UNIVERSITI SAINS ISLAM MALAYSIA
جَامِعَة العُلُوم الإِسْلَامِيَة المَالِيزِيَة
ISLAMIC SCIENCE UNIVERSITY OF MALAYSIA

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Visiting Fellow UNAIR

Safety Classification at Construction Site

- Personal Protective Equipment (PPE)- Hardhat, Vests, Boots
- Incident -Fall, Electric Shock, Scaffold, Heavy Machines, And Cranes

PENJAJARAN PSPSA KEPADA HALA TUJU GLOBAL DAN NASIONAL

10 10 MySTIE FRAMEWORK

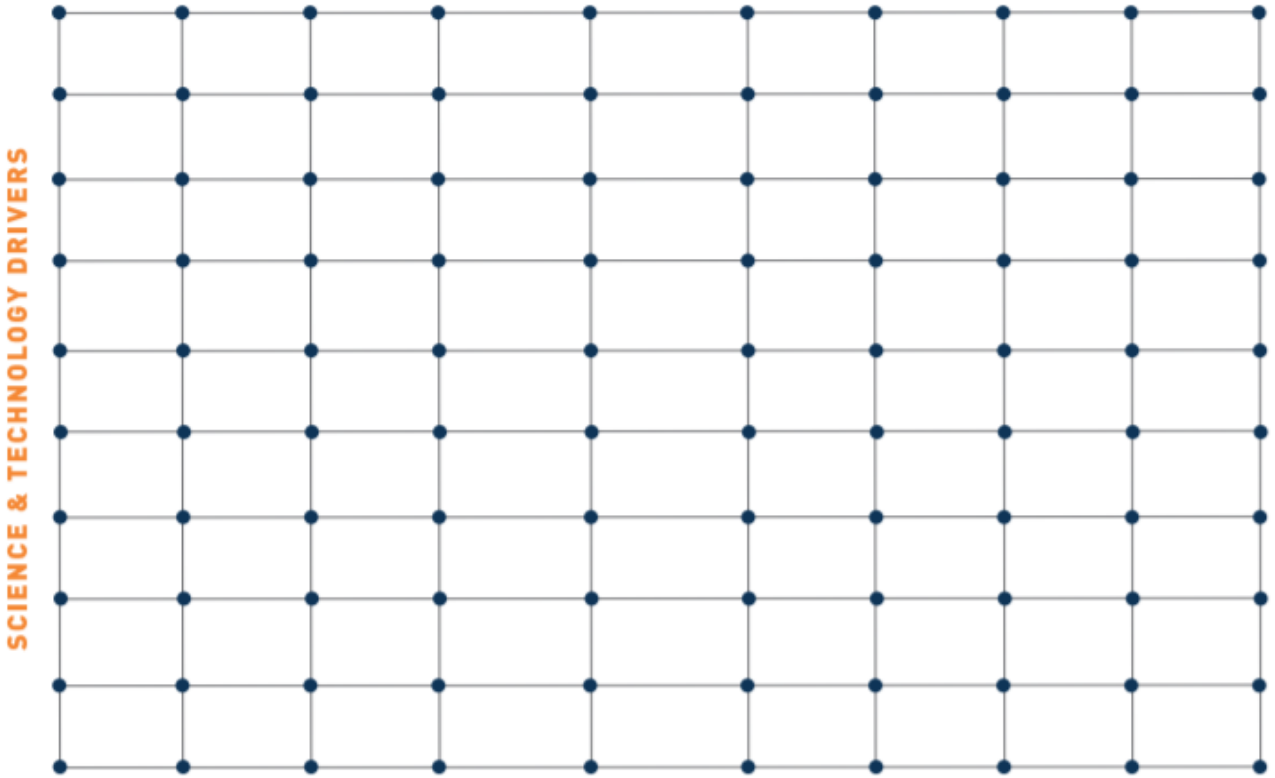
Building the Horizontal & Enabling the Vertical in the Ecosystem

MALAYSIAN SOCIO-ECONOMIC DRIVERS

- ENERGY
- BUSINESS & FINANCIAL SERVICES
- CULTURE, ARTS & TOURISM
- MEDICAL & HEALTHCARE
- SMART TECHNOLOGY & SYSTEMS (NEXT-GENERATION ENGINEERING & MANUFACTURING)
- SMART CITIES & TRANSPORTATION
- WATER & FOOD
- AGRICULTURE & FORESTRY
- EDUCATION
- ENVIRONMENT & BIODIVERSITY

SCIENCE & TECHNOLOGY DRIVERS

- 5G / 6G
- SENSOR TECHNOLOGY
- 4/5D-PRINTING
- ADVANCED MATERIALS
- ADVANCED INTELLIGENT SYSTEMS
- CYBER-SECURITY & ENCRYPTION
- AUGMENTED ANALYTICS & DATA DISCOVERY
- BLOCKCHAIN
- NEURO TECHNOLOGY
- BIOSCIENCE TECHNOLOGY

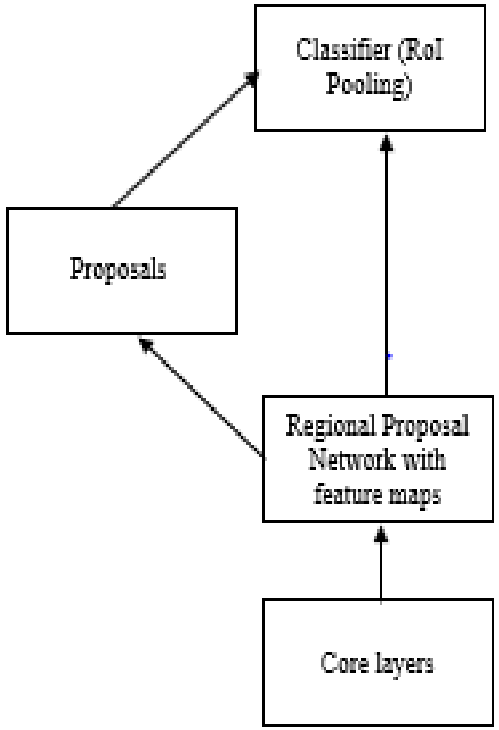


Each Science & Technology Driver should explore core technologies & applications for the 10 Malaysian Socio-economic Drivers

Driving Fundamental & Translational Research

Each Malaysian Socio-economic Driver should explore how the 10 Science & Technology Drivers will value-add and enhance their global competitiveness

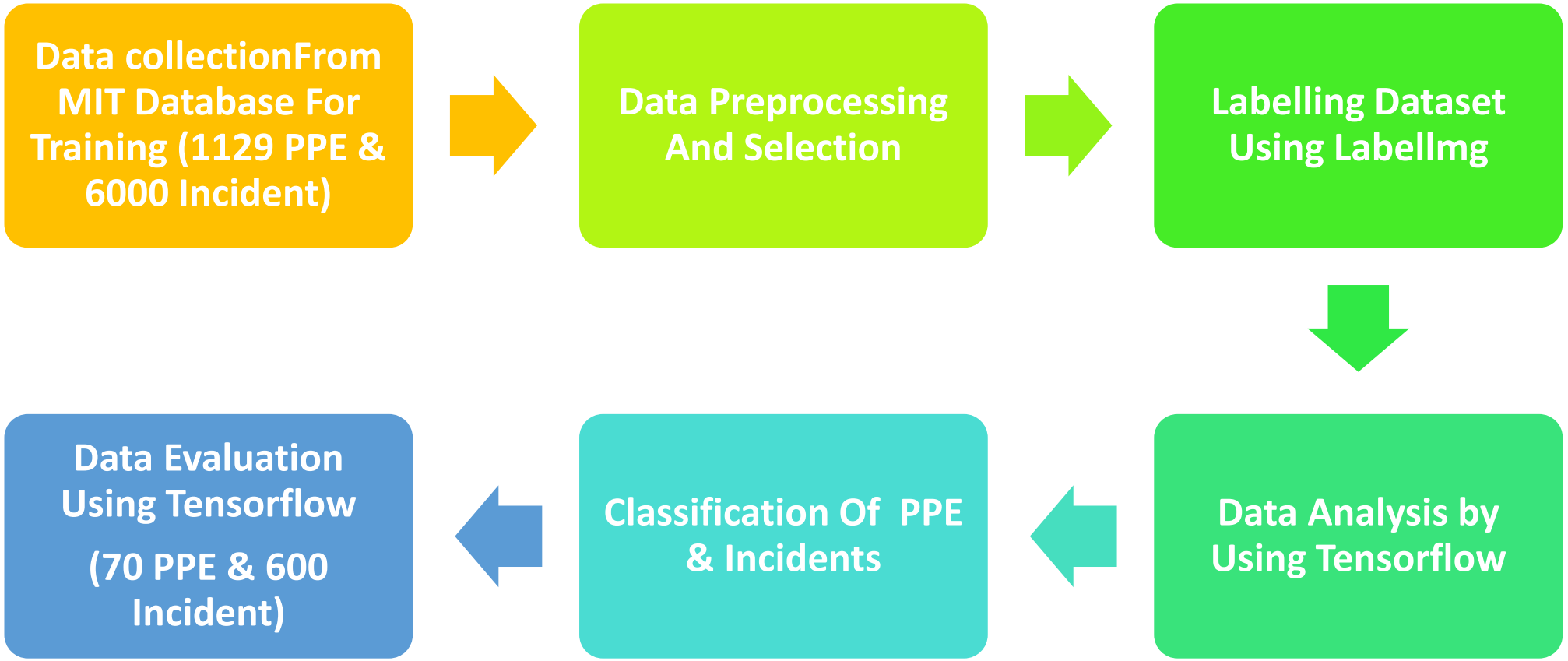
Faster R-CNN



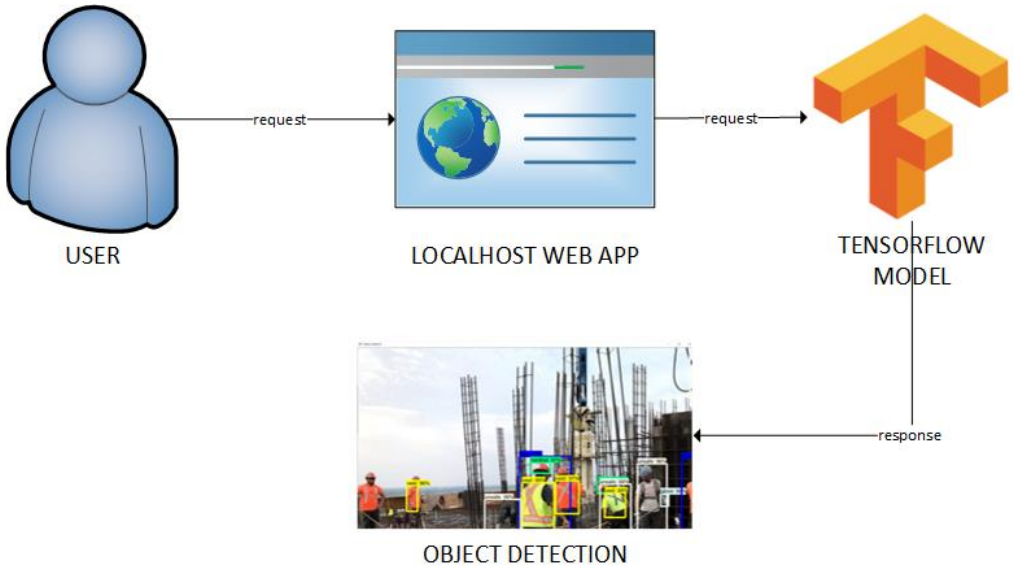
Faster R-CNN Design

- The strength of Faster R-CNN is based on its ability to reuse the CNN results for the regional proposal process.
- Hence, only one CNN needs to be trained, and regional proposals can be made almost cost-free computationally .
- This algorithm helps to identify and to assign the safety condition based on PPE and incidents.

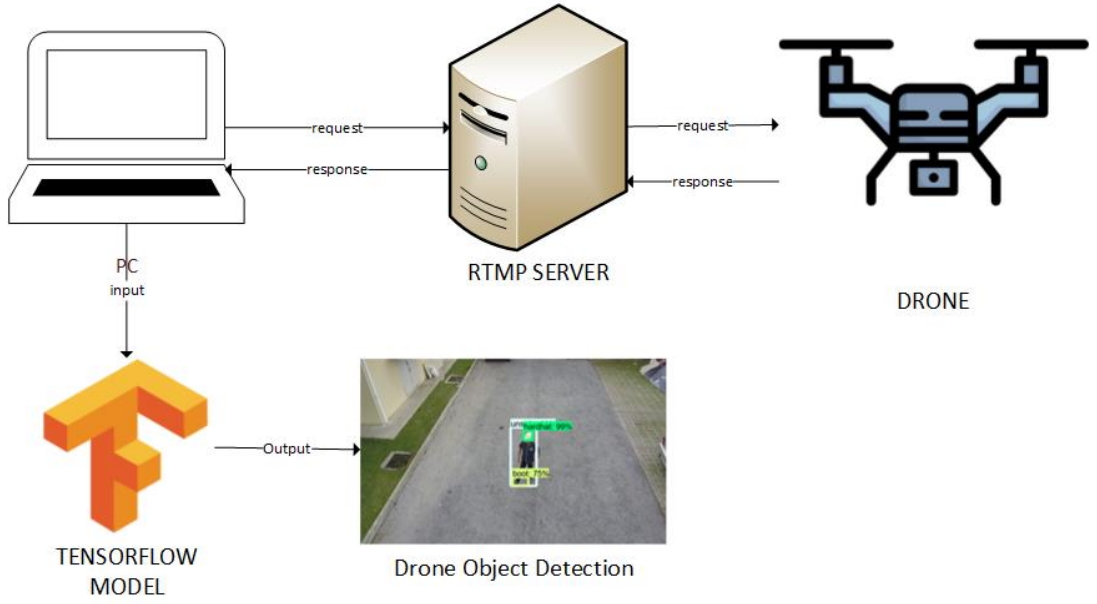
Methods


Data collectionFrom MIT Database For Training (1129 PPE & 6000 Incident)
Data Preprocessing And Selection
Labelling Dataset Using LabelImg
Data Analysis by Using Tensorflow
Classification Of PPE & Incidents
Data Evaluation Using Tensorflow
(70 PPE & 600 Incident)

Architecture



TOPBuilder Website Architecture



Drone Detection Architecture

Personal Protective Equipment (PPE) Classification

Before Safety Classification	After Safety Classification
	
	

Safety Classification Condition

Examples of the Tested Images (PPE)

PPE	Total Detected Images	Total Detected Images
Hard hat	2372	156
Vest	1478	73
Boot	1023	49
Safe	572	53

PPE Experiment Result

Incidents Classification

Before Classification	After Classification
	
	

Safety Classification Condition.

Examples of the Tested Images (Incidents).

Incident Result

Incident	Safe	Dangerous
Crane	No worker near Crane	Had worker near Crane
Heavy Machine	No worker near Heavy Machine	Had worker near Heavy Machine
Electric Shock	No worker near the wire	Had worker near the wire
Scaffold	Worker wore PPE such as harness, glove, vest, boot, and hardhat	The worker did not wear PPE such as harness, glove, vest, boot, and hardhat
Fall	High building with wall	High building with no wall

Safe and Dangerous Condition

INCIDENT	TOTAL DETECTED IMAGES	Total Detected Images
Crane	720	200
Heavy Machine	751	236
Scaffold	542	132
Fall	259	96
Electric Shock	95	20
Safe	711	215
Unsafe	731	234

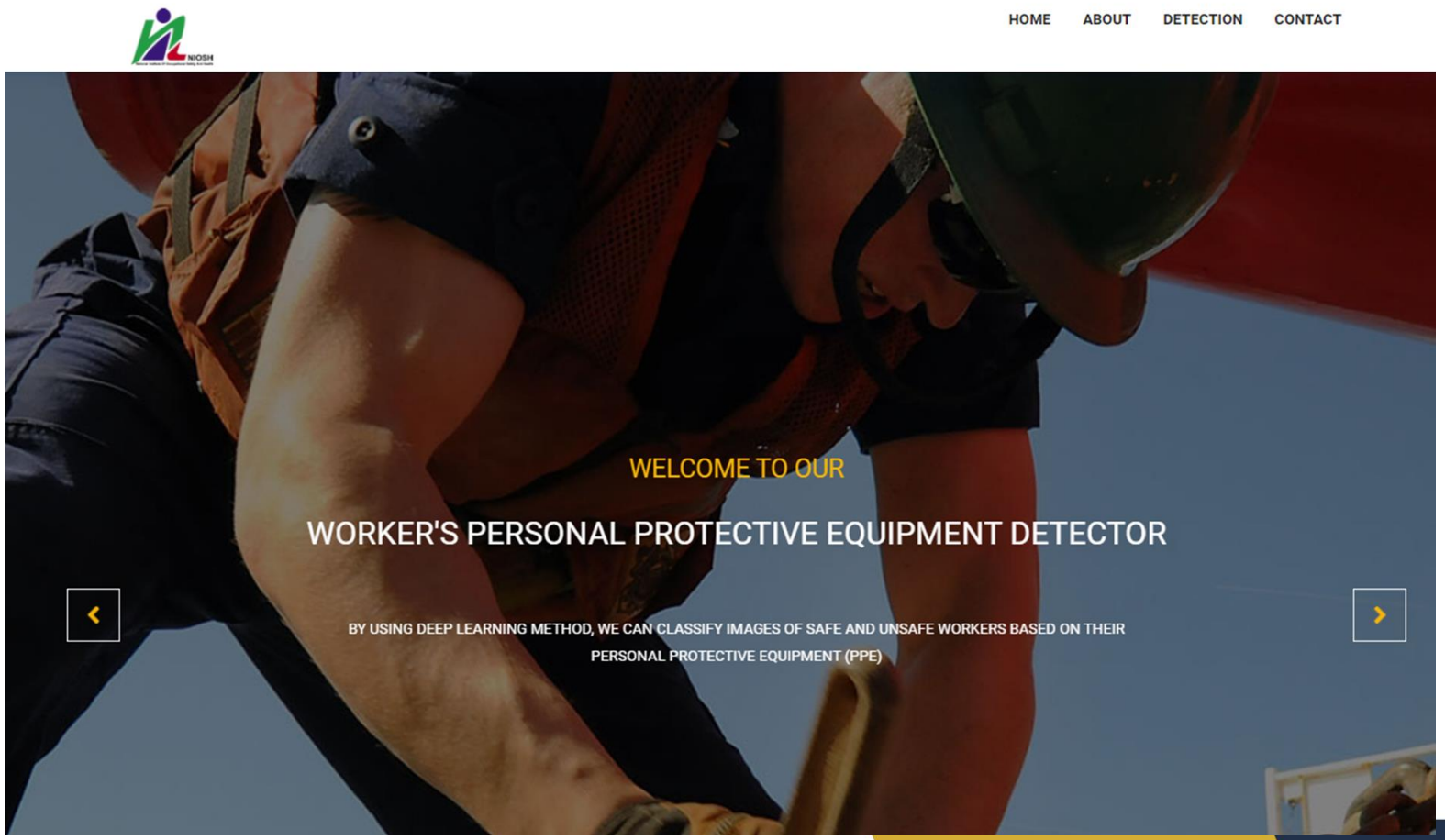
Incidents Experiment Results

Outcome

- The safety classification PPE (hardhats, vests, boots) and incidents (for fall, electric shock, scaffold, heavy machines, and cranes) at construction site had been successfully developed by using the Faster R-CNN algorithm.
- The PPE and incidents model proposed achieves a 70% rate of accuracy.

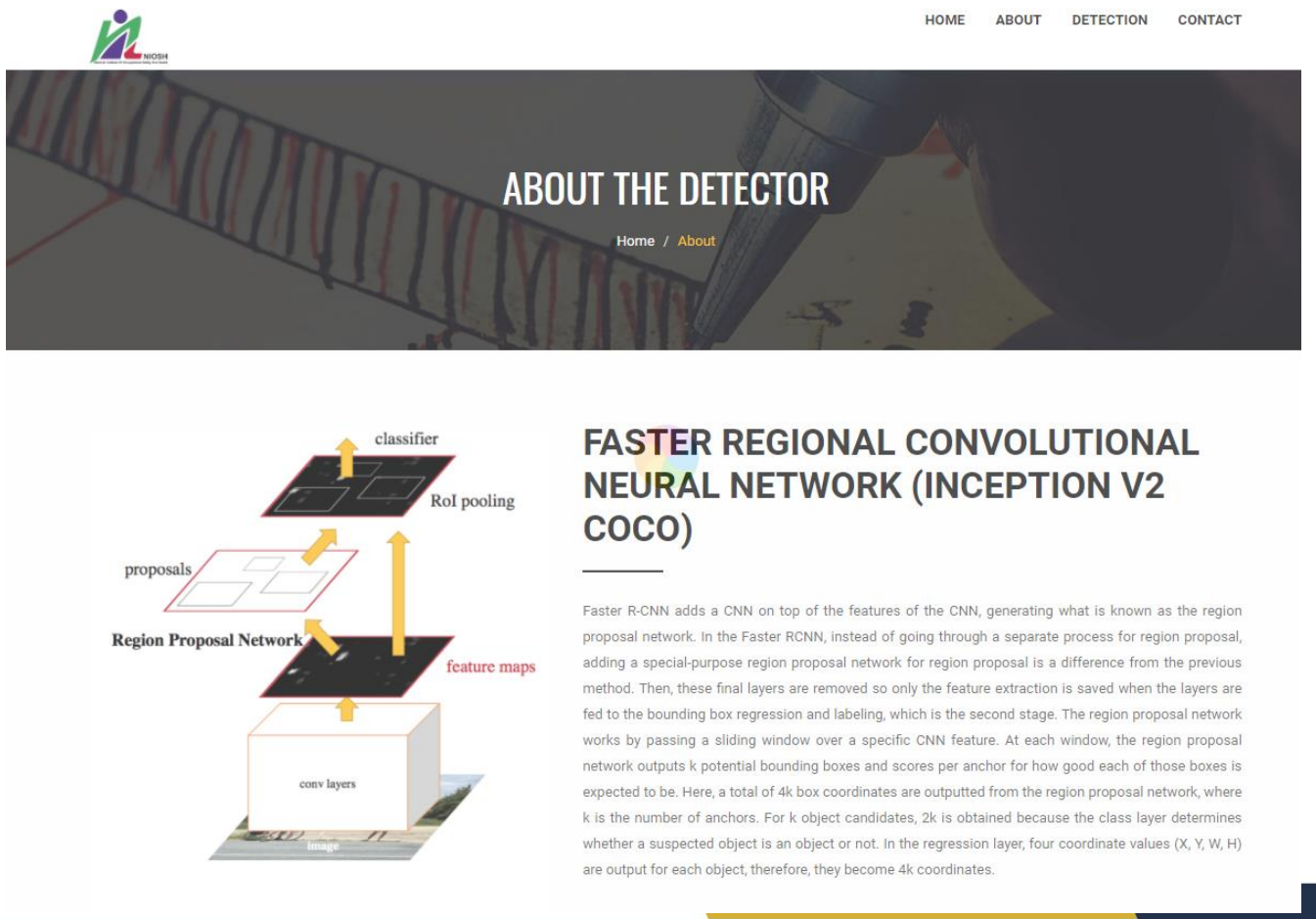
Implementation- Web Application

- Main Page



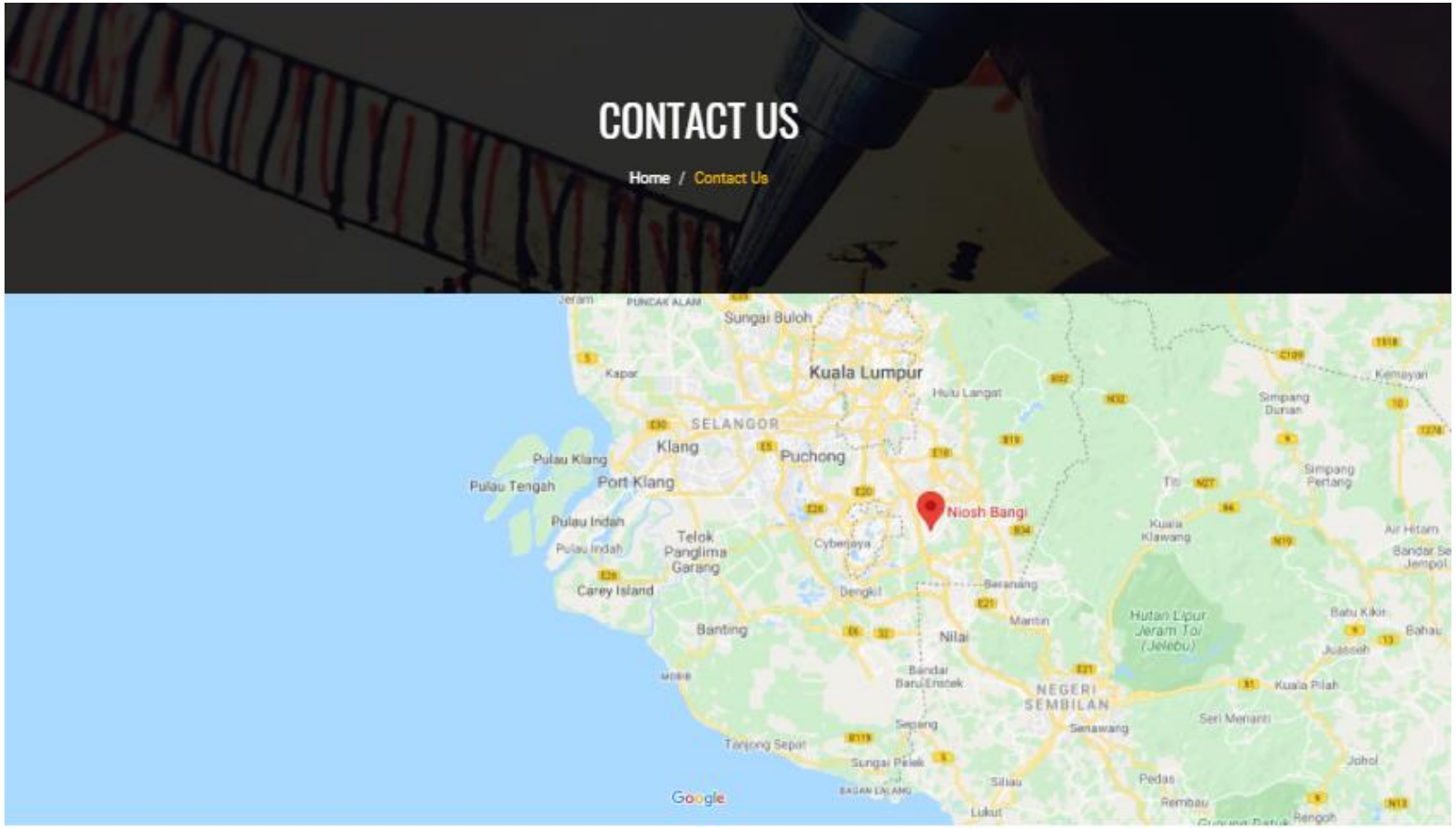
Implementation- Web Application

- About



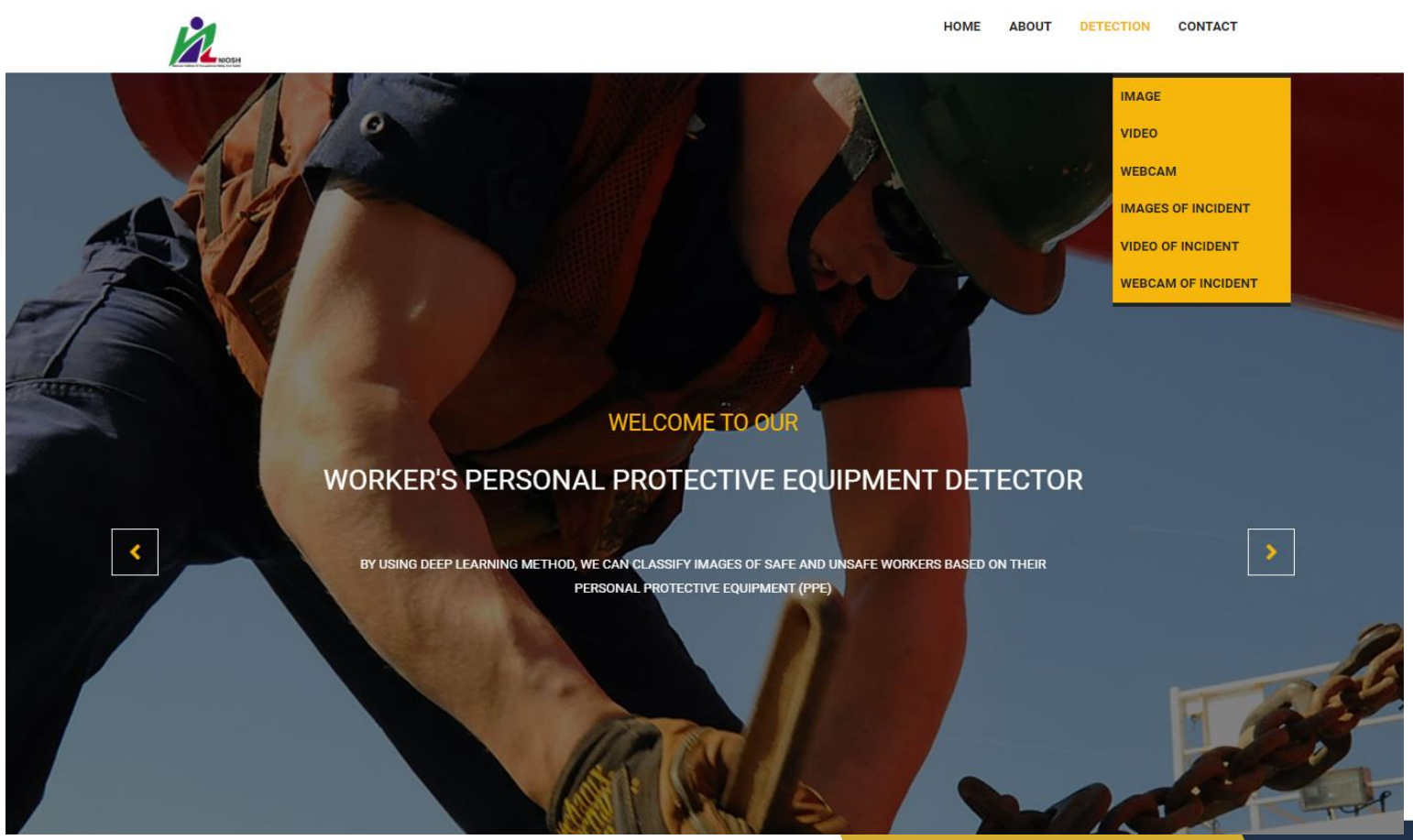
Implementation- Web Application

- Contact Us

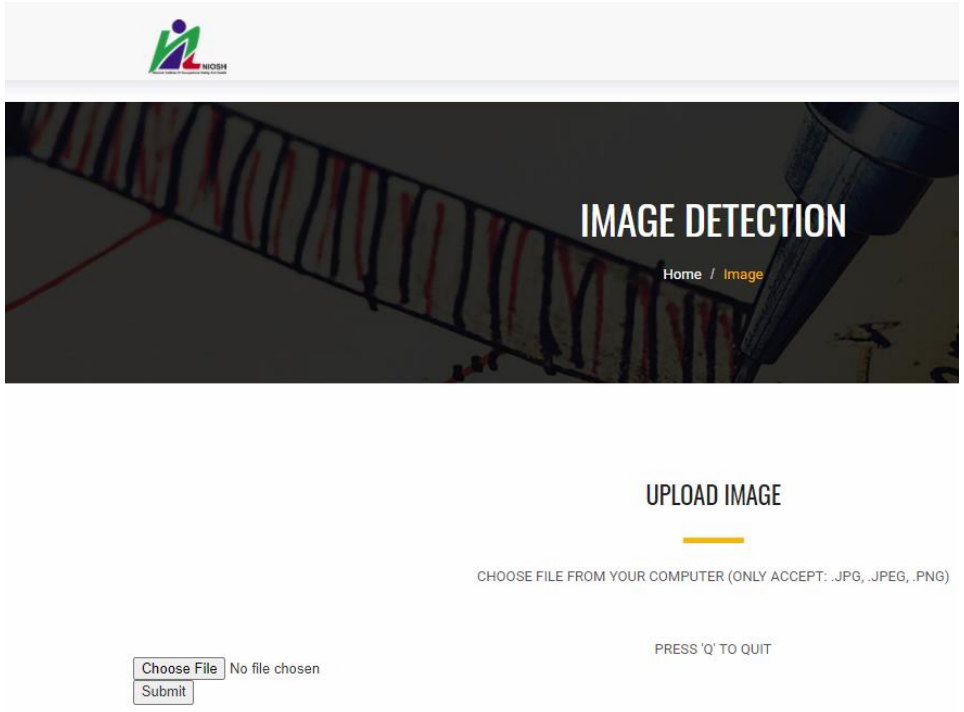


Implementation- Web Application

- Detection Tab

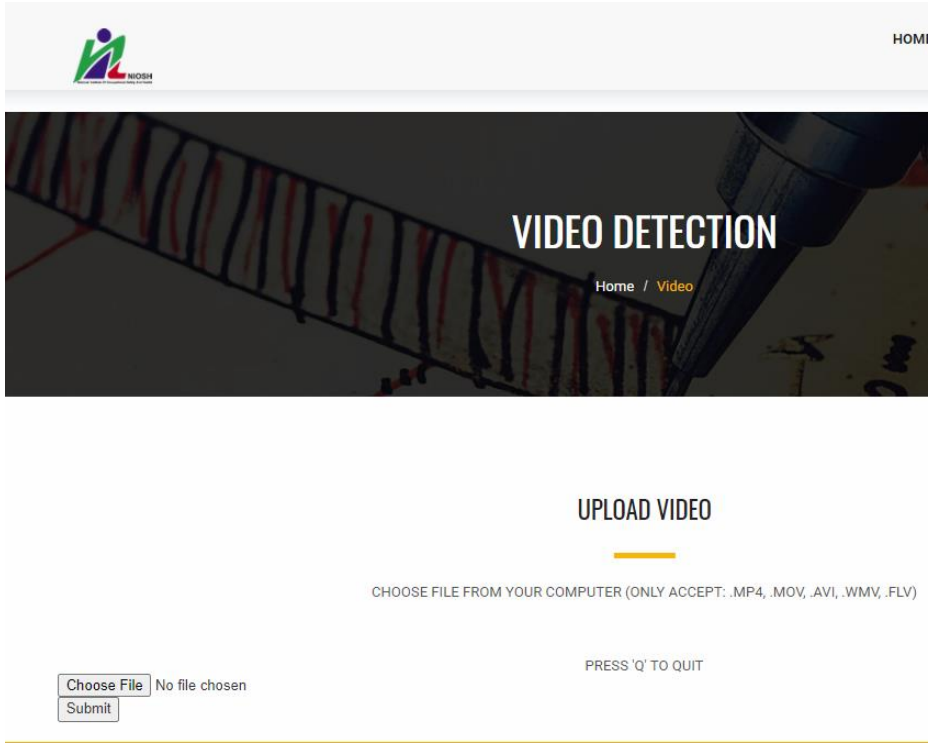


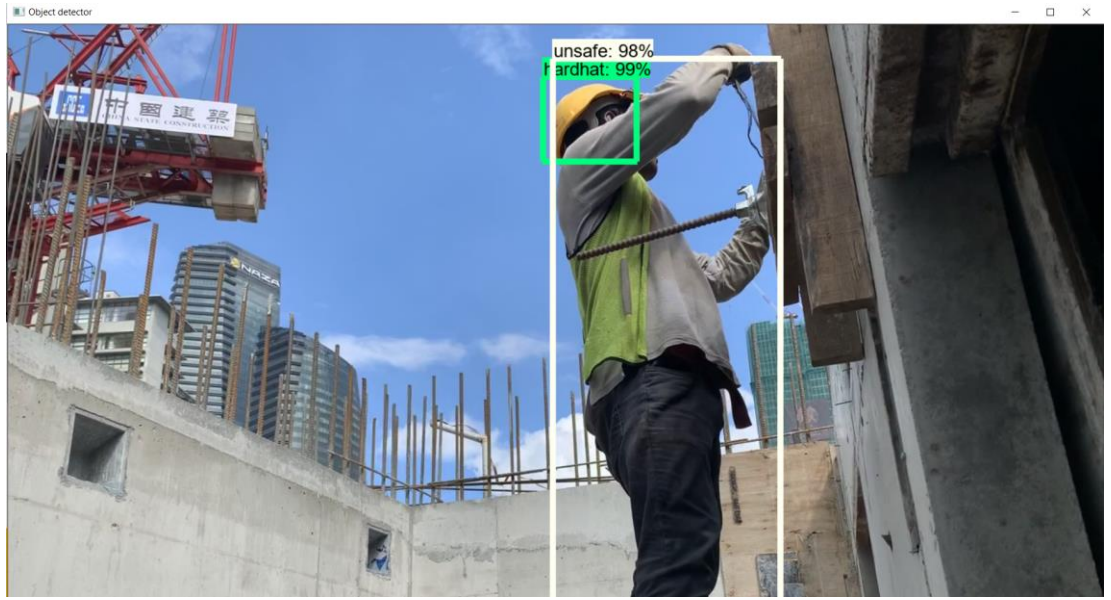
Implementation- Web Application



- Image Detection

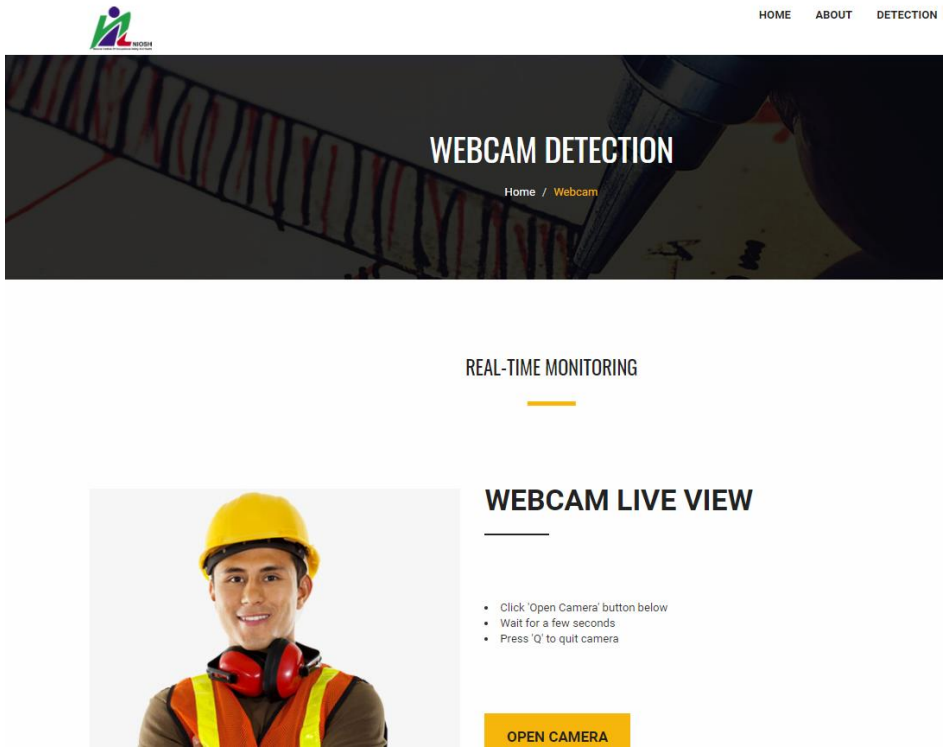
Implementation- Web Application

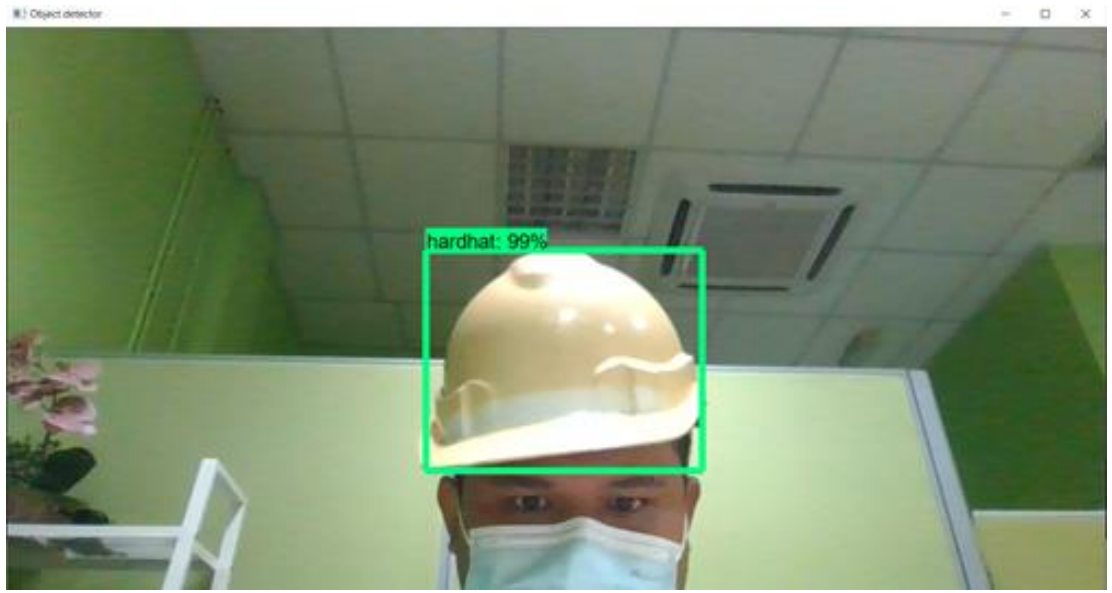




- Video Detection

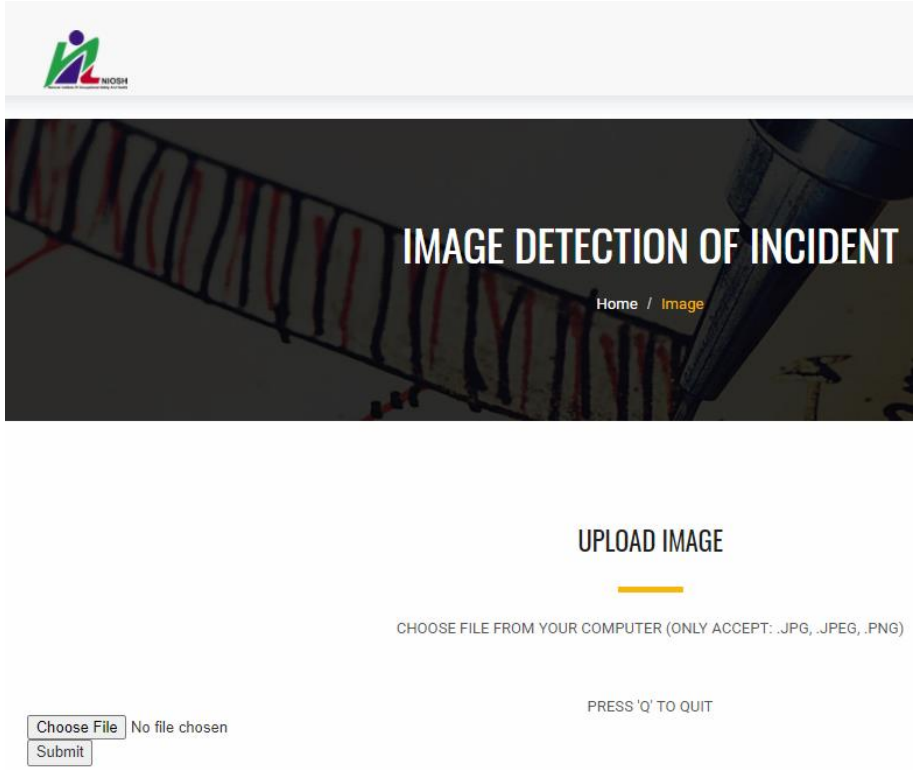
Implementation- Web Application





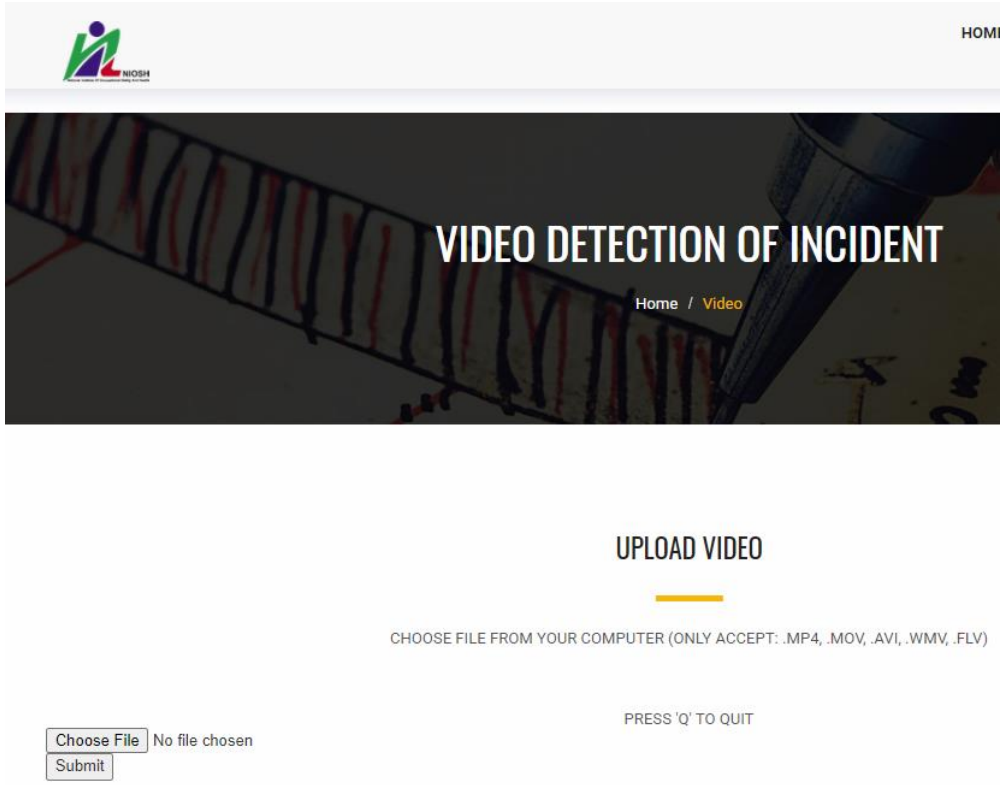
- Webcam Detection

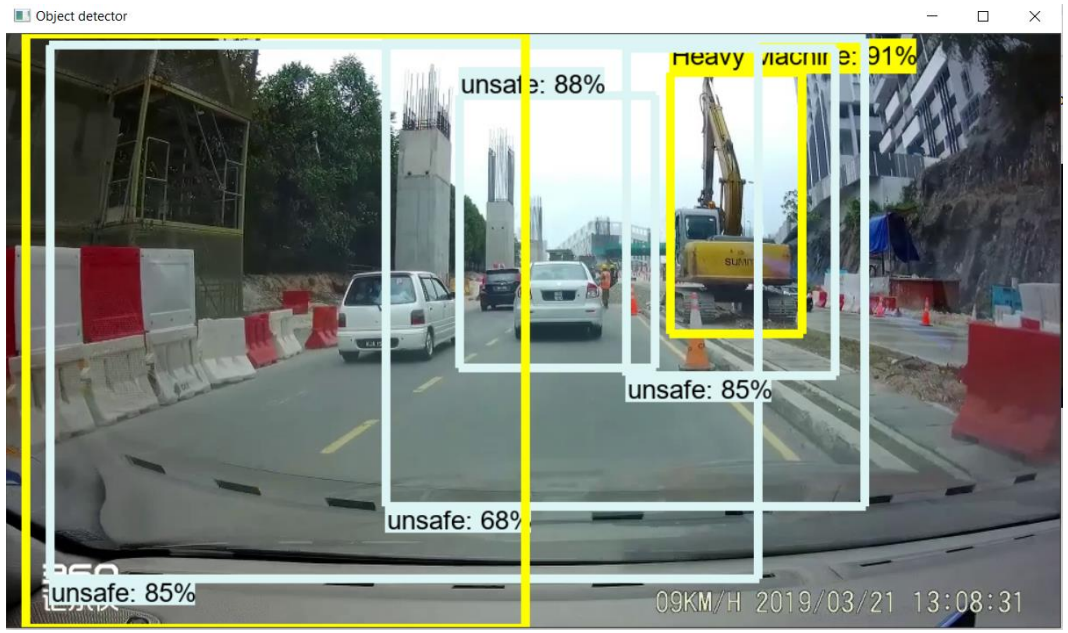
Implementation- Web Application



- Image Detection of Incident

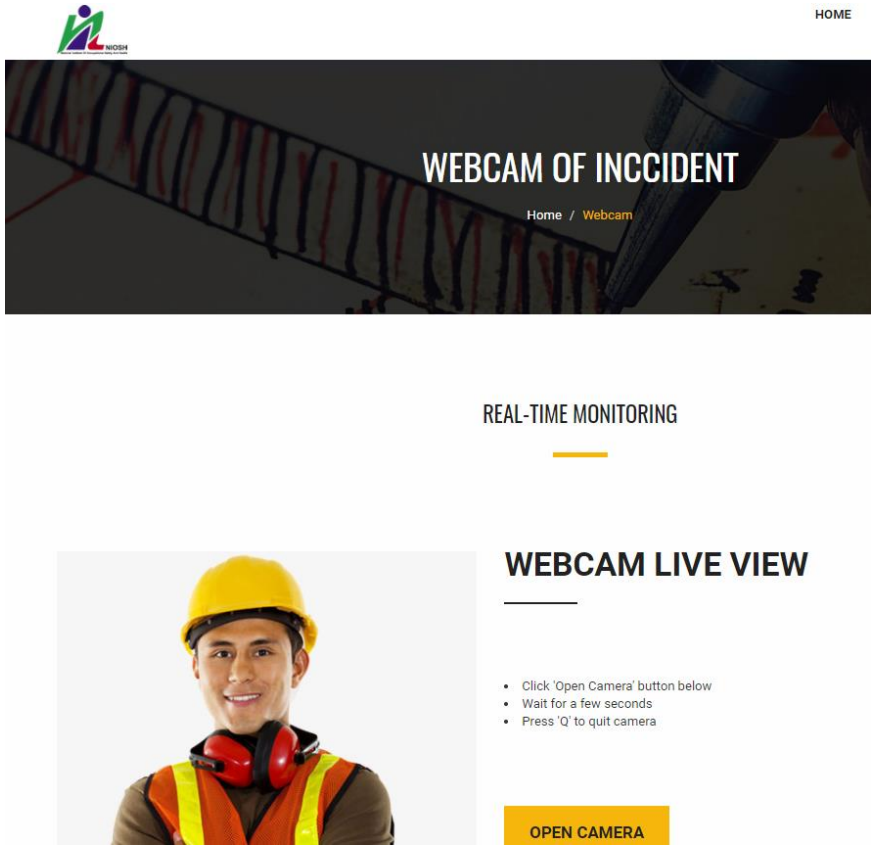
Implementation- Web Application

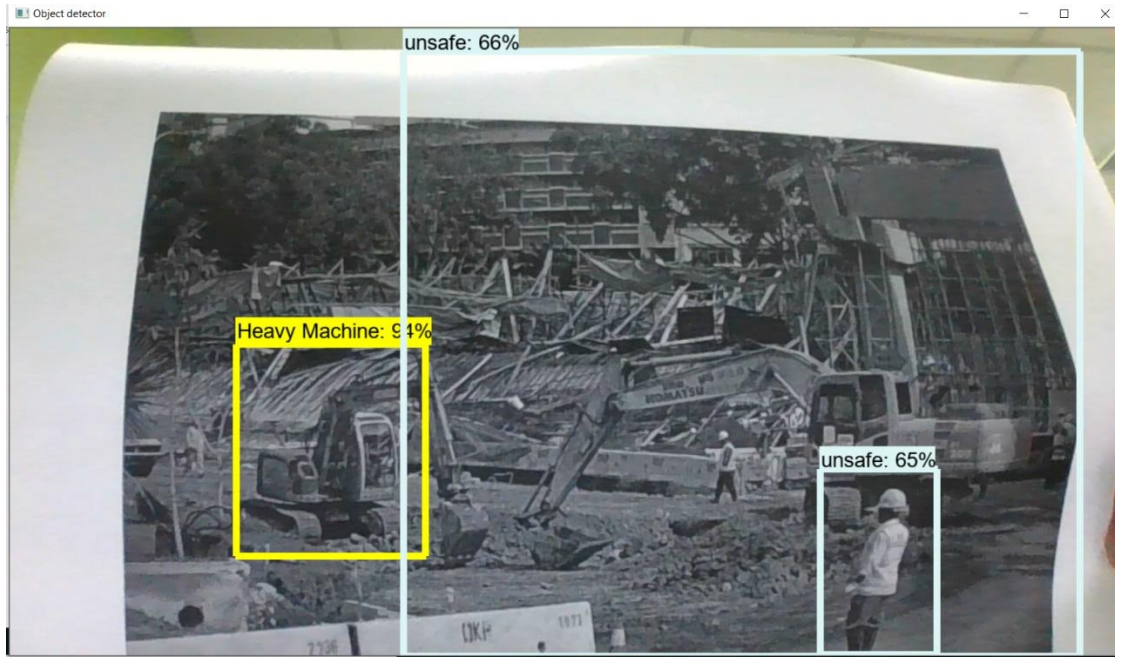




- Video Detection of Incident

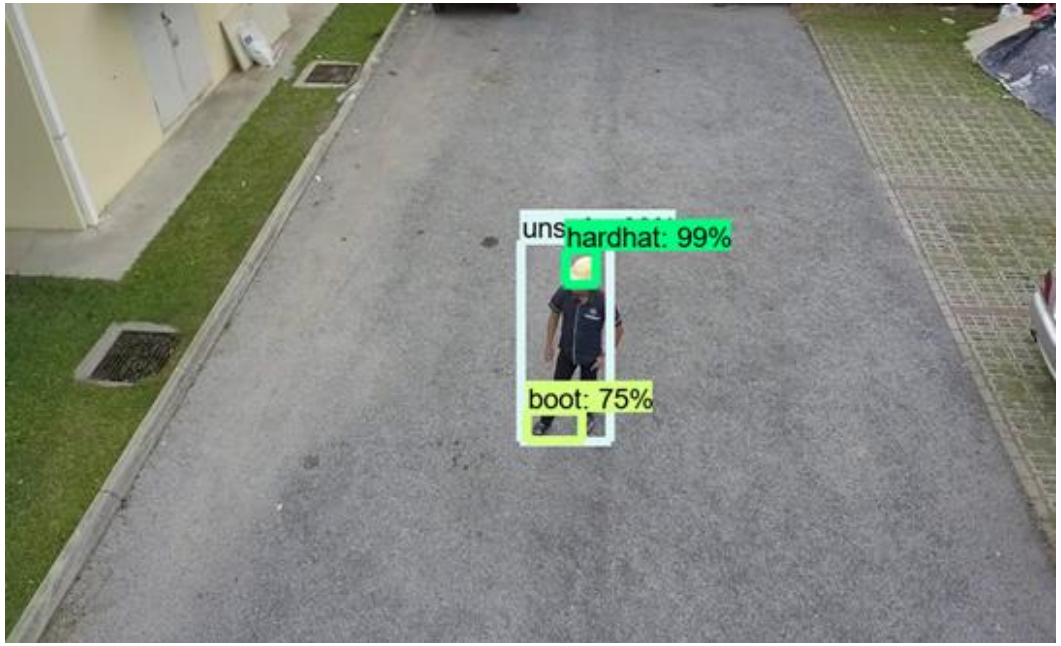
Implementation- Web Application

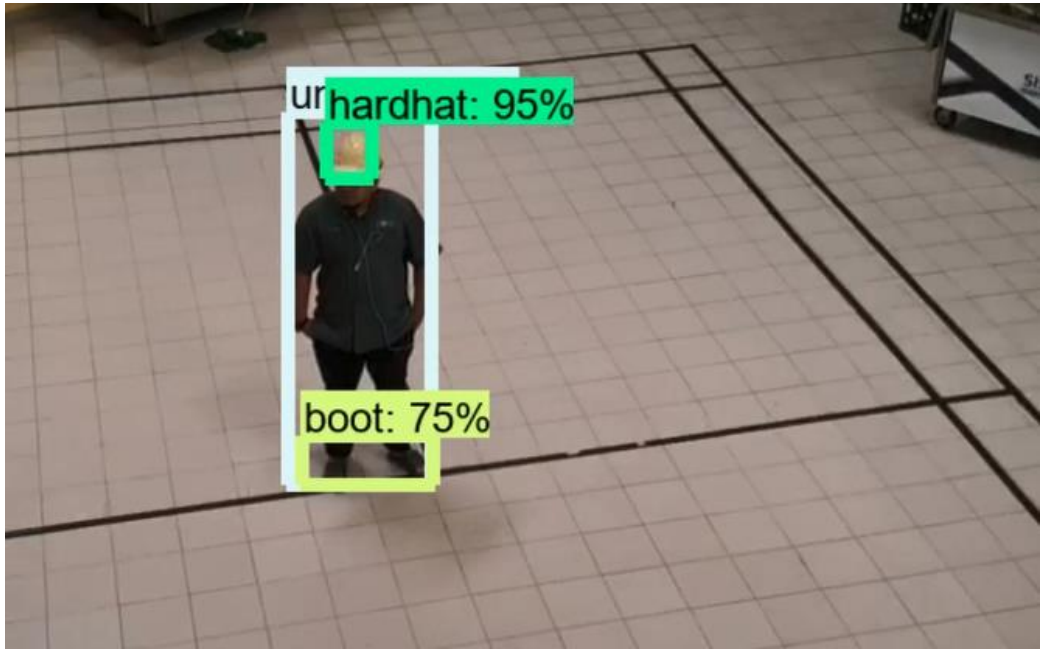




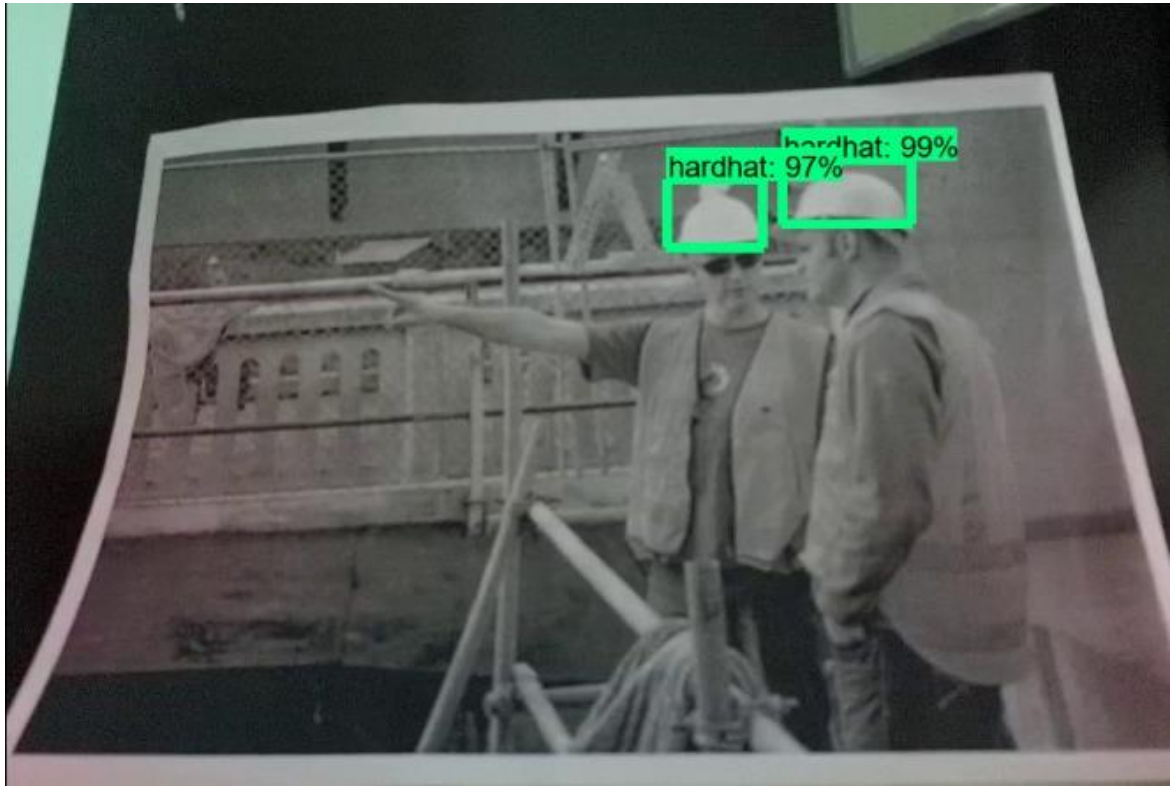
- Webcam of Incident

Drone Detection





Drone



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