

Problem

Pigeons are a nuisance for people with balconies and open windows. They dirty the entire place with their feathers and droppings. Often the only solution for them is a pigeon net. Which however are very un-aesthetic. Nobody likes buying a gorgeous flat a putting bird net on the windows in major cities like Mumbai.

Existing solutions

- Bird nets.
- Bird repellents using sound frequencies between 1-4 kHz.
- Roosting spikes.
- Anti-bird strobe light

Solution Types

1. Detect the pigeon before it enters and prevent it from entering.
2. Detect the pigeon when it enters and then remove it.
3. Hanging dummy scarecrows / predatory birds.

What things are pigeons responsive to?

1. Sound frequencies between 1 - 4 kHz are unpleasant.
2. Water thrusts are unpleasant to them.
3. Predatory or abrupt sounds are alarming.
4. Vibrations can be alarming to them.
5. Reflective lights can cause temporary visual problems to them.
6. Pigeons can detect the Earth's electromagnetic field.

Before it enters

Detecting:

- Ultrasonic sensor.
- Motion detector.
- Artificial Intelligence using a camera.

Preventing:

- Temporary Barrier.
- Pop up human / hawk.
- Water thruster.
- Thud Sound.
- Hawk sound.
- Low frequency of sound.
- Light flash (can backfire).

When it enters

Detecting:

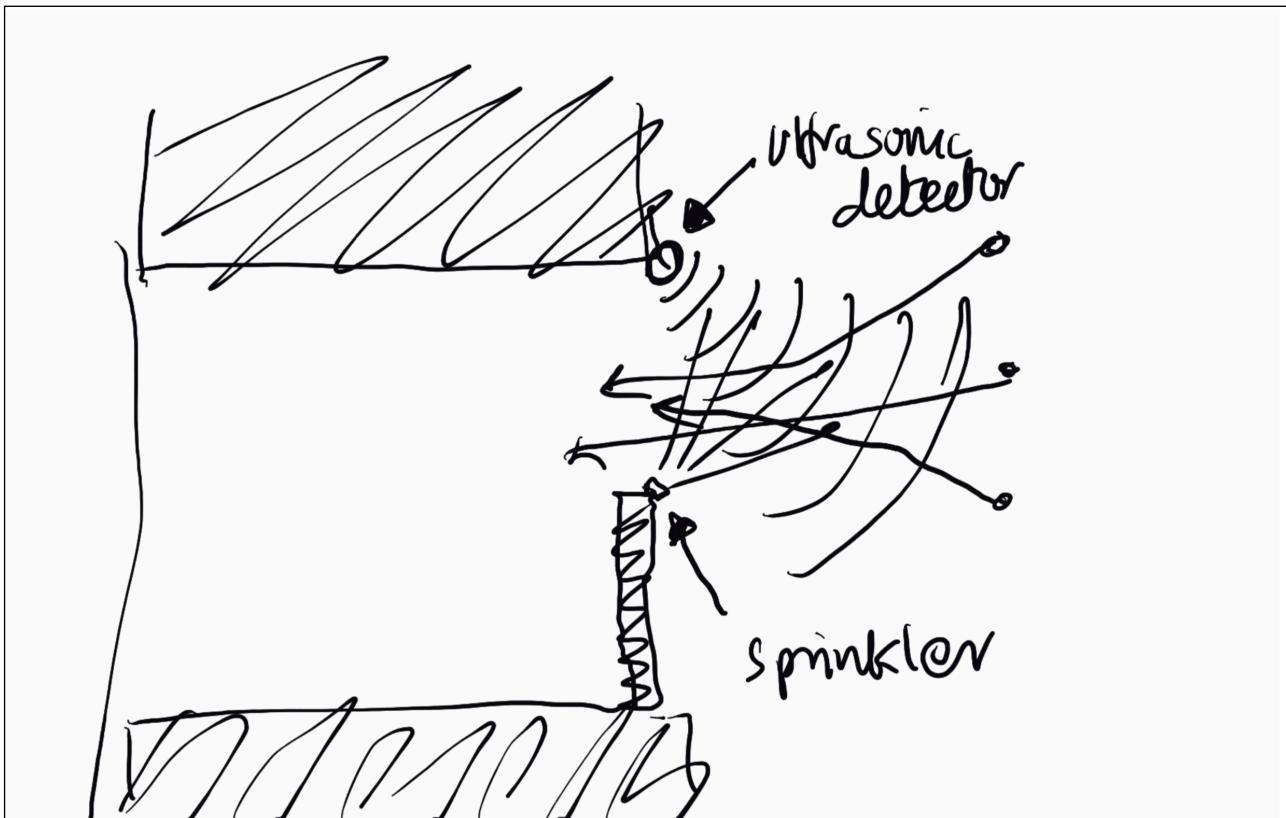
- Ultrasonic sensor.
- Motion detector.
- Artificial Intelligence using a camera.
- Weight sensors.
- Lasers.

Removing:

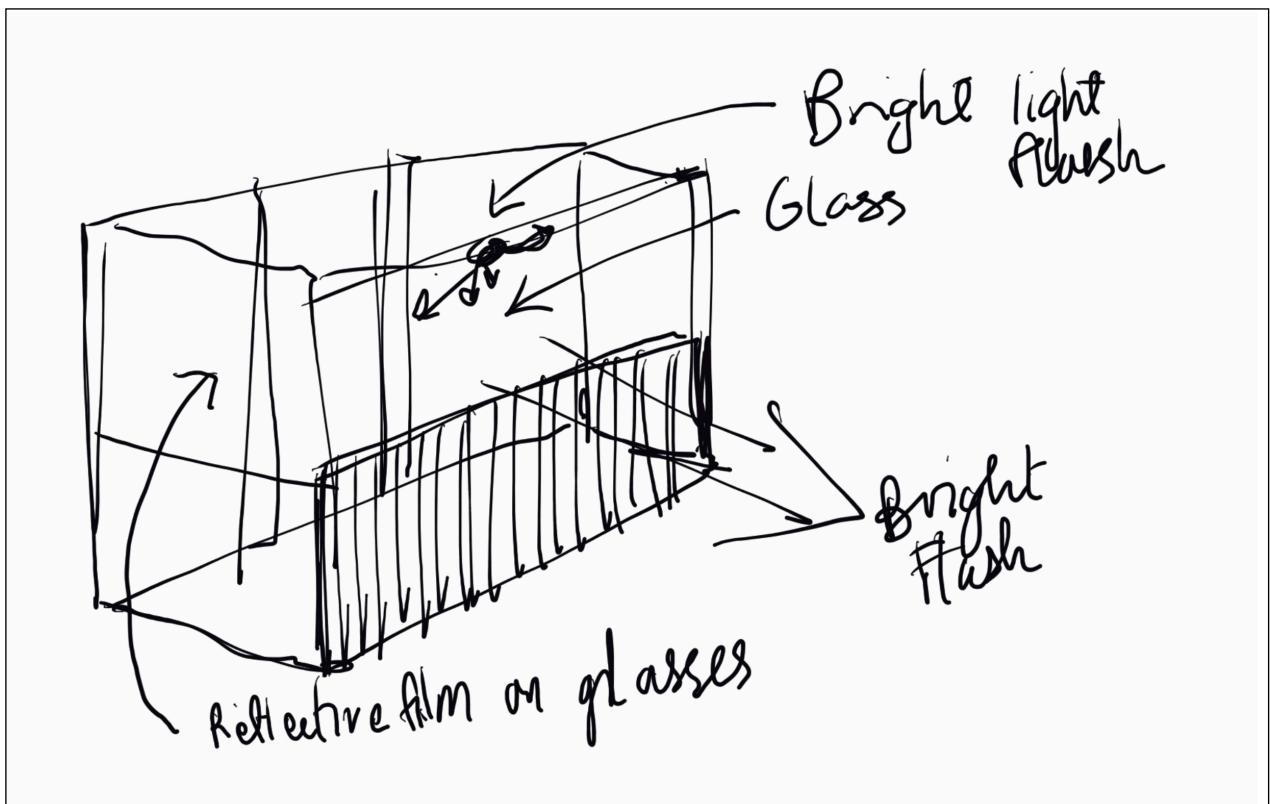
- Pop up human / hawk.

- Thud Sound.
- Hawk sound.
- Low frequency of sound.
- Vibrating the ground.

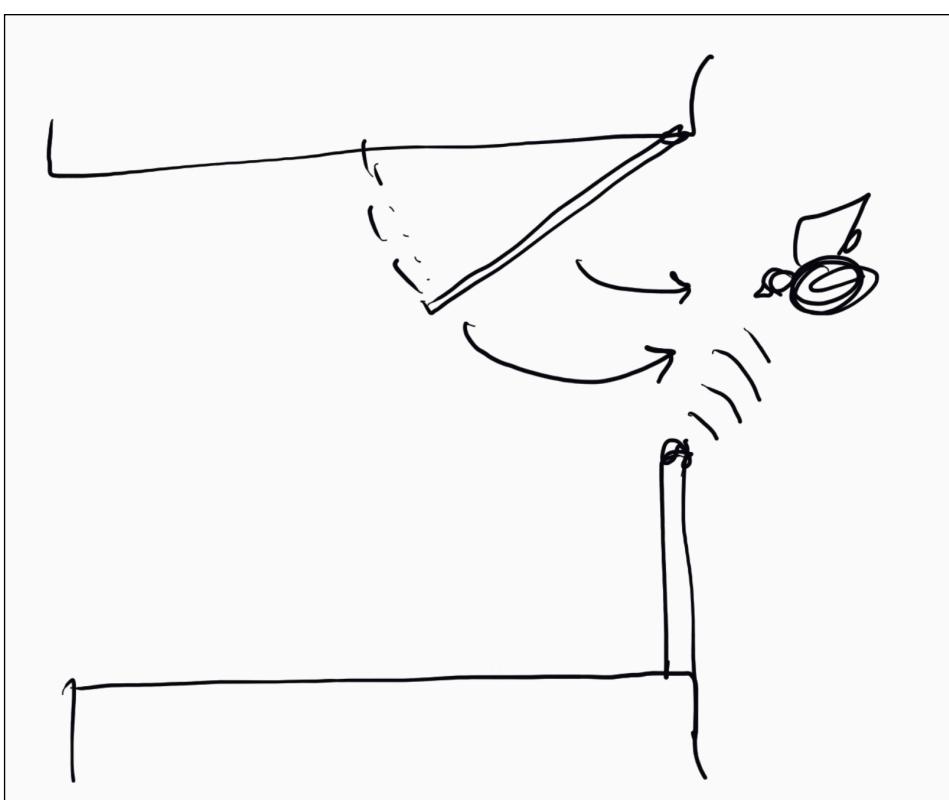
Few Sketches



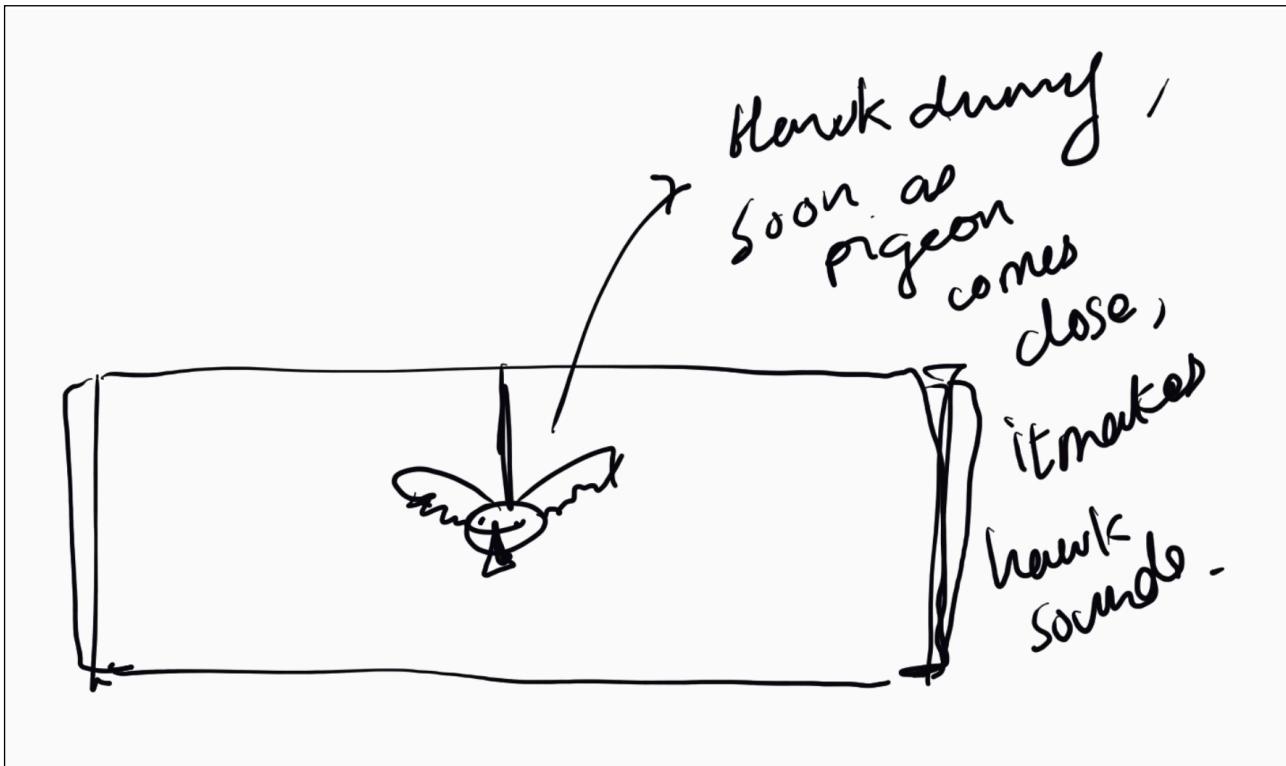
Detecting the pigeon before roosting or entry and preventing using water



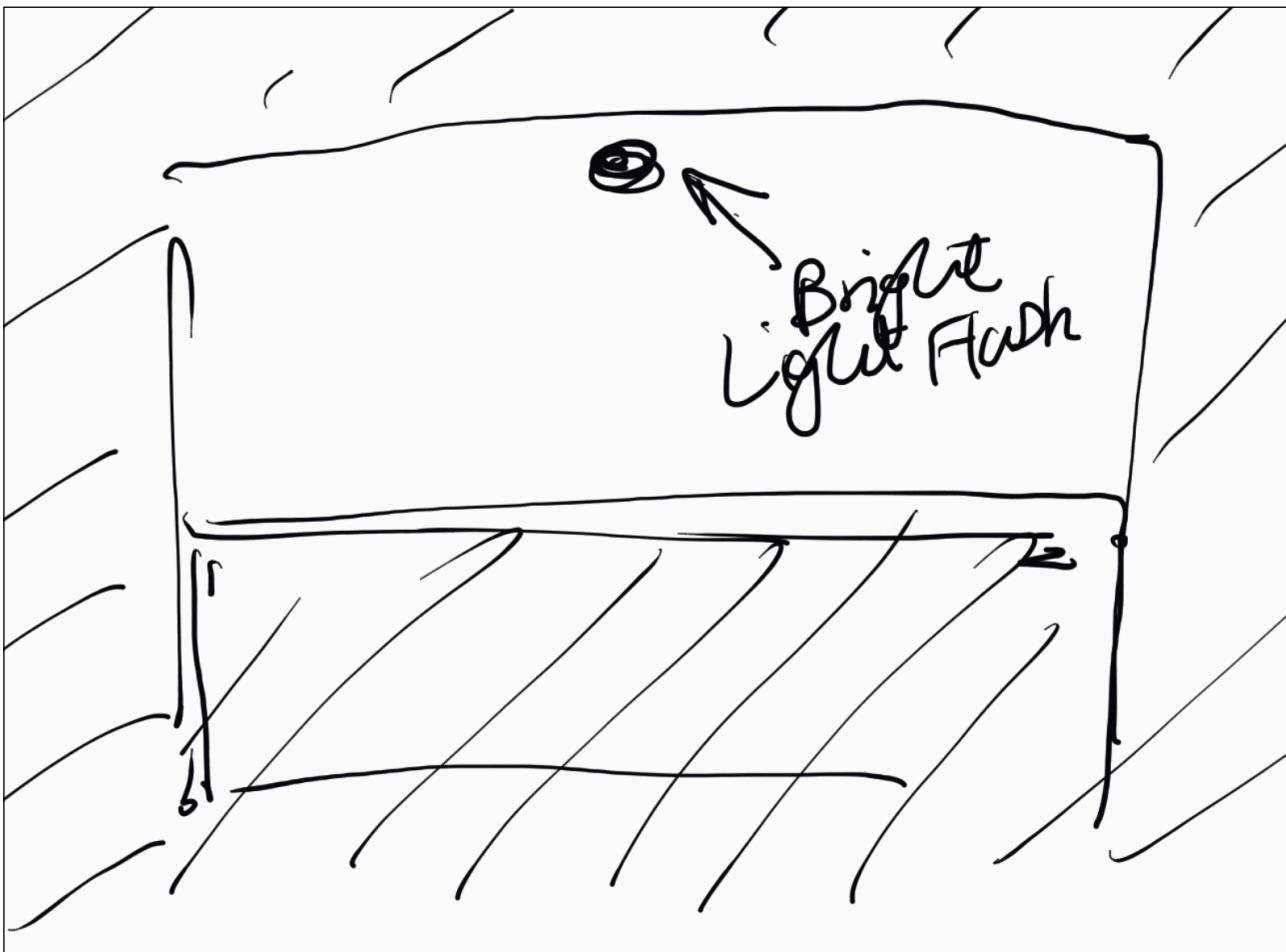
Using the window as a reflective surface to blind the pigeon before it enters



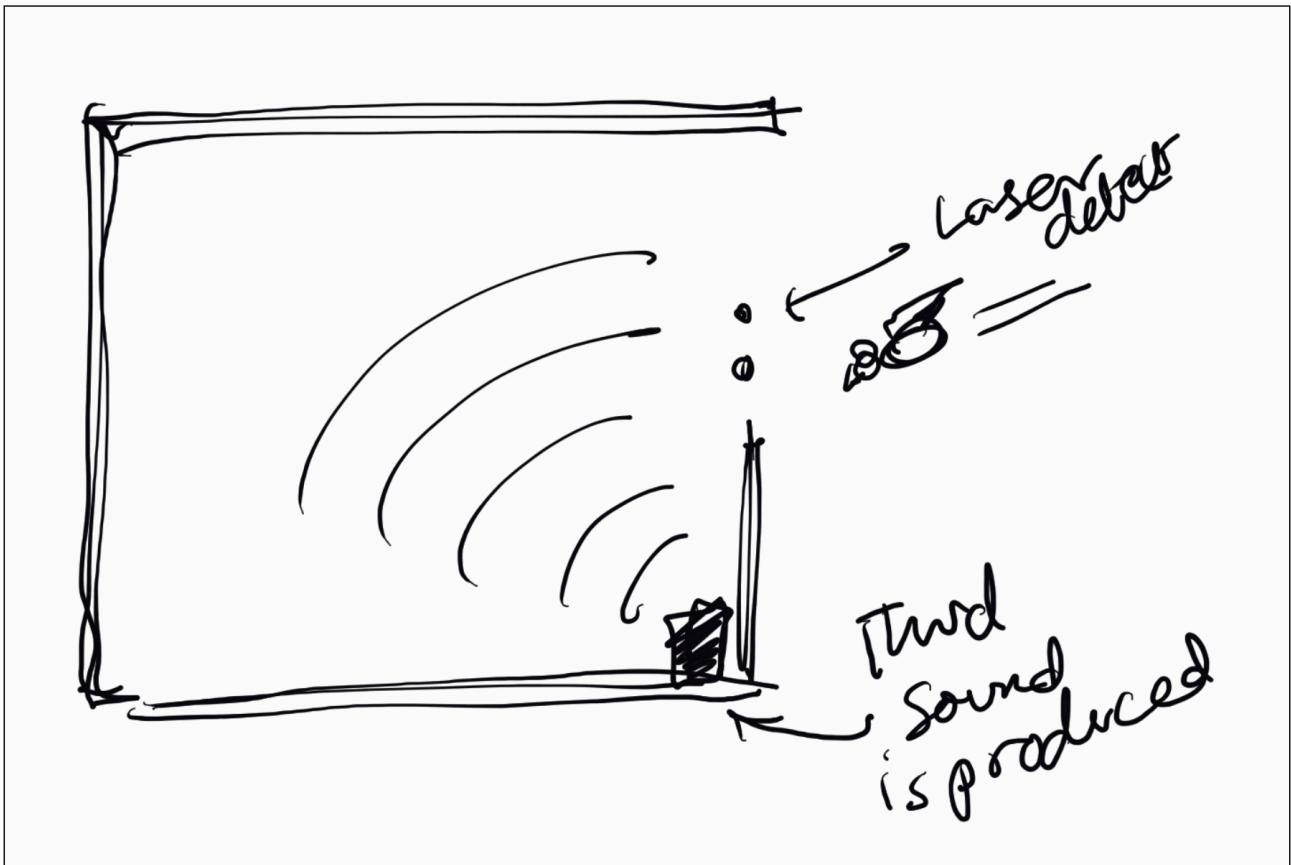
Detecting the pigeon before it enters and then deploying a barrier



Using a hawk dummy that acts as a scarecrow and makes a alarming sound for the pigeon



A temporary bright flash can disturb the pigeon's visual ability



Pigeon is detected and scared away using an abrupt sound

VERSION ONE:

Version one will detect pigeons using a PIR sensor and use a speaker to produce alarming or predatory sounds to scare the pigeon.

Experiment 1.0

To check whether the pigeon will be detected with the PIR sensor successfully, I setup an ESP8266 in my balcony that logged the time on an Adafruit feed when the PIR sensor returned a positive feedback.

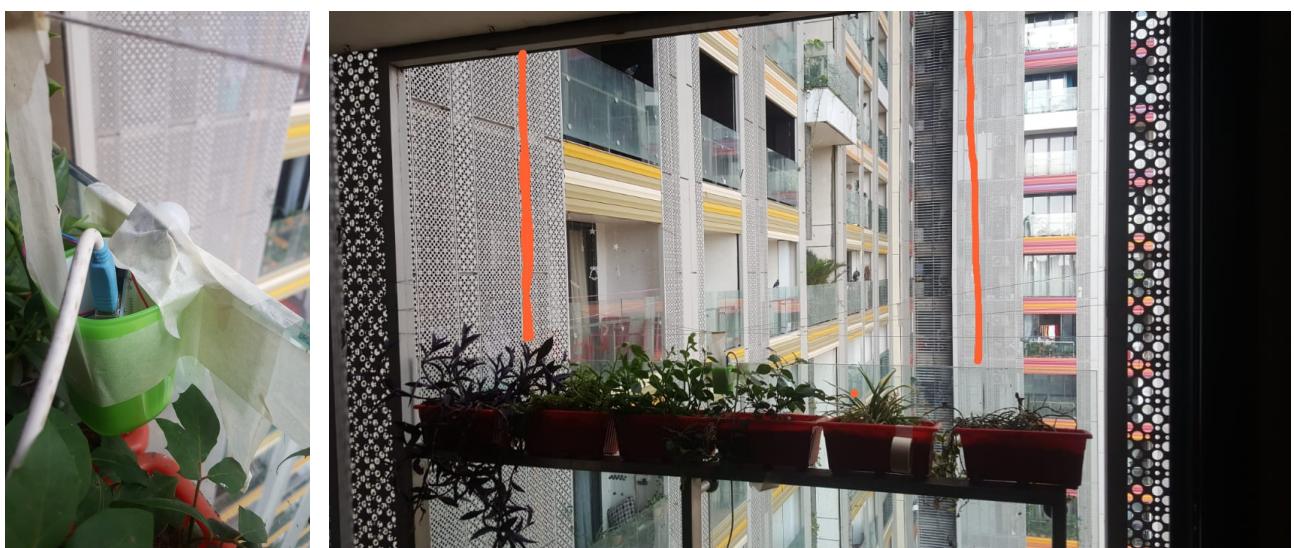


To verify whether the detection was only for a pigeon and not something else, a camera was put to record the entire balcony. After the experiment I cross checked the time logs and matched it to the video to see whether the detection was a false one or a true one.

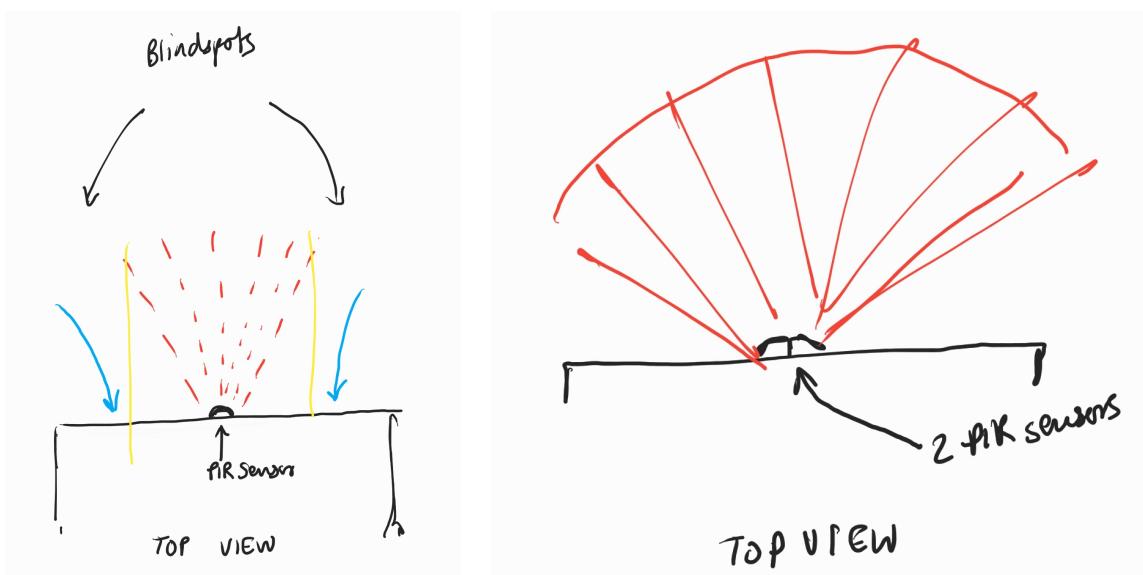
Unfortunately, the experiment was unsuccessful because multiple detections were logged every minute. And almost none of them were pigeon detections. This happened despite the PIR sensor being calibrated to minimum sensitivity and time delay. I suspect the jumper being faulty.

Experiment 2.0

This time I used an Arduino for the sake of simplicity, changed all the wires and also used a buzzer.



This experiment was super successful and had zero false detections, the buzzer only buzzed when I put my hand in front of the sensor or a pigeon came. However the only issue I learnt was that the PIR sensor would be able to detect a bird if it came from the range between the red lines drawn.



As drawn in the diagram above, if the pigeon enters far enough to the side that it doesn't cut the 3m long virtual cone space created by the PIR sensor, it will not be detected. This blindspot hasn't been a problem yet because pigeons usually enter through the centre. But if they do figure out the blindspot, it will become a problem. To cover the blindspot, two possible solutions are there: use two sensors and get a wider area of detection with more accuracy as shown in the diagram above; or use different fresnel lenses. Option 2 is definitely more cost effective and easier. But it's doubtful how much of the blindspot will it be able cover.

Experiment 3.0

Using a laser cutter, a small box was made from 3.5mm MDF wood. Inside the box was a simple circuit with a Arduino Nano, buzzer and PIR sensor. The box was placed on the pillar of a window facing outwards to detect for incoming pigeons. However, this experiment wasn't successful because it detected cars from the nearby street even after being on the minimum sensitivity setting.



Experiment 3.3

Using the same prototype from the last experiment documented (E.3.0), the device was placed on the balcony railing as shown below.



Since the sensor was still detecting the movement from nearby leaves on branches. I put a small piece of plastic (the double sided tape's removable covering) between the sensor and the frenzel lens. This however reduced the accuracy of detecting an object in its proximity but it also prevented any false positives. Since this particular area didn't have the pigeon problem, we just simply threw a beanie back and forth to simulate the pigeon behaviour (E.3.3_video.mp4).