NANYANG TECHNOLOGICAL UNIVERSITY
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School of Computer Science and Engineering
College of Engineering

Lightweight Surveillance Systems on Embedded Domains

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Project Objectives:

The objective of this project is to develop lightweight algorithms to perform surveillance tasks such as presence detection, people counting, and facial recognition on an embedded device -- Himax WE-I Plus. With the rise in demand for these applications, there is an emerging market that introduces low-cost, low-powered, small form factor Embedded Devices as an alternative solution.

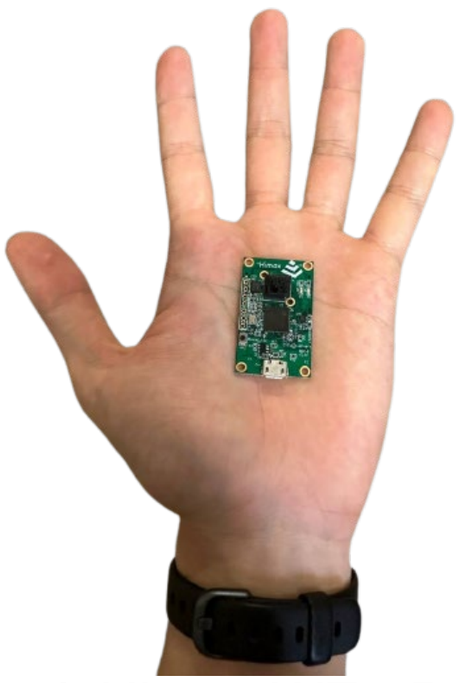

Fig 1. Himax WE-I Plus vs palm size

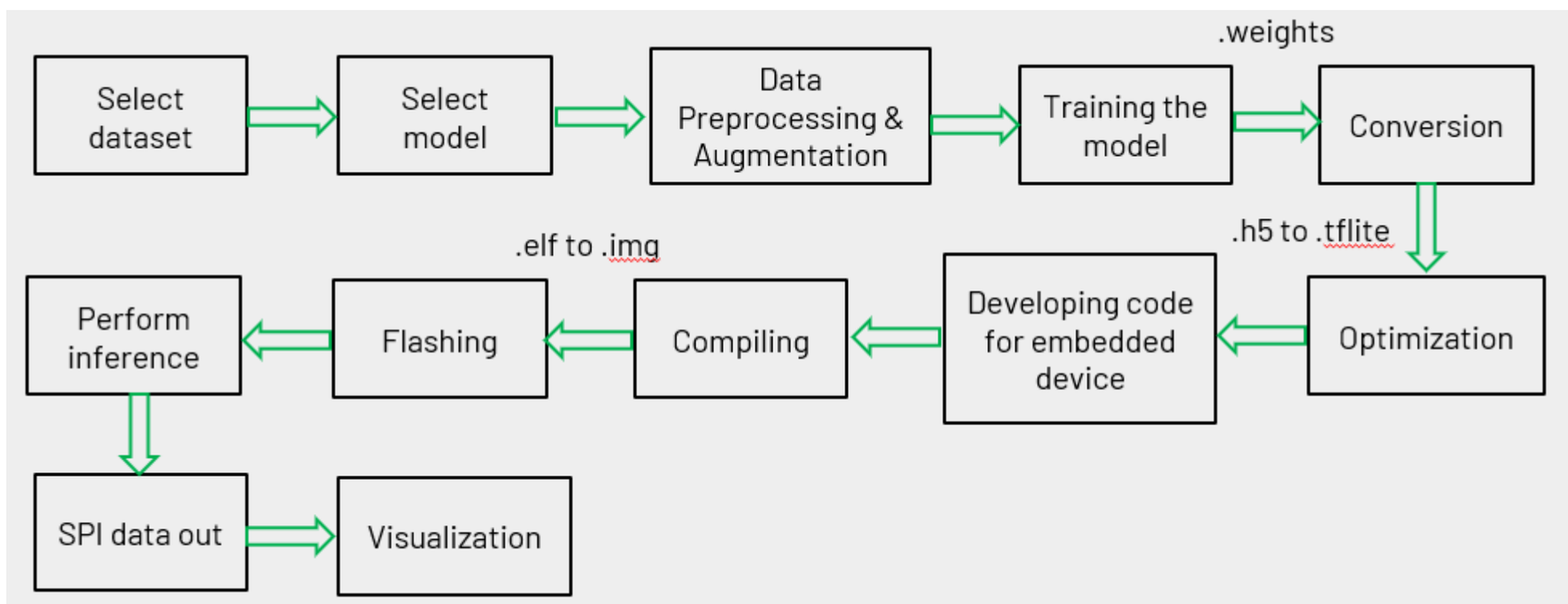

Fig 2. Project's workflow

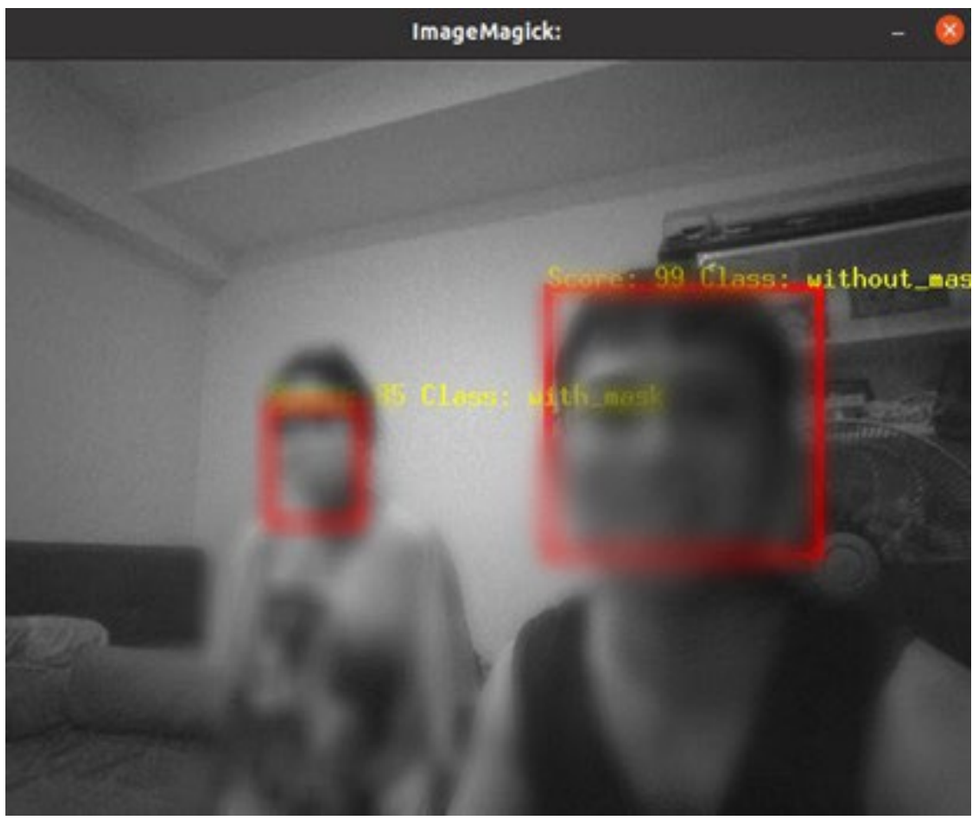

Fig 3. Inference was performed on images captured by the device's camera

Methods:

- Experimented with different frameworks such as Edge Impulse.
- Researched on various models such as YOLOv4, YOLO-Fastest, EfficientDet, Swin Tranformer and CNN.
- Model training.
- Developed an algorithm and applied optimization techniques.
- Implemented and tested the program.

Model	Resolution	Layers	AP_{50}	FLOPS	Weight size	Average Inference Time
Yolo_Mask	160x160	131	28.9	0.054BFlops	1.152MB	250ms

Fig 4. Results obtained from the model