

# FAZZA

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SDAIA Data science and artificial intelligence Bootcamp Capstone Project  
**AI aerial Based Car Accident Detection Drone**

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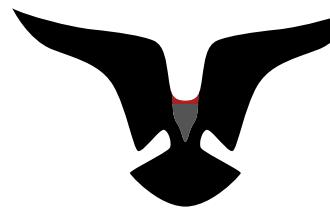
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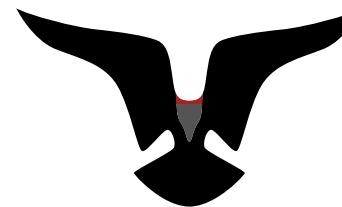


# Introduction

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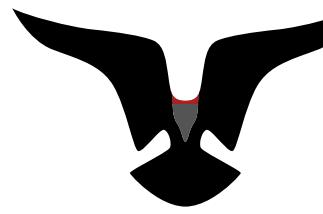
- Fazza project utilizes AI and drones for traffic accident analysis.
- Drones with advanced sensors capture high-resolution footage and data.
- Aims to revolutionize accident analysis using AI and drone technology.





# Planing

- The presentation and demo continued to be worked on throughout this period



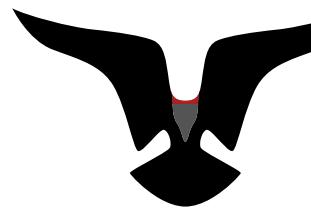
# Problem Statement

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- Highway accidents causing traffic congestion, delays, and safety risks.
  - Current methods suffer from delayed detection, impacting emergency response and worsening traffic issues.

## Solutions

- Design and implement an advanced accident detection drone system.
- Drones autonomously patrol highways for swift accident detection.
- Enables rapid response, minimizes traffic congestion, and enhances highway safety.





# Saudi 2030 Vision

## Diversifying the Economy

The plan aims to reduce Saudi Arabia's dependence on oil revenue by diversifying the economy into other sectors.

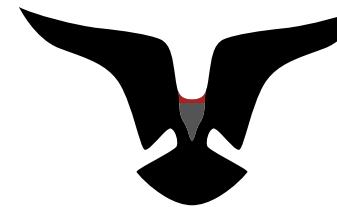
## Sustainable Development

Fuel consumption and carbon emissions.

## Preserving the Environment

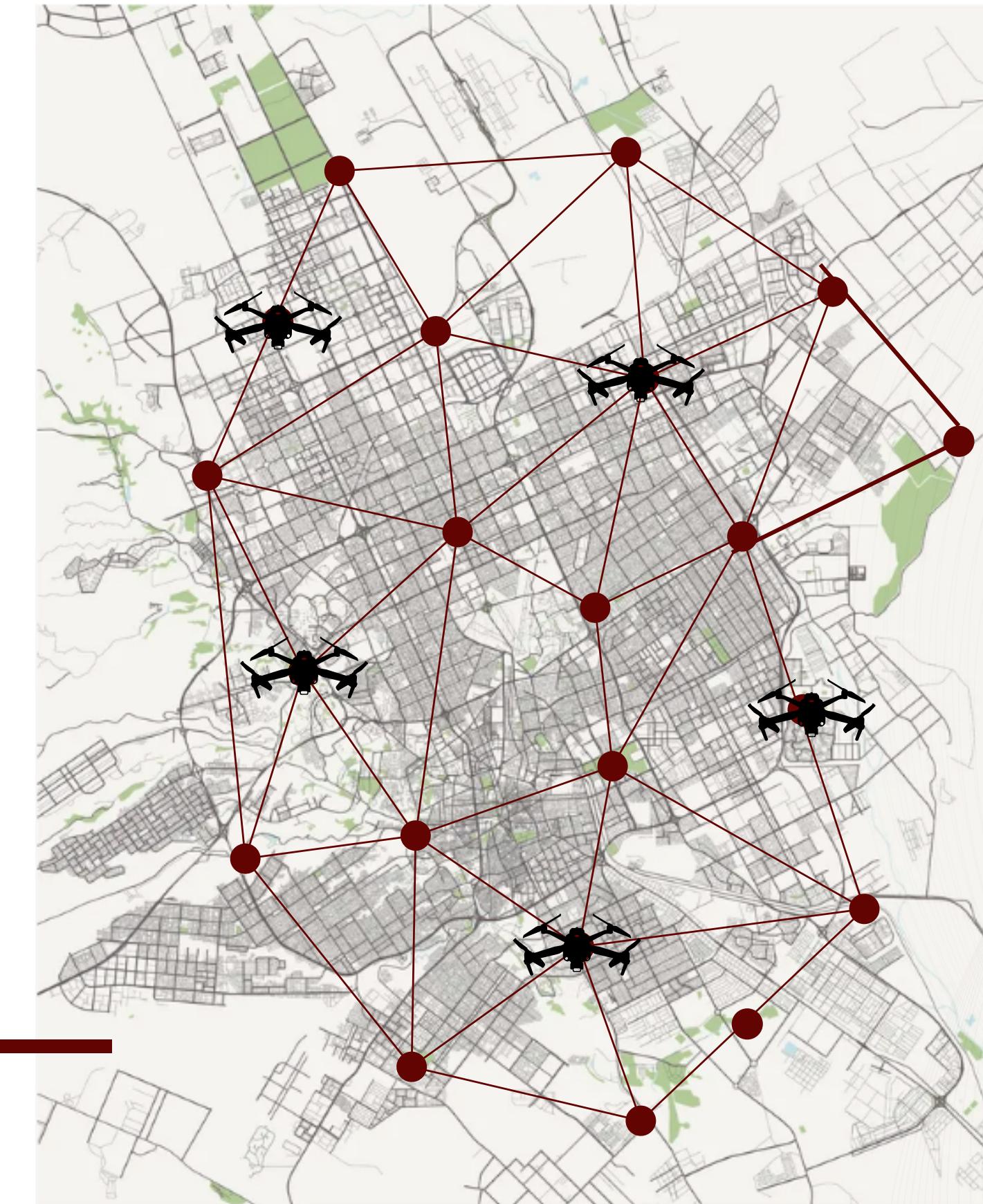
Saudi Vision 2030 recognizes the importance of environmental sustainability and aims to protect the environment and natural resources.

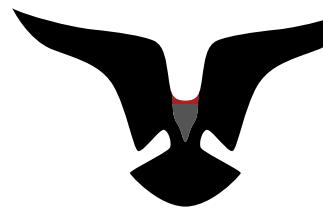




# Fazza's Network

If Fazza is implemented in the future, it will be roughly like this: 30 drones will be distributed in Riyadh, along with a single control center that will manage all the drones. These drones will cover incidents in Riyadh.





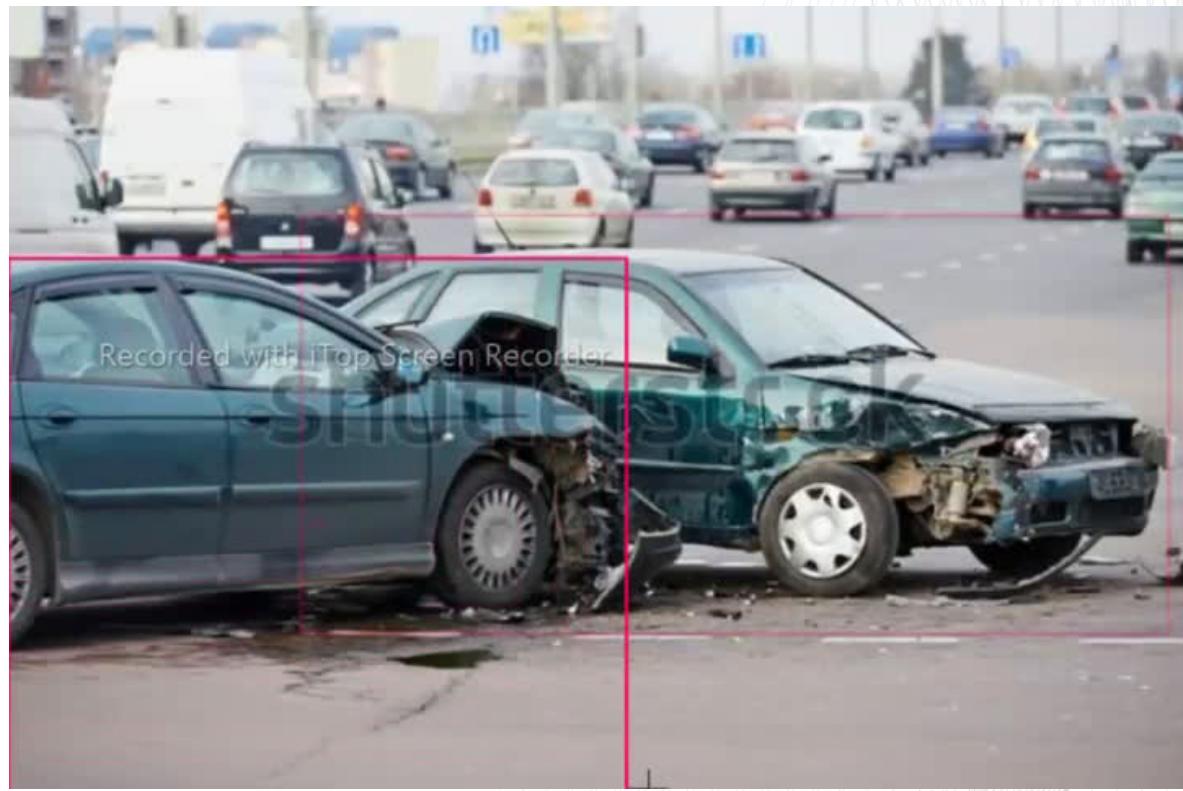
# Dataset&Challenges

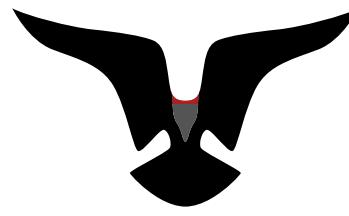
## Dataset

- kaggle dataset for accident detection in smart cities | 13,228 total images(6,614 images for accidents and 6,614 images for non-accidents).
- Collected and labeling car accident fault estimation dataset 150 image with classes(100%,75%,50%,25%,0%).

## Challenges

- Insufficient Data
- Lack of Domain-specific Data
- Handling large size of image dataset.





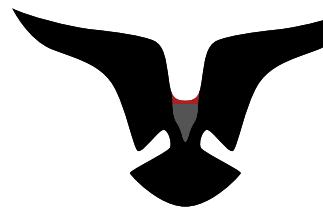
# Dataset&Challenges

**Accident**



**Non-Accident**





# Model & Challenges

## CNN Model

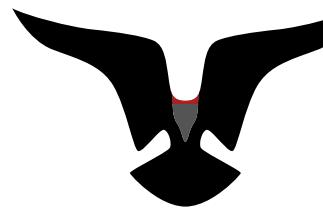
- We opted to utilize a vgg16-CNN model from scratch to detection traffic accidents on the highway, given its proven effectiveness in handling visual data and its ability to capture complex patterns and features.

Accuracy: 0.980392

## Model Challenges

- Preprocessing Issues.
- Training Time (14 hours).

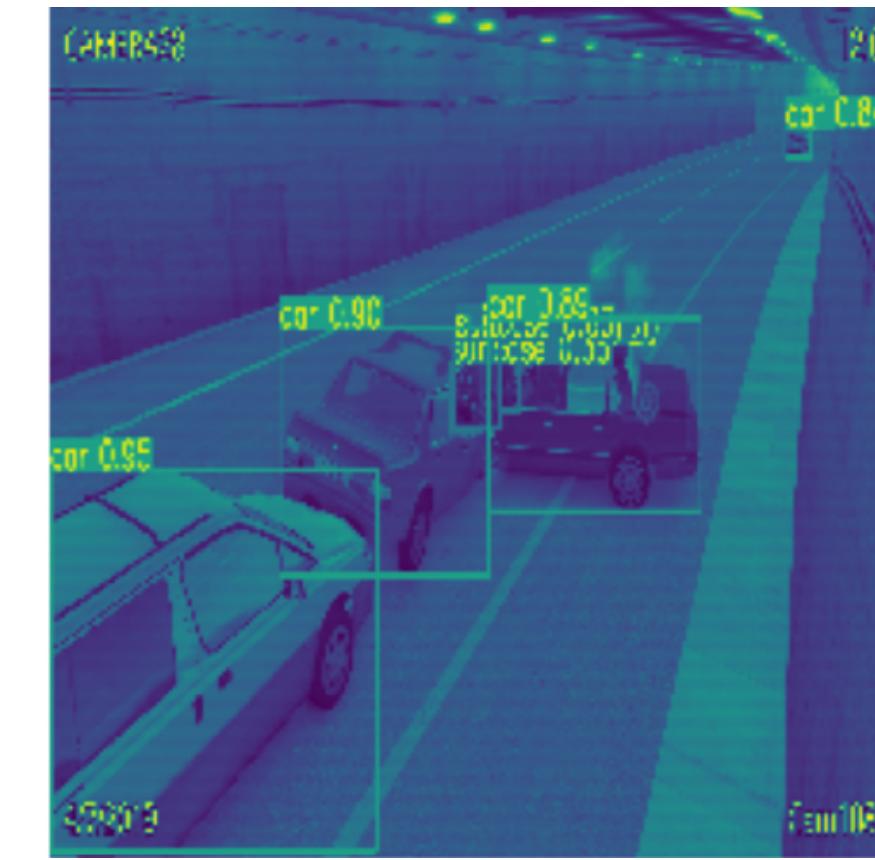
Model: "sequential"		
Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 224, 224, 64)	320
max_pooling2d (MaxPooling2D)	(None, 112, 112, 64)	0
conv2d_1 (Conv2D)	(None, 112, 112, 128)	32896
max_pooling2d_1 (MaxPooling2D)	(None, 56, 56, 128)	0
conv2d_2 (Conv2D)	(None, 56, 56, 256)	131328
max_pooling2d_2 (MaxPooling2D)	(None, 28, 28, 256)	0
conv2d_3 (Conv2D)	(None, 28, 28, 512)	524800
max_pooling2d_3 (MaxPooling2D)	(None, 14, 14, 512)	0
dropout (Dropout)	(None, 14, 14, 512)	0
flatten (Flatten)	(None, 100352)	0
dense (Dense)	(None, 500)	50176500
dropout_1 (Dropout)	(None, 500)	0
dense_1 (Dense)	(None, 1)	501
<hr/>		
Total params: 50866345 (194.04 MB)		
Trainable params: 50866345 (194.04 MB)		
Non-trainable params: 0 (0.00 Byte)		

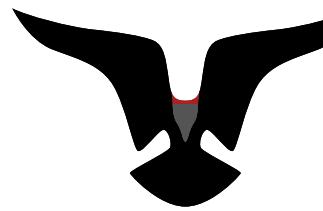


# Transfer Learning

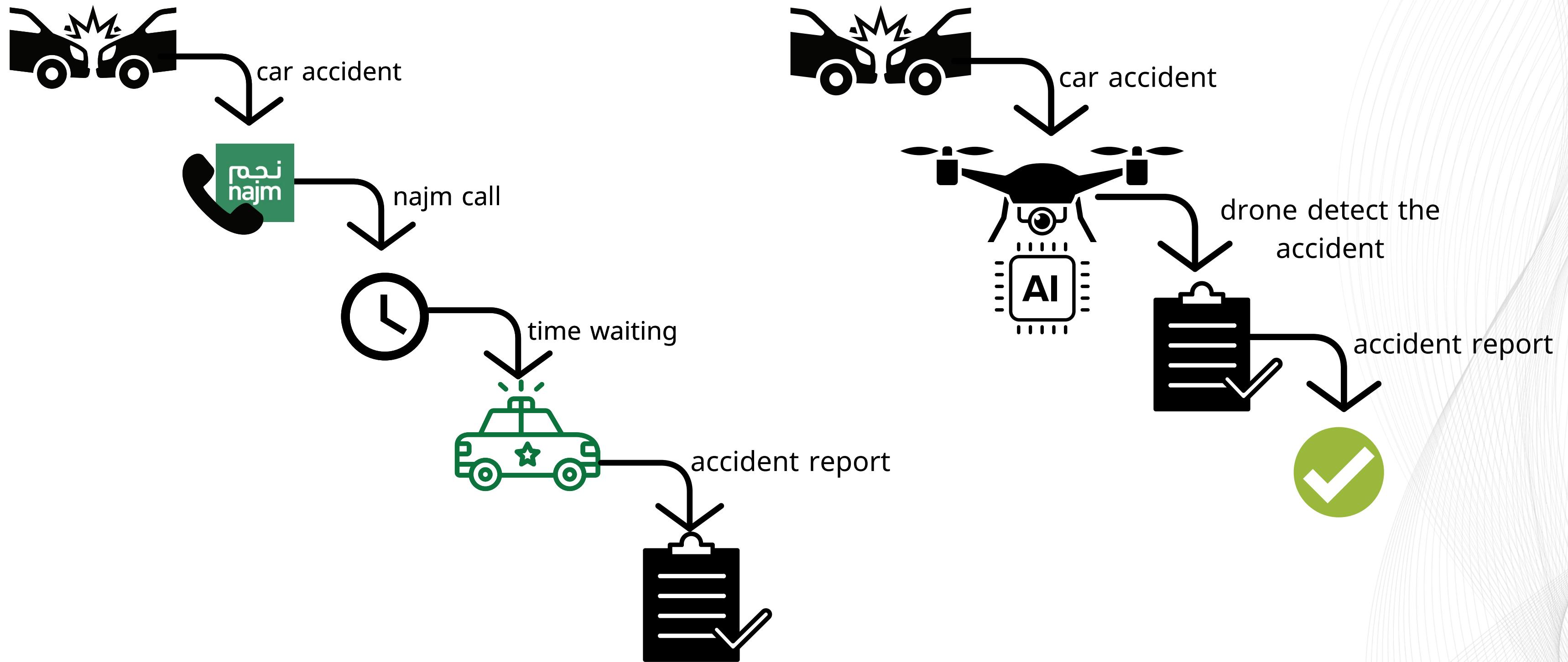
## YOLOV8 Model

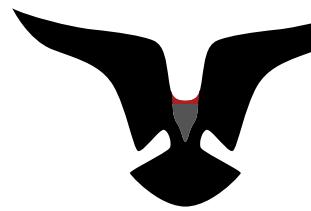
- The model delineated boundaries for all the car on the highway.
- The efficiency and speed.
- Real-Time Processing.





# Application in Real Life





# Future Work

## **LiDAR Systems**

Utilize ultraviolet or near-infrared signals to create detailed 3D maps of accident scenes for emergency services.

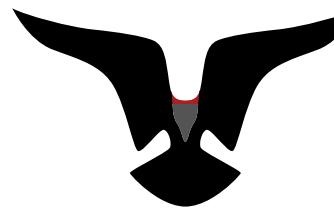
## **Predictive Analytics**

Develop predictive models from collected data to identify high-risk areas, enabling proactive measures.

## **Collaboration With Insurance Companies**

Collaborate with insurance companies to utilize Fazza's accident analysis for tailored insurance offerings .

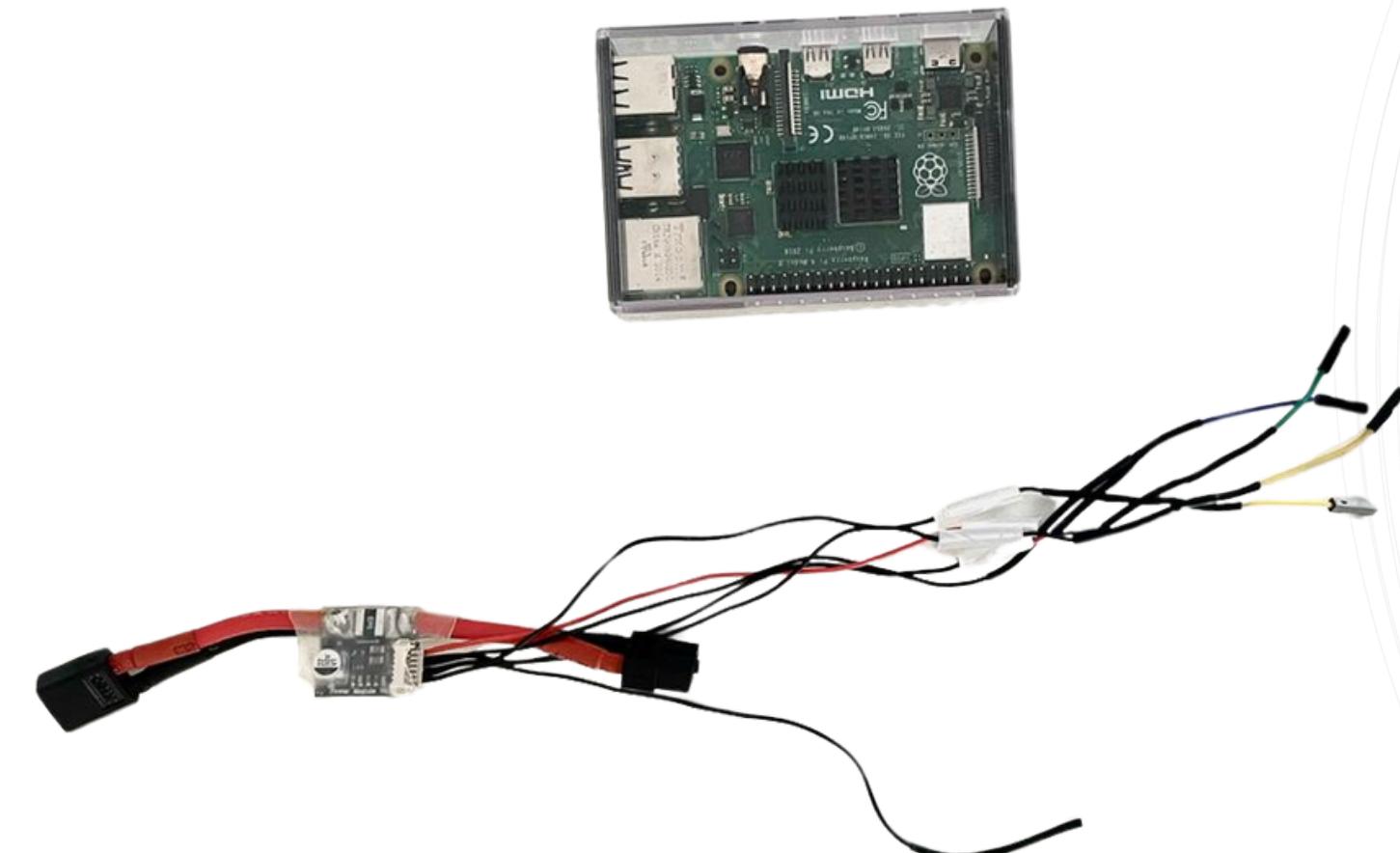


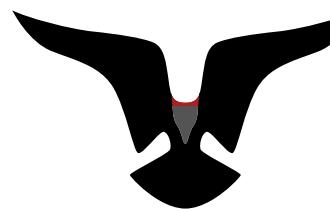


# Drone challenges

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- The components & Tools.
- The weights .
- The flight Controllers .
- The isolation between the hardware and software systems .



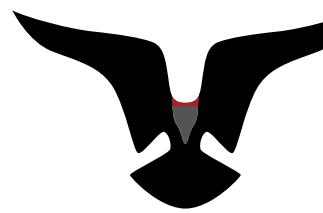


# Flight Time

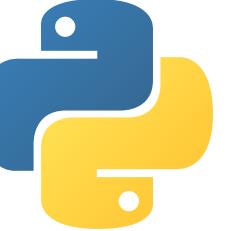
Item	Name	Quantity	Weight in grams
1	Frame	1	454
2	Motors	4	58 x 4 = 232
3	Propeller	4	11 x 4 = 44
4	Li-Poly Battery 5200mAH/11.1v	1	373
5	ESCs	4	39 x 4 = 156
6	Raspberry Pi 4	1	45
7	Pixhawk 4	1	15.8
8	Raspberry Pi Camera Board	1	25
9	GPS	1	68
10	Fly Sky Fs Receiver	1	23.4
<b>Total</b>			<b>1.486g</b>

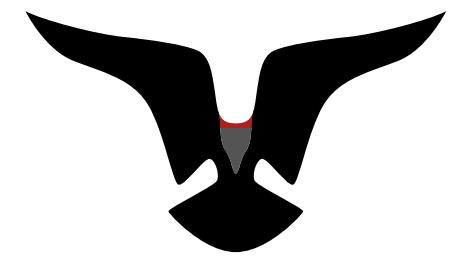
- All up weight. ✓
- Battery power . ✓
- Consumed power. ✓
- Substitute in the formula. ✓

$$t = \frac{1}{n} \times \frac{60}{1000} \times \frac{c \times v}{n \times pm + pe} \longrightarrow 0.8 \times \frac{60}{1000} \times \frac{5200 \times 11.1}{4 \times 20 + 40} = 23-25 \text{ min}$$



# Tools & Libraries

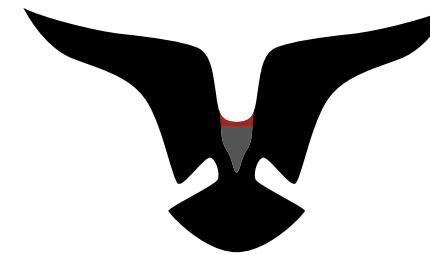
Pre-processing and Visualization	  	 
Bulid Model	 	
Work space		 



**Demo**

02

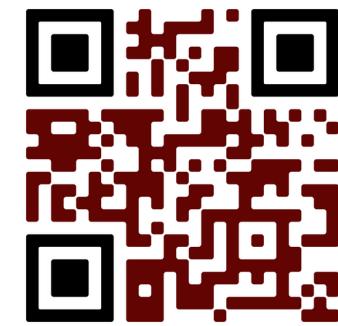




# Thank You



Haya Aldossari



Reem Alshehri



Reema Albadrani



Abdulrahman Muqati



Khalid Alanazi

