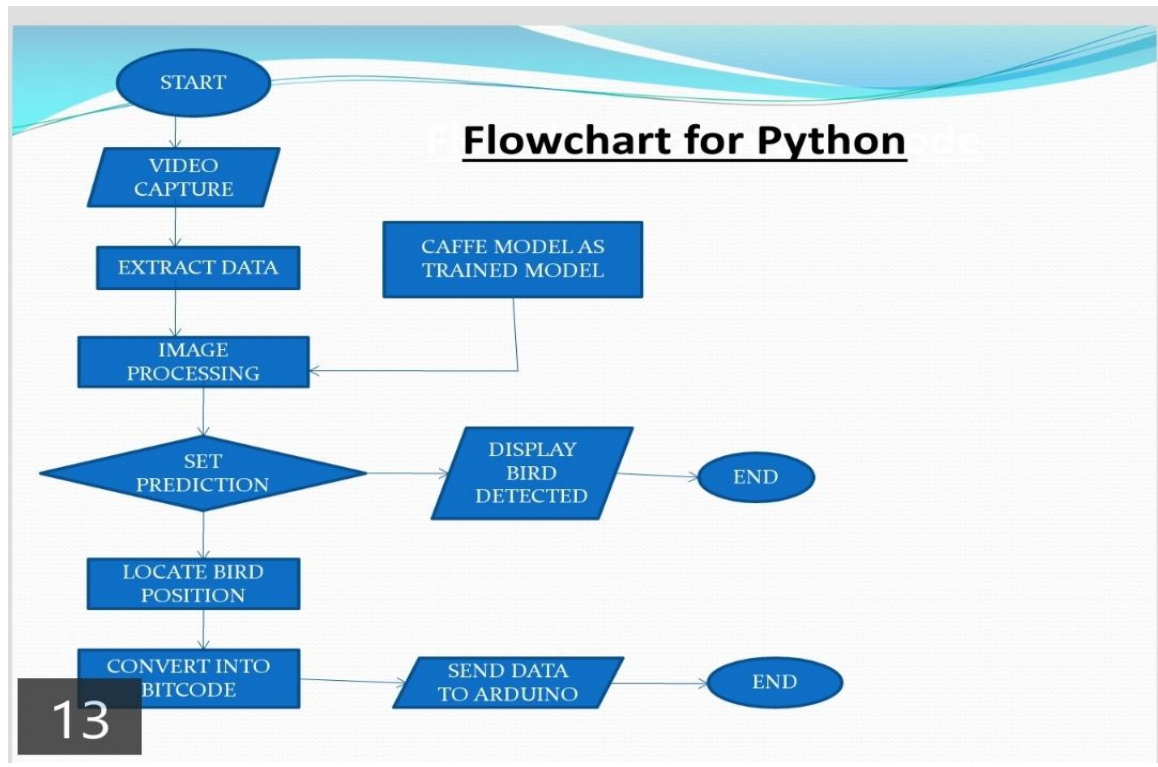


Fig.3



Flowchart for Python



Code for bird detection in python

```

import cv2
from datetime import datetime

confidence_thr = 0.5
arduino_data = serial.Serial('com5', 9600)

CLASSES = ["background", "aeroplane", "bicycle", "bird", "boat",
            "bottle", "bus", "car", "cat", "chair", "cow", "diningtable",
            "dog", "horse", "motorbike", "person", "pottedplant", "sheep",
            "sofa", "train", "tvmonitor"]
COLORS = np.random.uniform(0, 255, size=(len(CLASSES), 3))

print("[INFO] loading model...")
ggg=None
shared_dir = '../MobileNet-SSD/'
net = cv2.dnn.readNetFromCaffe(shared_dir+ 'deploy.prototxt', shared_dir+ 'mobilenet_1.0_3.0.caffemodel')

def arduino(startX, startY, endX, endY):
    global ggg
    finalX = (startX+endX)/2
    finalY = ((480-startY)+(480-endY))/2
    Xvalue = str(int(0.1375*finalX)+30)
    Yvalue = str(int(0.25*finalY)+30)
    arduino_data.write(Xvalue.encode())
    print(Xvalue.encode(), Yvalue.encode())
    ggg=datetime.now()

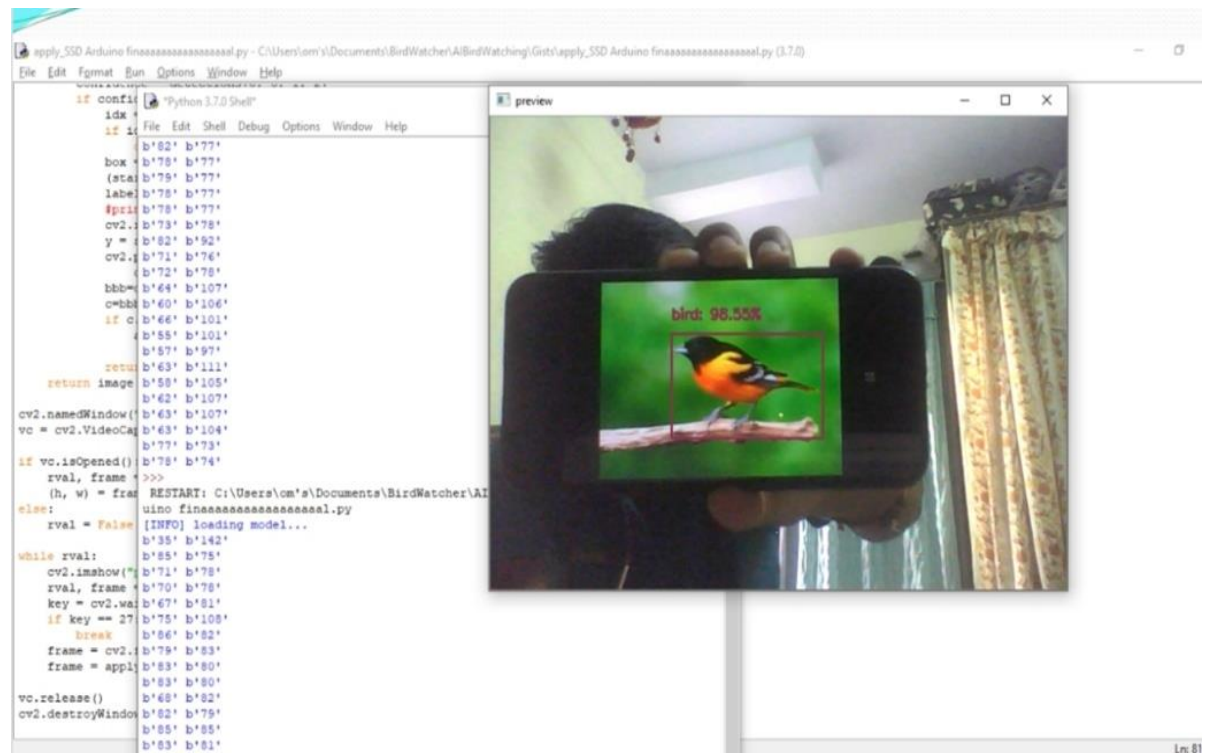
arduino(30,30,30,30)

blob=None
def applySSD(image):
    global blob
    blob = cv2.dnn.blobFromImage(cv2.resize(image, (300, 300)), 0.007843, (300, 300), (128, 128, 128))
    net.setInput(blob)
    detections = net.forward()
    for i in np.arange(0, detections.shape[2]):
        confidence = detections[0, 0, i, 2]
        if confidence > confidence_thr:
            idx = int(detections[0, 0, i, 1])
            if idx!=3:
                continue
            box = detections[0, 0, i, 3:7] * np.array([w, h, w, h])
            (startX, startY, endX, endY) = box.astype("int")
            label = "{}: {:.2f}%".format(CLASSES[idx], confidence * 100)
            #print("[INFO] {}".format(label))
            cv2.rectangle(image, (startX, startY), (endX, endY), COLORS[idx], 2)
            y = startY - 15 if startY - 15 > 15 else startY + 15
            cv2.putText(image, label, (startX, y), cv2.FONT_HERSHEY_SIMPLEX, 0.5, COLORS[idx], 2)
            hbb=datetime.now()
            c=bbb-ggg
            if c.total_seconds()>1.5:
                arduino(startX, startY, endX, endY)
    return image

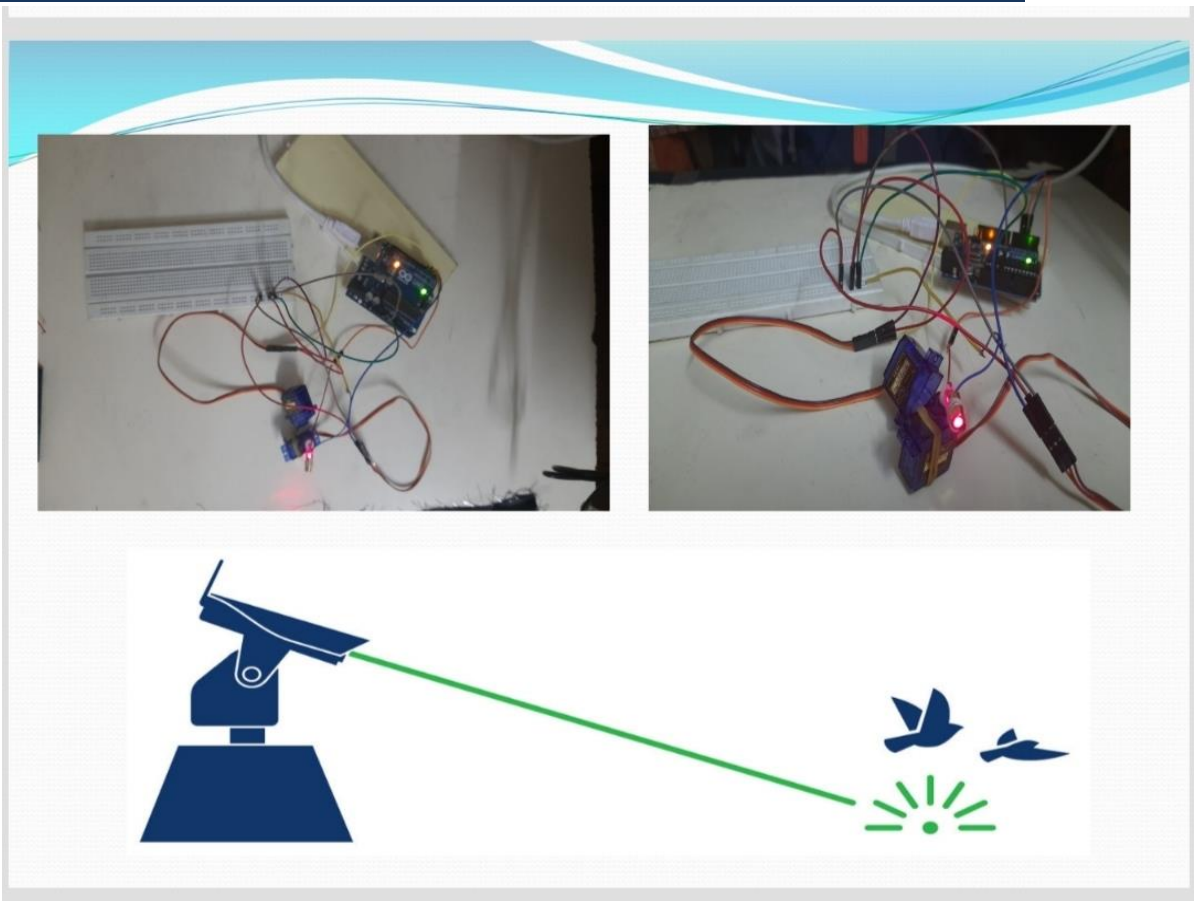
cv2.namedWindow("preview")
vc = cv2.VideoCapture(0)

if vc.isOpened():
    rval, frame = vc.read()
    (h, w) = frame.shape[0], frame.shape[1]
else:
    rval = False

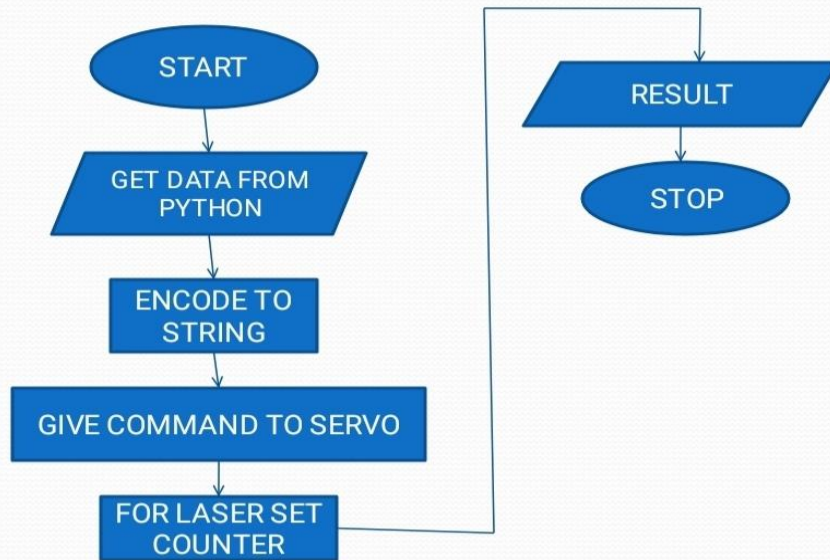
while rval:
    cv2.imshow("preview", frame)
    rval, frame = vc.read()
    key = cv2.waitKey(20)
    if key == 27:
        break
    frame = cv2.flip(frame, 1)
    frame = applySSD(frame)
vc.release()
cv2.destroyAllWindows()
  
```



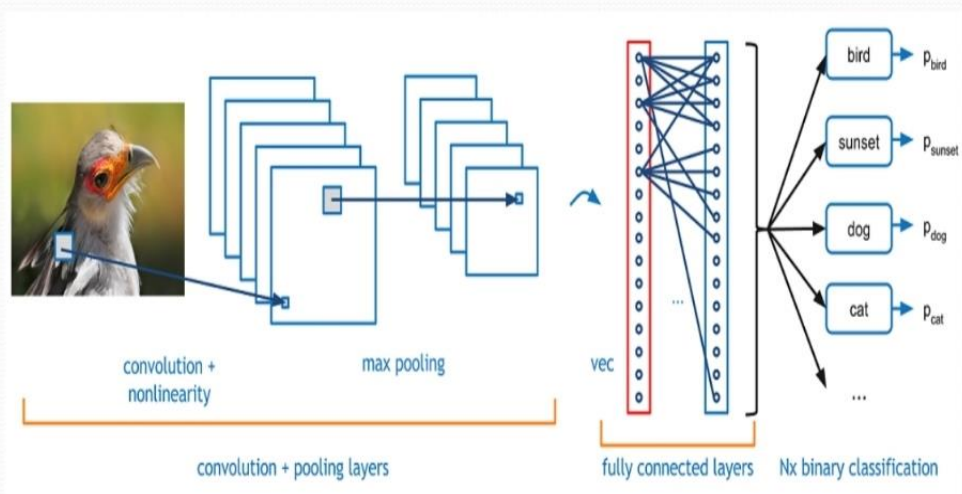
HARDWARE MODEL AND IMPLEMENTATION



Flowchart for Arduino



CNN architecture it can be used in image classification.



MAJOR SOFTWARE AND HARDWARE USED:

Major software and Hardware Used

Caffe



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SUMMARY:

Advantages & Purpose

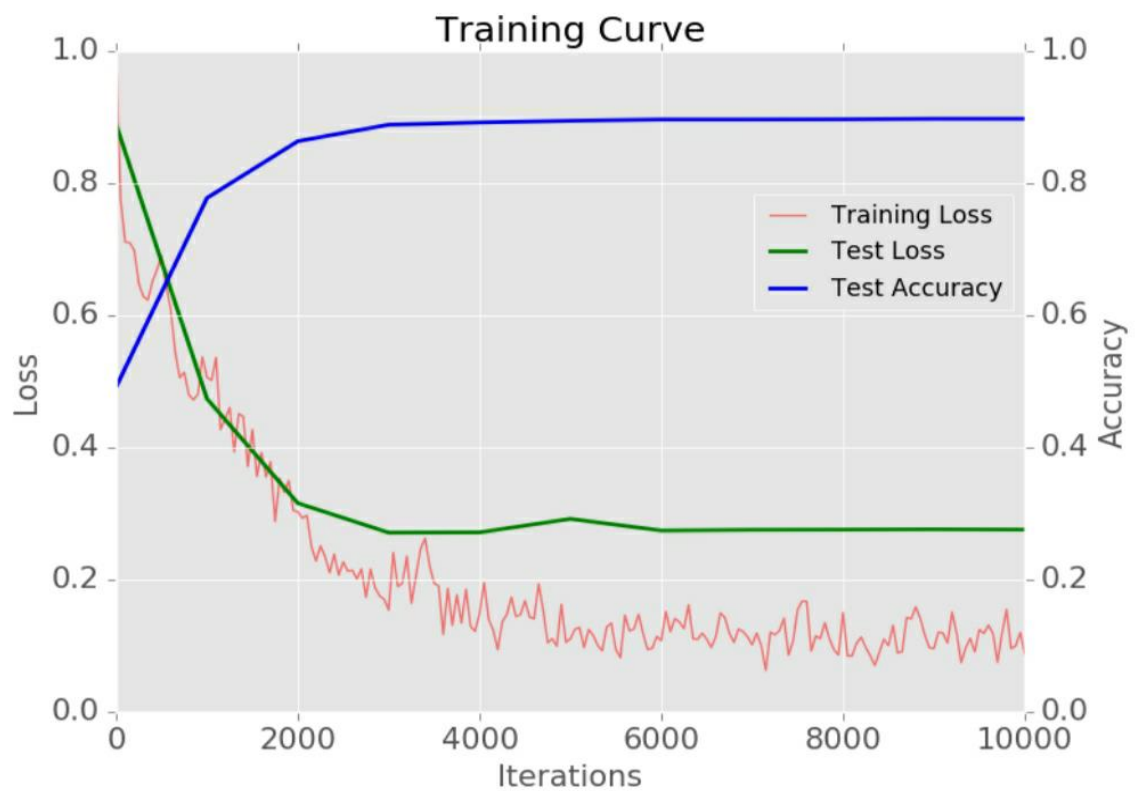
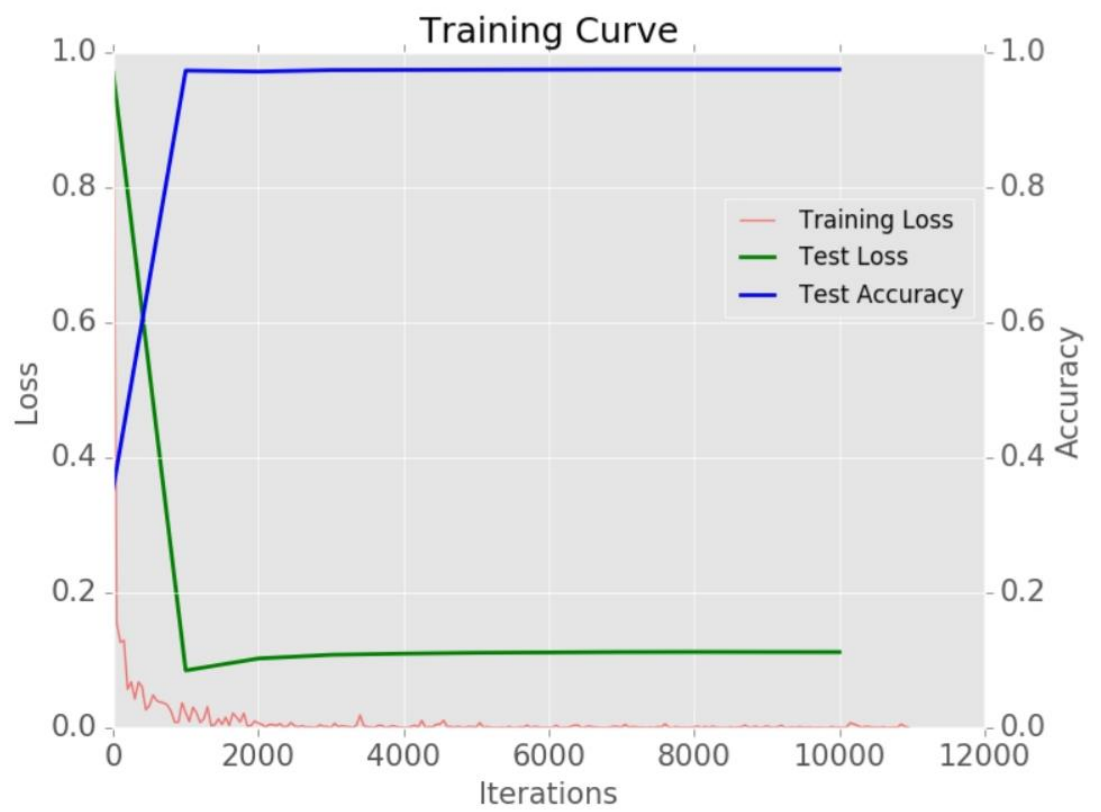
- It is environment friendly.
- The circuit is less complex.
- The working and synchronizing patterns are easy.
- It is easy to maintain.
- In any situation it is going to work throughout the day and night.
- Purpose is to save the birds, crop etc.

Hardware Specifications :

- Arduino UNO
- Computer
- Laser
- Servo motor
- Camera

Software Specifications :

- Arduino Compiler
- Programming Language: Python
- Caffe compiler



Scope of future work:

- We can generate laser lights which keeps away all the bird species.
- Object of the invention to provide engine guards that can be easily connected to existing aircraft engine housings.
- We can use it in solar source in future for energy source.
- This invention is directed to an aircraft engine guard, for protecting an aircraft engine against ingestion of large objects, the guard comprising: a generally cone-shaped body; a base section at a rear end of the guard body.

Limitations

- Range is limited.
- Laser lights may be disadvantageous for the persons but we are able to solve this.
- Responding time may take more than expectation. Technical maintenance should require.

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- https://en.wikipedia.org/wiki/Bird_scarer ➤ https://en.wikipedia.org/wiki/Bird_control_spike
- https://en.wikipedia.org/wiki/Electronic_pest_control
- http://www.amenix.cn/deter-birds-15433014298218881.html?gclid=CjwKCAjwxaXtBRBbEiwAPqPxcJY9ECUJLTyNYZbk8Pn2e_Jj0x-VvPa3rrwXcRRnCvY3_FO7GCArBoC8jIQAvD_BwE
- <https://bird-x.com/birdproducts/lasers#targetText=Bird%2DX%20laser%20bird%20deterrent,harmful%20poisons%20C%20traps%20or%20pesticides.>

