

Goal

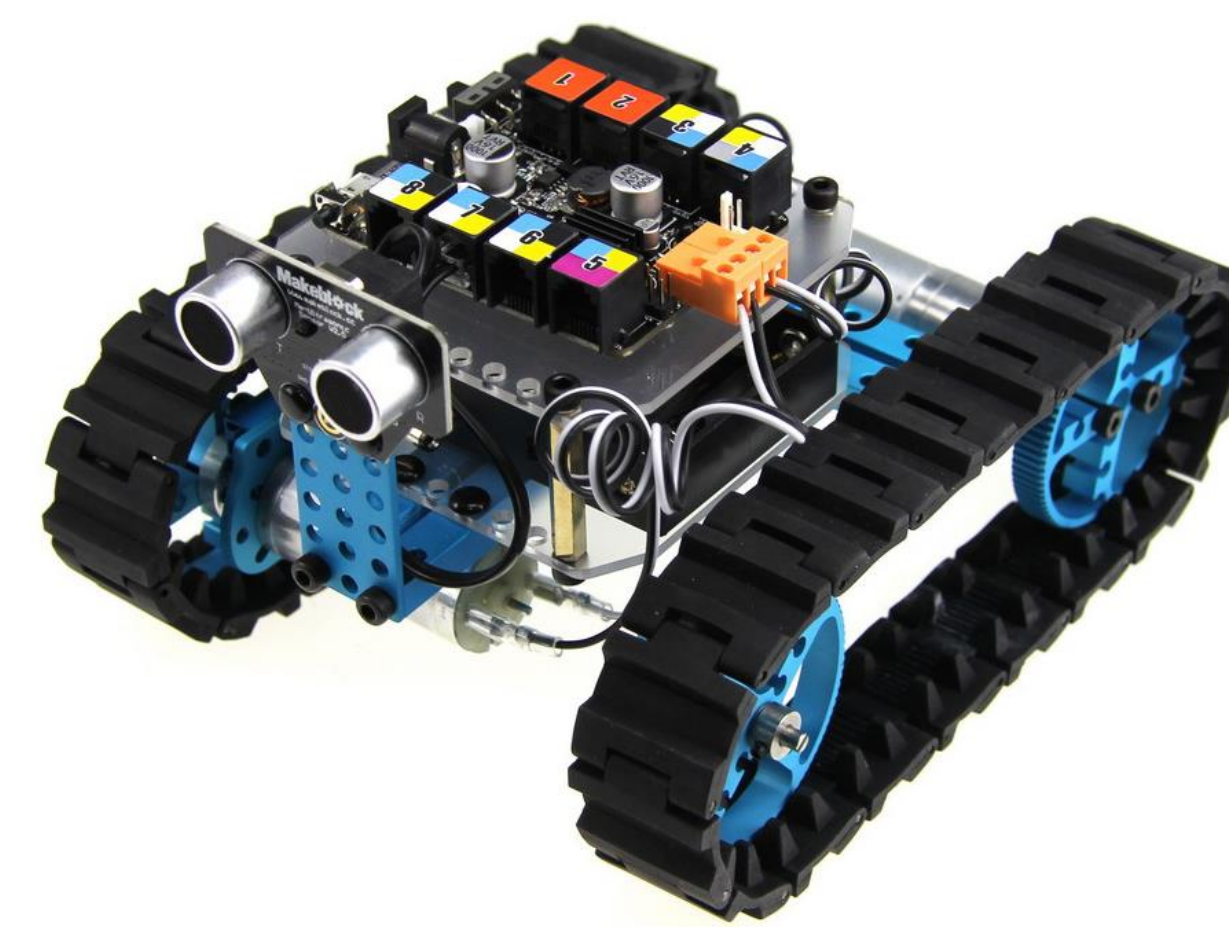
- ❑ The objective of this project is to create a small, autonomous vehicle that can interact with its environment practicing all the rules of the road.
 - ❑ Stopping at stop signs
 - ❑ Responding to traffic lights
 - ❑ Yielding to pedestrians

Makeblock



Robot Scorpion

Raspberry Pi



Robot Tank

Motivations and Objectives

- ❑ Increasing demand and research in autonomous vehicles
- ❑ Cost-efficient approach using only a camera and sonar
- ❑ Investigating its application to other small scale autonomous technologies

Research Challenges

- ❑ Troubleshooting faulty hardware
- ❑ Implementation of OpenCV for obstacle detection
- ❑ Determining the ideal video sampling rate given an error threshold

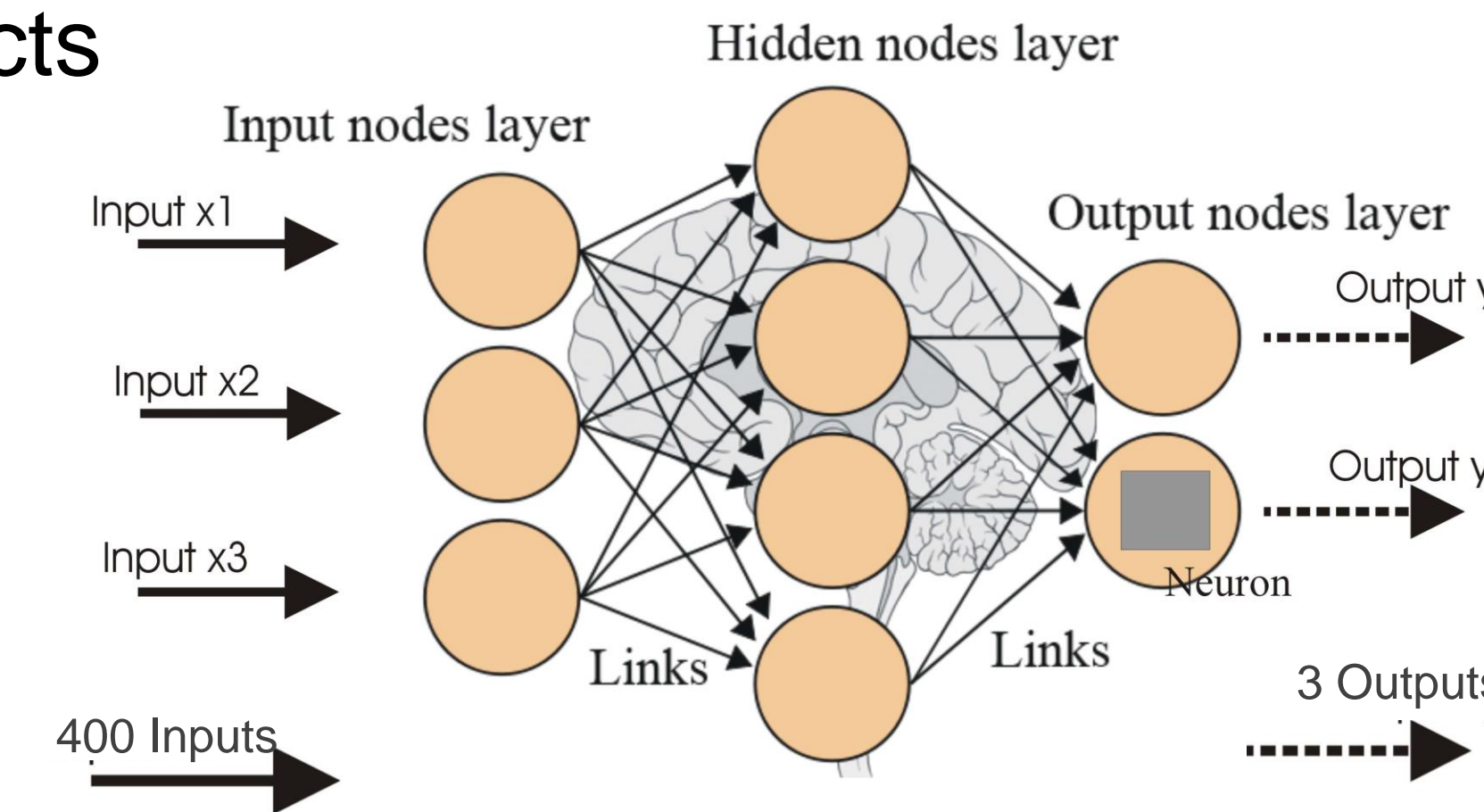
Acknowledgement

We would like to thank Professor Kristin Dana for all of her support and guidance, as well the entire ECE department.

Methodology

SOFTWARE

- ❑ **Neural Network:** Training & testing to detect objects



- ❑ **Cascade Classifier:** Locate & isolate object to evaluate



- ❑ **Autonomous Decision-Making:** Using information to elicit the appropriate hardware response

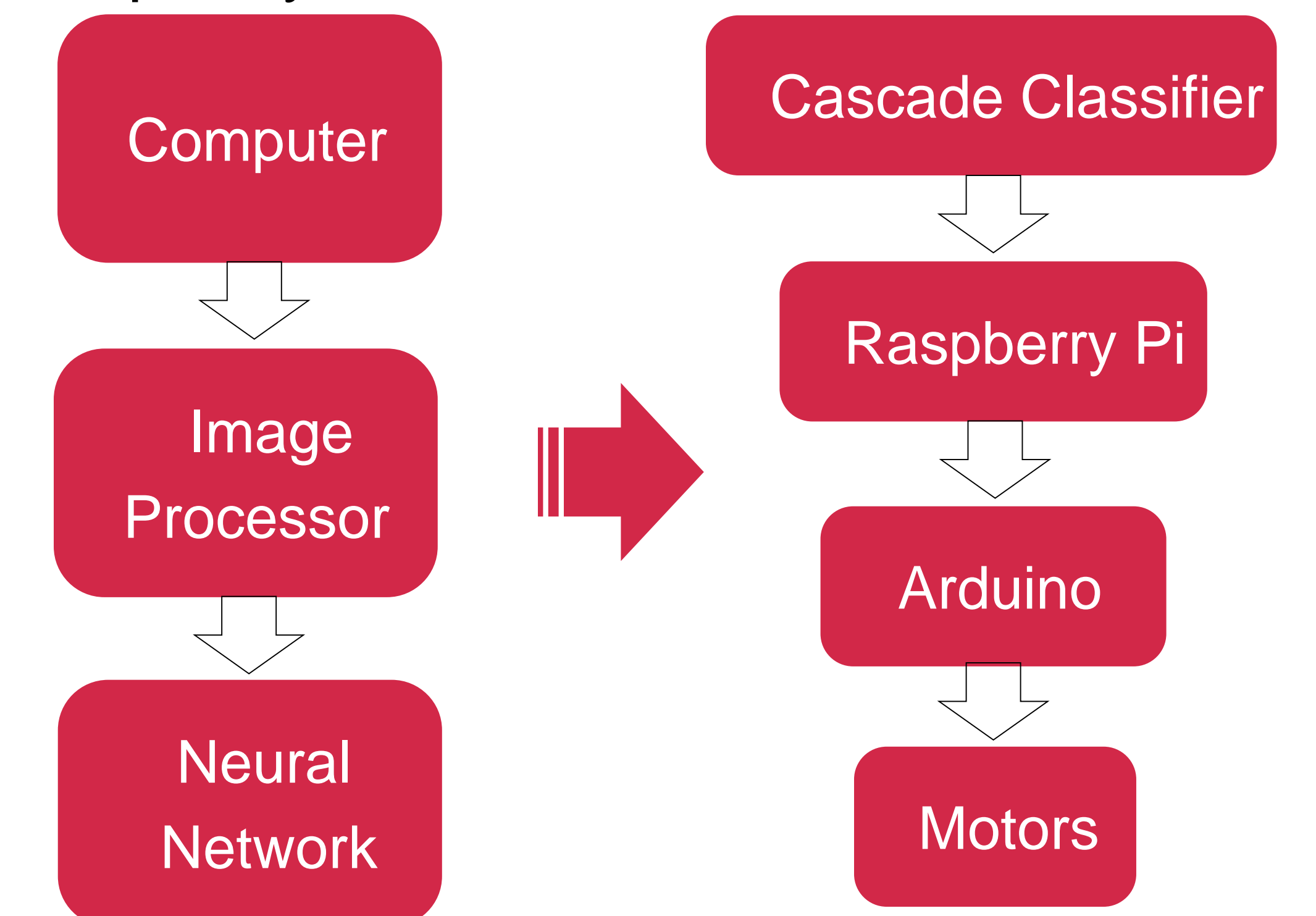
Neural Network

- ❑ Confusion matrix of neural network trained on clustered features of 594 testing samples displays reasonable agreement between training and testing.



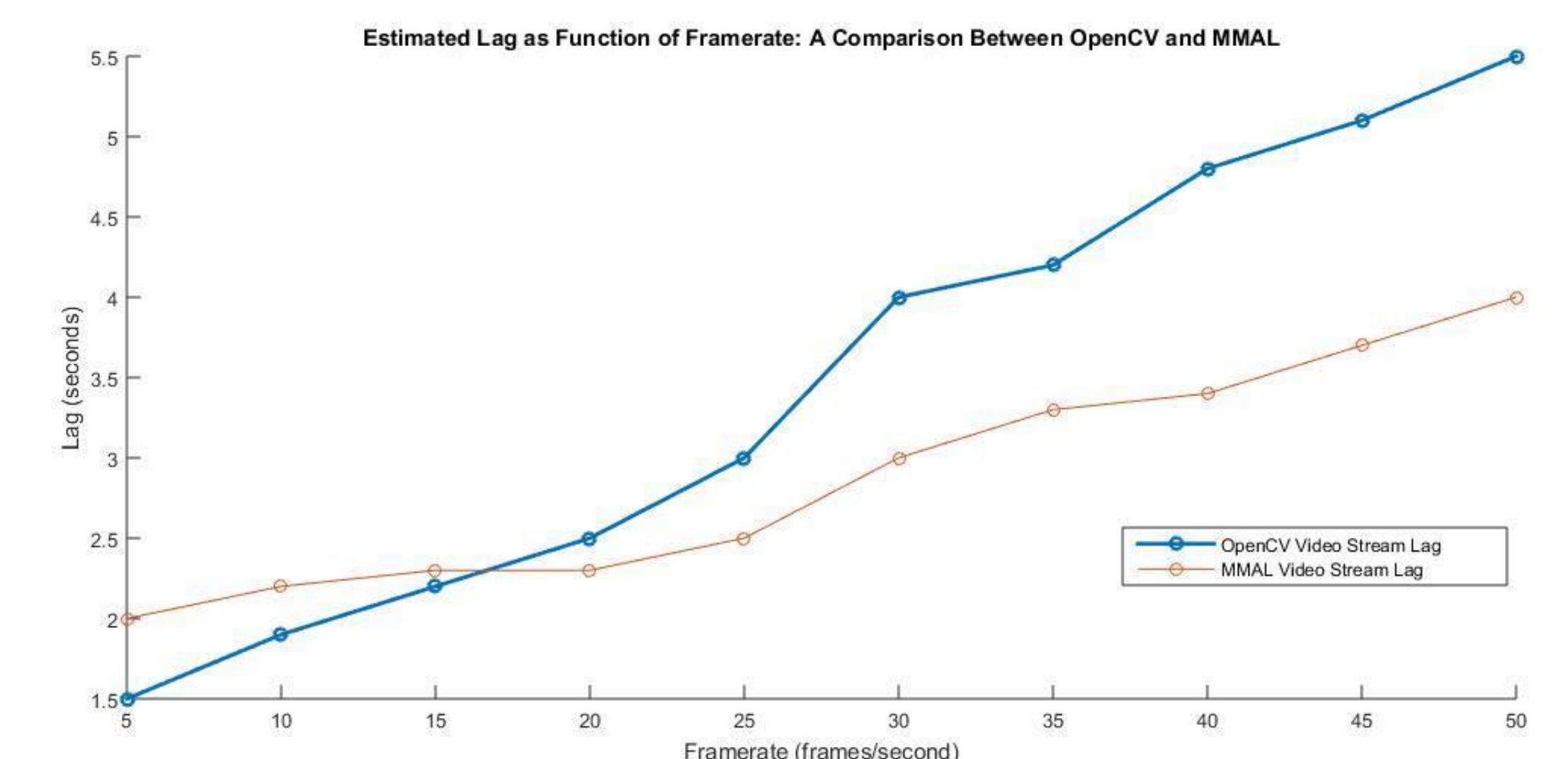
HARDWARE

- ❑ Establishing communication between hardware blocks using Bluetooth
- ❑ Live video feed using OpenCV and Raspberry Pi



Streaming Delay

- ❑ OpenCV Lag is relatively small at low frame rate
- ❑ MMAL Lag remains at reasonable value even at high frame rate



References

- [1] D. Atabay, "Pyrenn: A recurrent neural network toolbox for python and matlab", 2016. [Online]. Available: <https://pyrenn.readthedocs.org/en/latest/>. [Accessed: 27- Mar- 2016].
- [2] "Python Programming Tutorials." Python Programming Tutorials. Python Software Foundation. Web. 25 Apr. 2016.].