DRONE APPLICATION

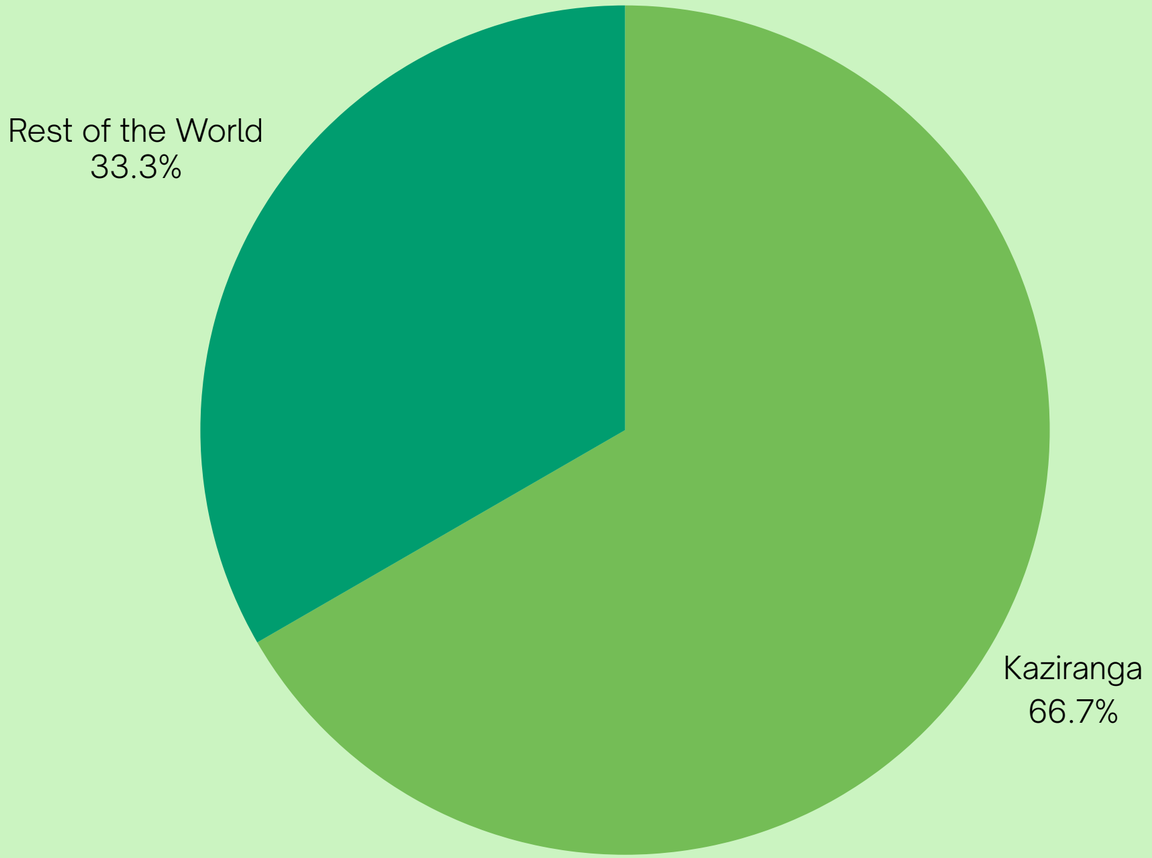
Medication and Multipurpose Drone for Wildlife Conservation

HET PATEL
20BEC1165
REVIEW-2
CONTROL SYSTEMS

Rhinos in Kaziranga

The park is home to two- thirds of the the great one-horned rhino.

Among the 2413 rhinos in Kaziranga, around 800 are male, 942 female, and the rest unsexed.



What inspired us to solve this problem?

Threat to Rhinos

Despite several measures taken by the government to stop poaching, Rhinos still fall prey to poachers to this day.

Floods in the state is the main concern for the population of rhinos trapping them without food for long periods and also pushing them to areas prone to poaching.

DRONE PROPOSITION

Medical Surveillance

Surveillance of the National Park using the drone will allow Park officials to track down injured Rhinos and send help to their location.

In case an injured rhino is located during surveillance, the drone is capable of perching on a tree branch using its claw like mechanism and continue to provide surveillance of the animal.

Security

Continuous drone surveillance over the park area will help reduce poaching efforts in the National Park.

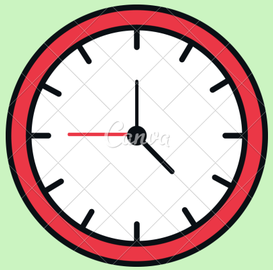
This will also allow park officials to keep tabs on progress of the Rhino population.

Safari Assistance

The drone can provide live feed of several animals, including rhinos to the visitors of the park.

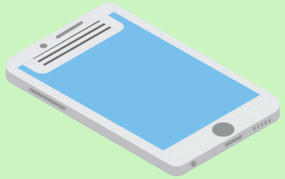
The drone will also help park rangers and tour guides locate any rhino group, so that the Safari groups can be taken those locations for sight seeing.

Features

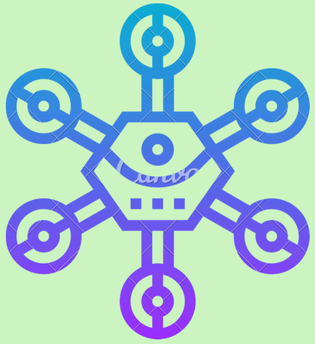


Endurance of 40 Mins

Covers a total area of 500 Hectare

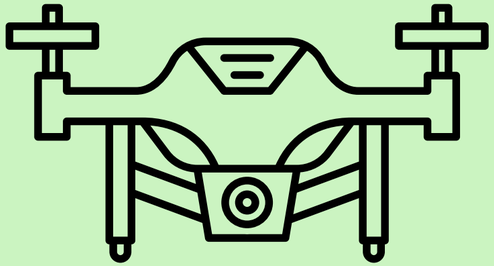


Mobile Application with live streaming



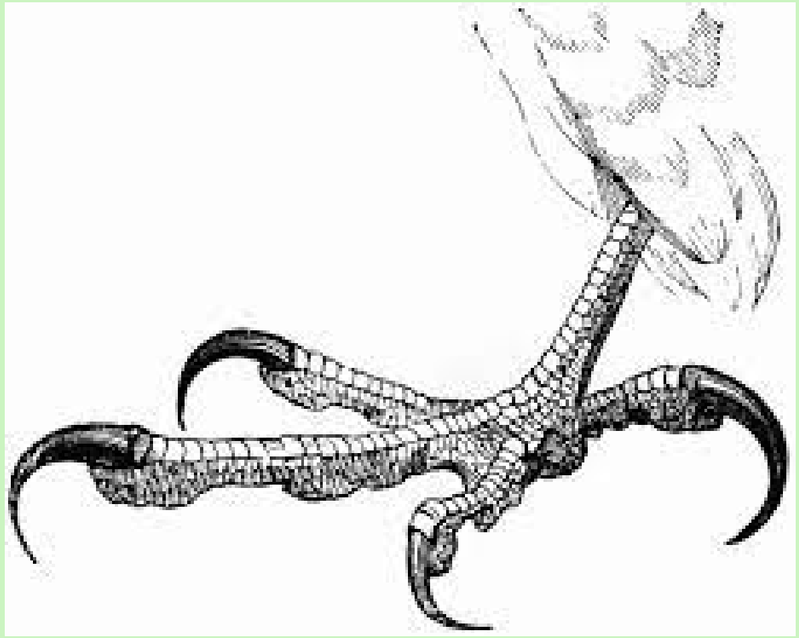
Obstacle Avoidance using bat-like sonar

Falcon-like gripping mechanism

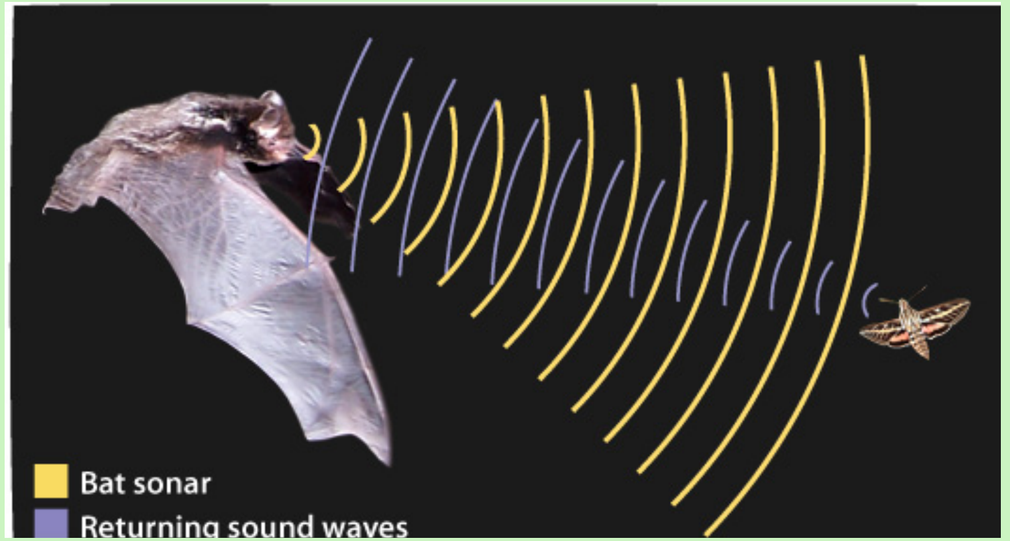


Surveillance and Medication

Biomimicry features



Falcon-Like Claws
Gripping mechanism



Bat-like Sonar

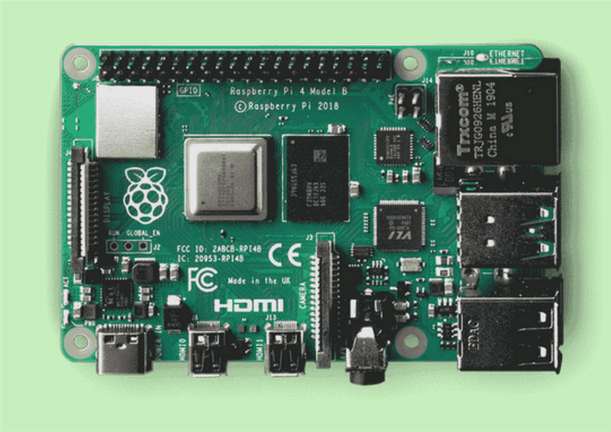
Components

FLIGHT CONTROLLER

Pixhawk flight controller (FC) is used which has the job to control each component of the drone in response to input.

ON BOARD COMPUTER

Raspberry pi with the RAM of 4GB is used to operate various functions and commands to run our drone



CAMERA

The camera is mounted onto a drone to send real-time video down to the ground using a video transmitter

Components

MOTOR

TITAN T5010 300KV BLDC Motor has been selected for this drone to provide enough thrust

ESC

ESC (Electronic Speed Controller) of 30A is taken to manage the enough current in the drone.

PPROPELLER

The propeller of 18 inches with the pitch of 6.5 is used in the drone to make it compatible with the datasheet of the motor

COST, WEIGHT & FEASIBILITY OF PRODUCTION

Serial.No.	Weight Parameters	Quantity	Weight (gm)	Price (Inr)
1	Body	-	1900	5000
2	Payload	-	400	0
3	Battery (TATTU 30,000mAh 6S 25C)	x1	3370	28241
4	Motor (Titan 5010 300 KV)	x6	990	38507
5	ESC (30A)	x6	600	10914
6	Pixhawk + Buzzer + Arming Switch	x1 (each)	54	9099
7	Raspberry 4B+	x1	52	5500
8	Camera	x1	5.5	999
9	GPS (Ublox Neo M8N)	x1	23	1849
11	UBEC (HENGE 8A)	x1	14	1249
12	VTX (AKK VTX with range 10Km)	x1	23	3407
13	Propeller (18 inches - 18*6)	x6	56	6549
14	Antenna (5.8Ghz 150MM FPV Albtross)	x1	10	669
15	Servo	x2	150	600
16	Gripper (Claw Mechanism)	x2	600	2000
17	Ultrasonic sensor - HCSR-04	x6	53.1	330
18	FS-iA6 2.4G 6CH AFHDS Receiver	x1	6.4	1281
19	Misc	-	100	250
		Total	8407	116444.22

Endurance and Distance Calculation

Total Weight of hexacopter = 8407 gm

Considering Thrust to Weight Ratio = 1.2 : 1

∴ Total Thrust Required = 10088.4

Number of Motors = 6

⇨ Thrust required per motor = 1681.4 gm

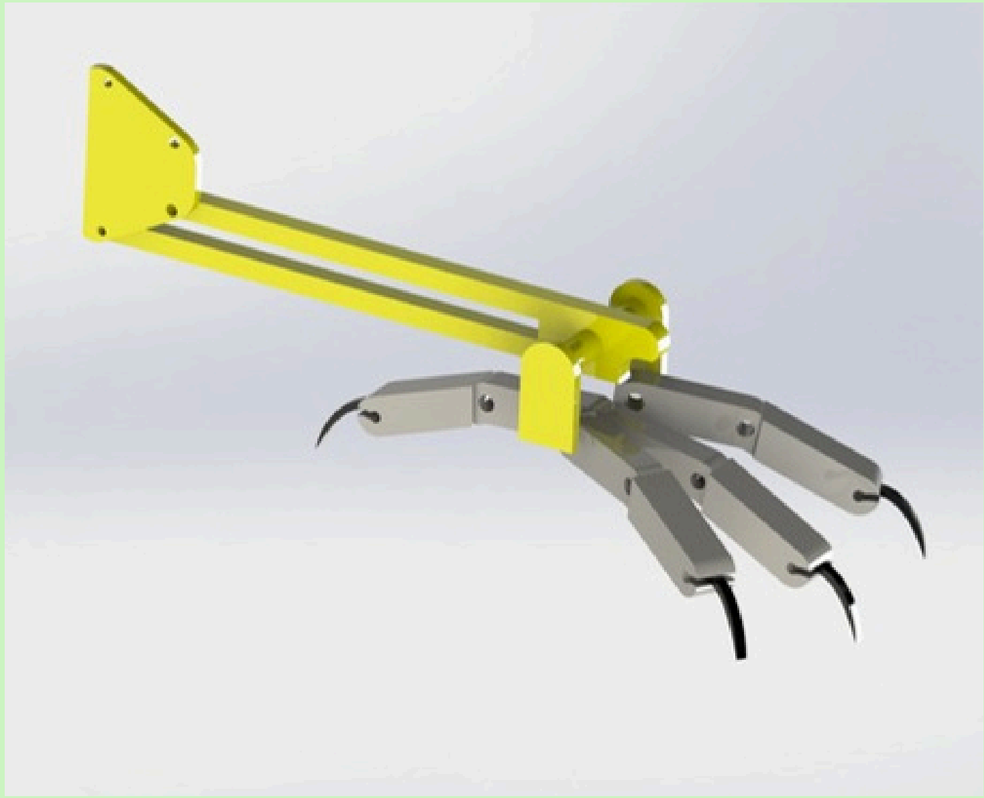
According to the datasheet of motor Titan T5010, current required = 7.4 A

⇨ Total Current consume by the hexacopter = 44.4 A

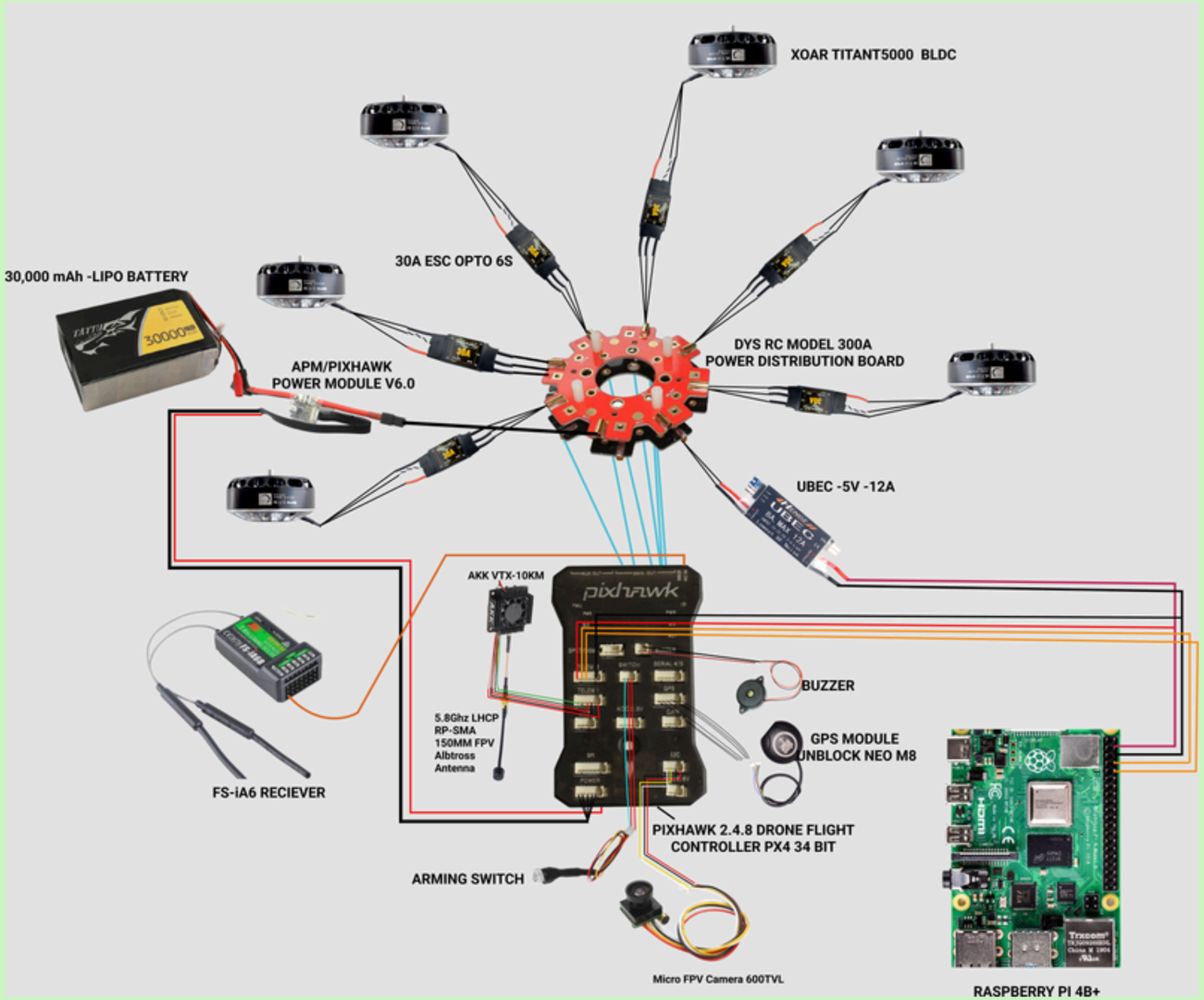
Capacity of the Battery taken = 30000 maH (6S)

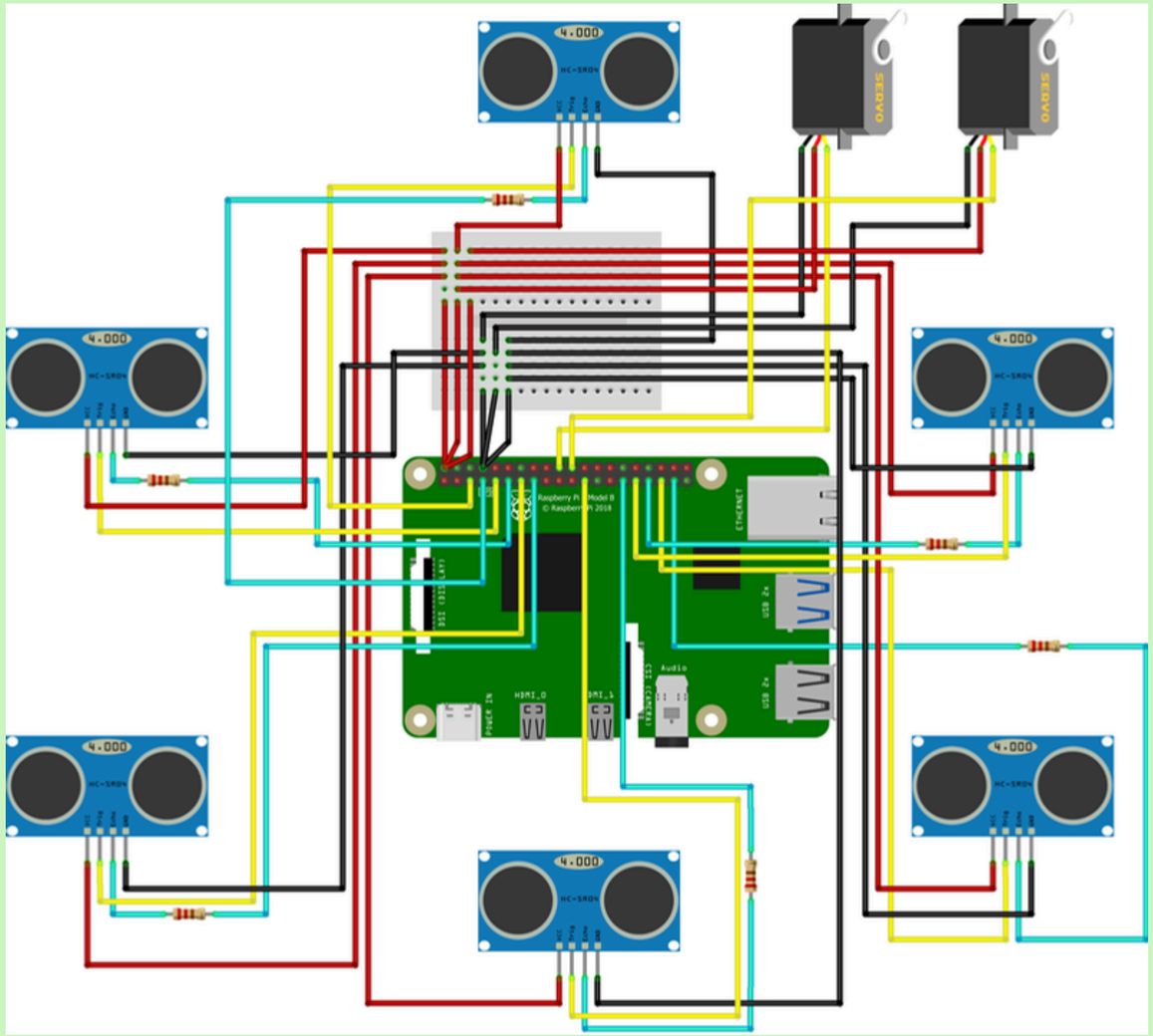
$$\therefore \text{Time of Flight} = \frac{\text{Capacity} * 60}{1000 * \text{Current}} = \frac{30000 * 60}{1000 * 44.4} = 40.54 \text{ mins}$$

CAD DESIGNS



CIRCUIT DIAGRAMS





MISSION PLANNING

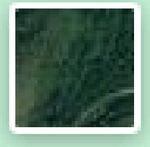
Kaziranga National Park

Assam, India

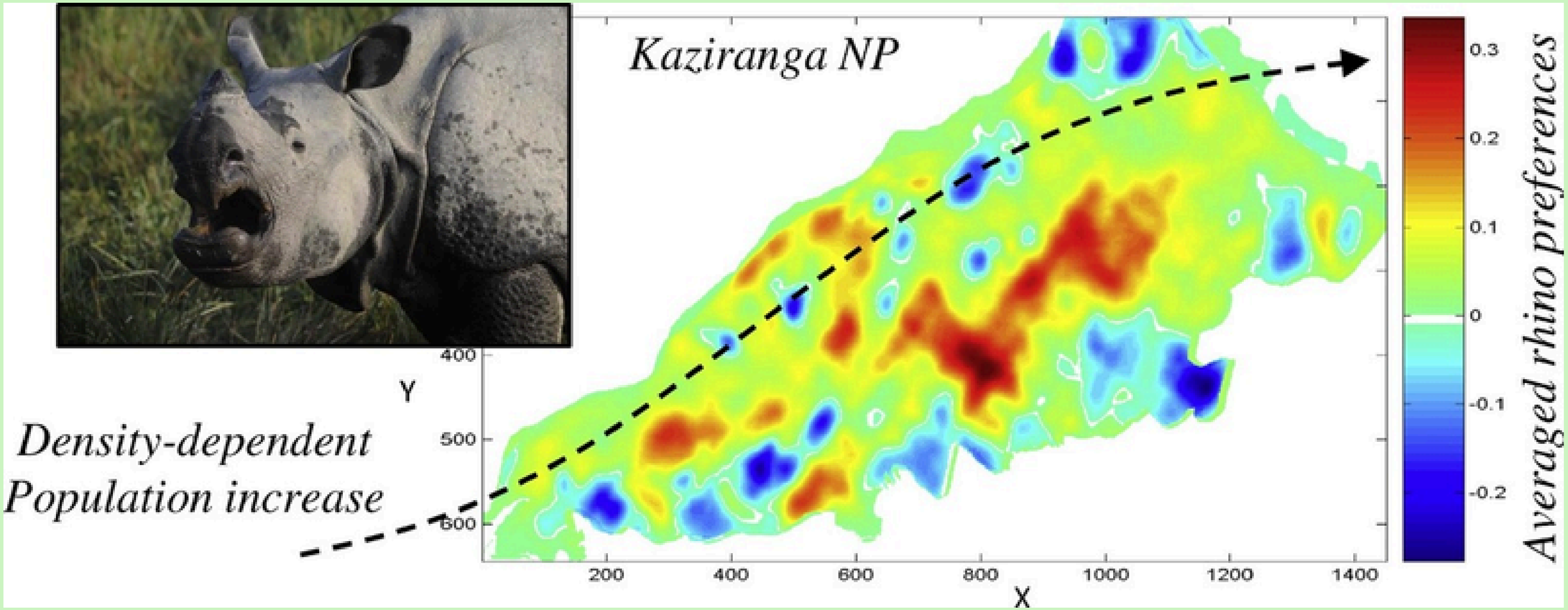
Directions

4.5 ★★★★½ 8,817 reviews

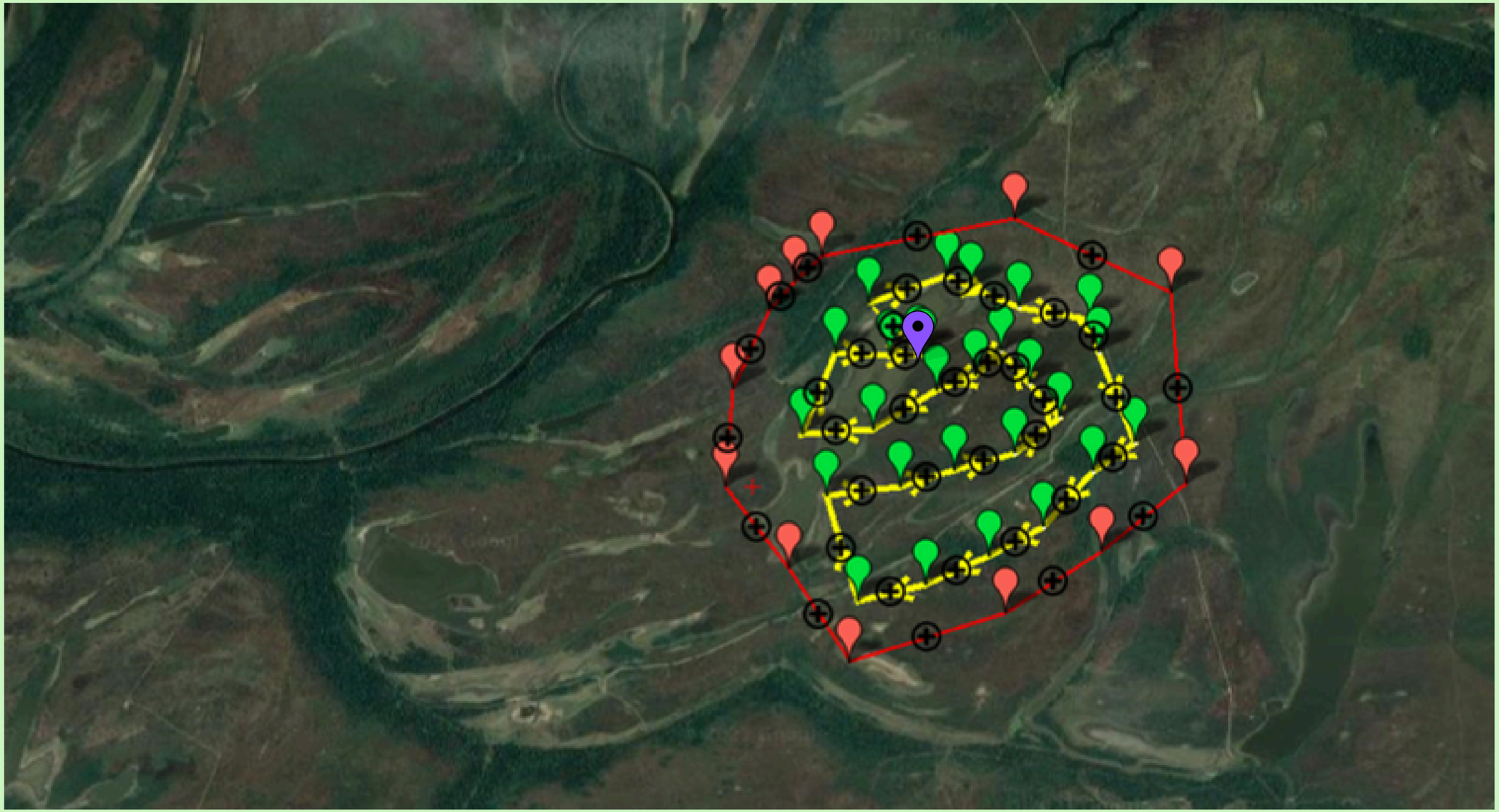
View larger map



POPULATION DENSITY STATISTICS



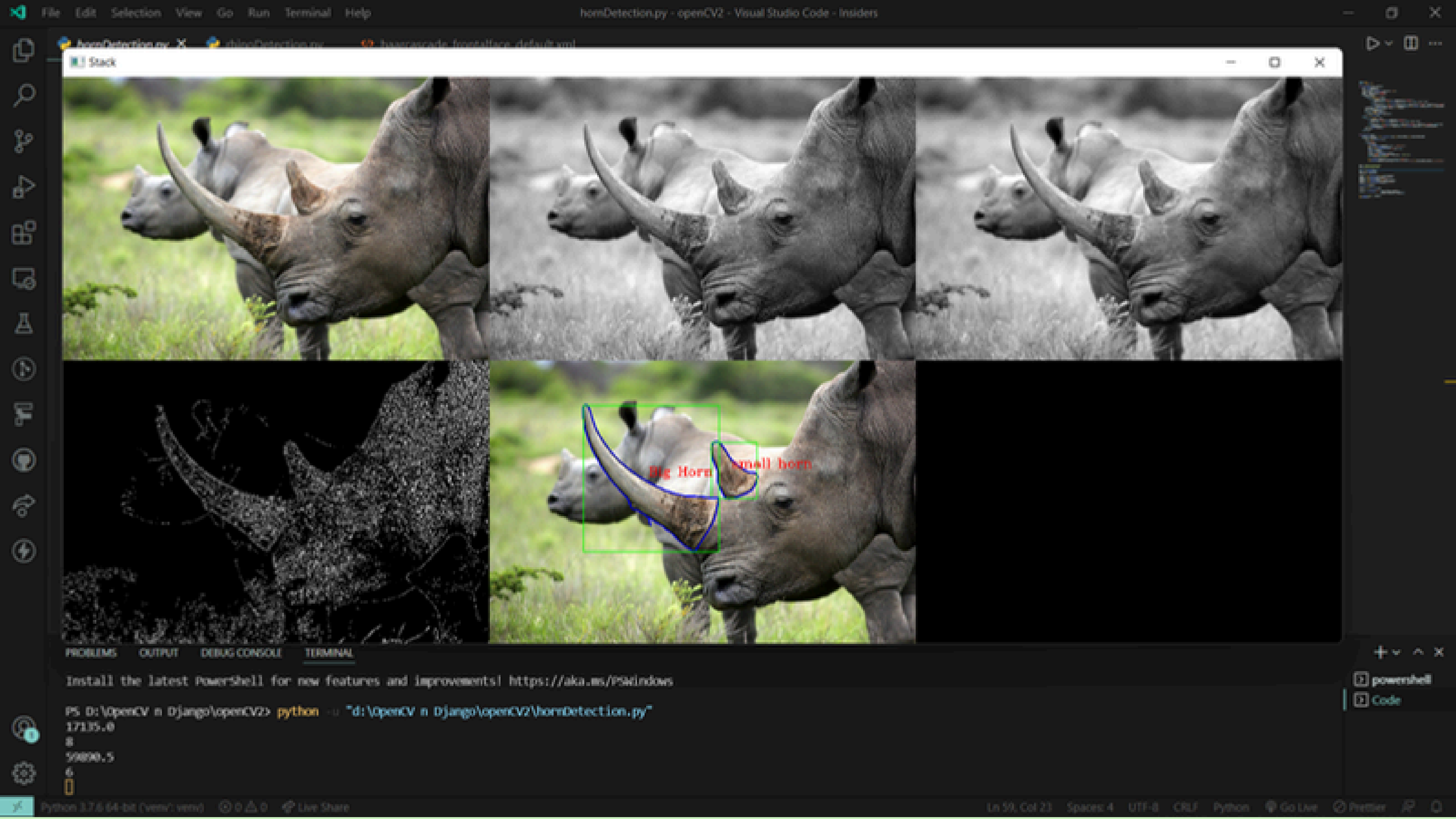
Drone path and area covered

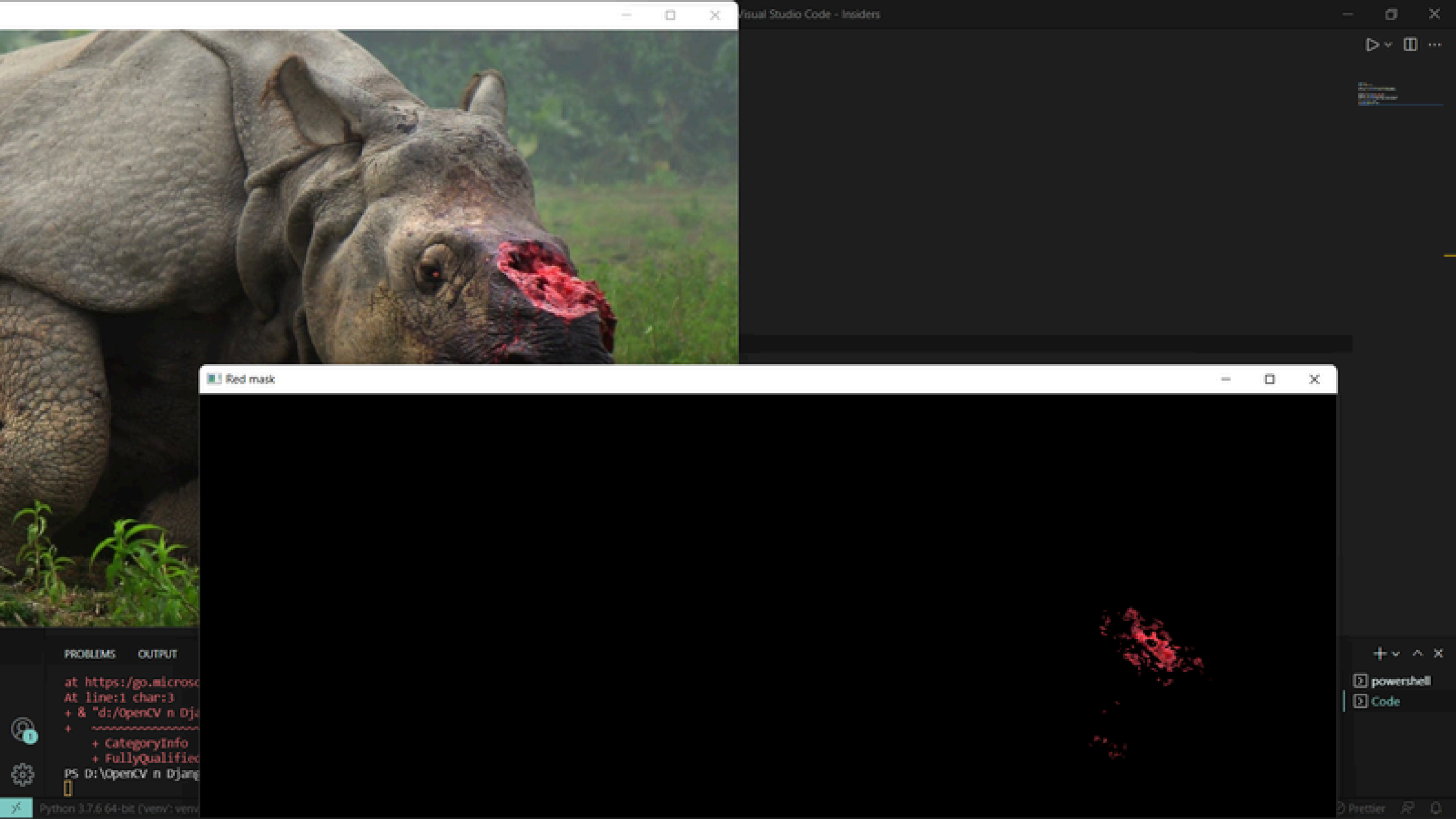



(droneenv) S:\Avionics\drone programming>pyth
on drone.py --connect tcp:127.0.0.1:5762
Vehicle is now armable
Waitig for drone to enter GUIDED fligt mode
DATA
PLAN
SETUP
CONFIG
SIMULATION
HELP
ARDUPILOT
TCP
111100
Stats...
TCP5760-1-HEXAROT(
DISCONNECT
DISARMED
0kph
0 m
Guided
Quick
Actions
Messages
FlyFlight
Gauges
Transponder
Altitude (m)
GroundSpeed (kph)
-0.03
0.09
Dist to WP (m)
Yaw (deg)
0.00
1.27
Vertical Speed (kph)
DistToMAV
0.00
0.01
hdop: 1.2
Sats: 10
GPS Track (Black)
26.6345507 93.3574600 -0.03m
Tuning
Auto Pan
Zoom
16.0
DRONEVITZ

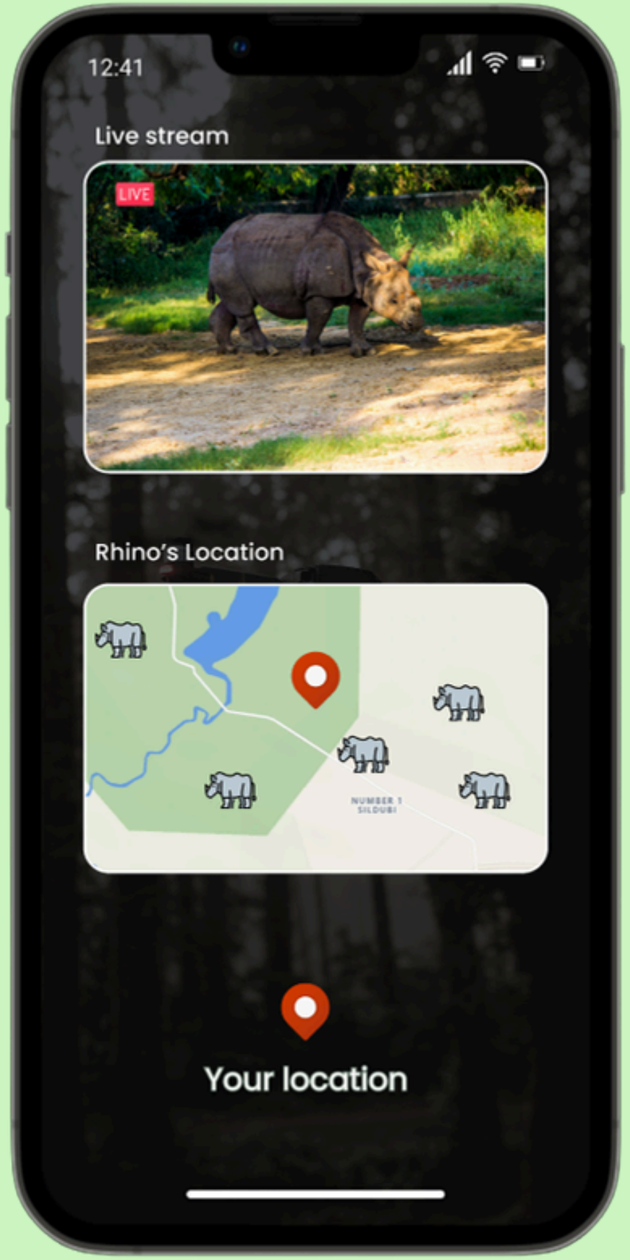
yolo_object_detection.py

```python
import cv2
import numpy as np
import glob
import random


# Load Yolo
net = cv2.dnn.readNet("yolov3_training_last.weights", "yolov3_testing.cfg")

# Name custom object
classes = ["Rhino"]

# Images path
images_path = glob.glob(r"E:\Rhino Images\*.jpg")
# images_path = glob.glob("Resources/4.jpg")



layer_names = net.getLayerNames()
outputlayers = [layer_names[i-1] for i in net.getUnconnectedOutLayers()]
colors = np.random.uniform(0, 255, size=(len(classes), 3))

# Insert here the path of your images
random.shuffle(images_path)
# Loop through all the images
for img_path in images_path:
    # Loading image
    img = cv2.imread(img_path)
    img = cv2.resize(img, None, fx=0.4, fy=0.4)
    height, width, channels = img.shape

    # Detecting objects
    blob = cv2.dnn.blobFromImage(img, 0.00392, (416, 416), (0, 0, 0), True, crop=False)

    net.setInput(blob)
    outs = net.forward(outputlayers)

    # Showing informations on the screen
    class_ids = []
    confidences = []
```


Stack
Big Horn
small horn
PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
Install the latest PowerShell for new features and improvements! https://aka.ms/PSWindows
PS D:\OpenCV n Django\openCV2> python "d:\OpenCV n Django\openCV2\hornDetection.py"
17135.0
8
59800.5
6
powershell
Code


Visual Studio Code - Insiders
Red mask
PROBLEMS
OUTPUT
at https:/go.microsc
At line:1 char:3
+ & "d:/OpenCV n Dja
+ ~~~~~~~~~~~~~~~~~
+ CategoryInfo
+ FullyQualifiec
PS D:\OpenCV n Djang
powershell
Code
Python 3.7.6 64-bit ('venv': venv
Prettier

This is how the mobile application will look !



EXISTING PRODUCT AND ITS SHORTCOMINGS

- Only surveillance of animals in national parks
- Medication purposes in national parks

HOW THIS DRONE PROPOSITION CAN TACKLE THOSE SHORTCOMINGS

- Covers all aspects ranging from medication to surveillance to providing live stream to tourists and visitors to the park.

- No rhino surveillance drones exist so far.

FUTURE SCOPE

- Uses can be extended to other wildlife sanctuaries housing other animals as well
- Increased endurance, better battery - to expanding the boundaries, not only to wildlife sanctuaries but forests too.
- SLAM algorithms, LIDARs can greatly improve path planning .


Thank you!