MNIST Digit Classification Using Raspberry Pi Pico W

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Motivation

- **Embedded Systems**

  Dedicated hardware and software + constraint on power, memory, size

- **Machine Learning**

  Large scale automation; Large number of resources to train

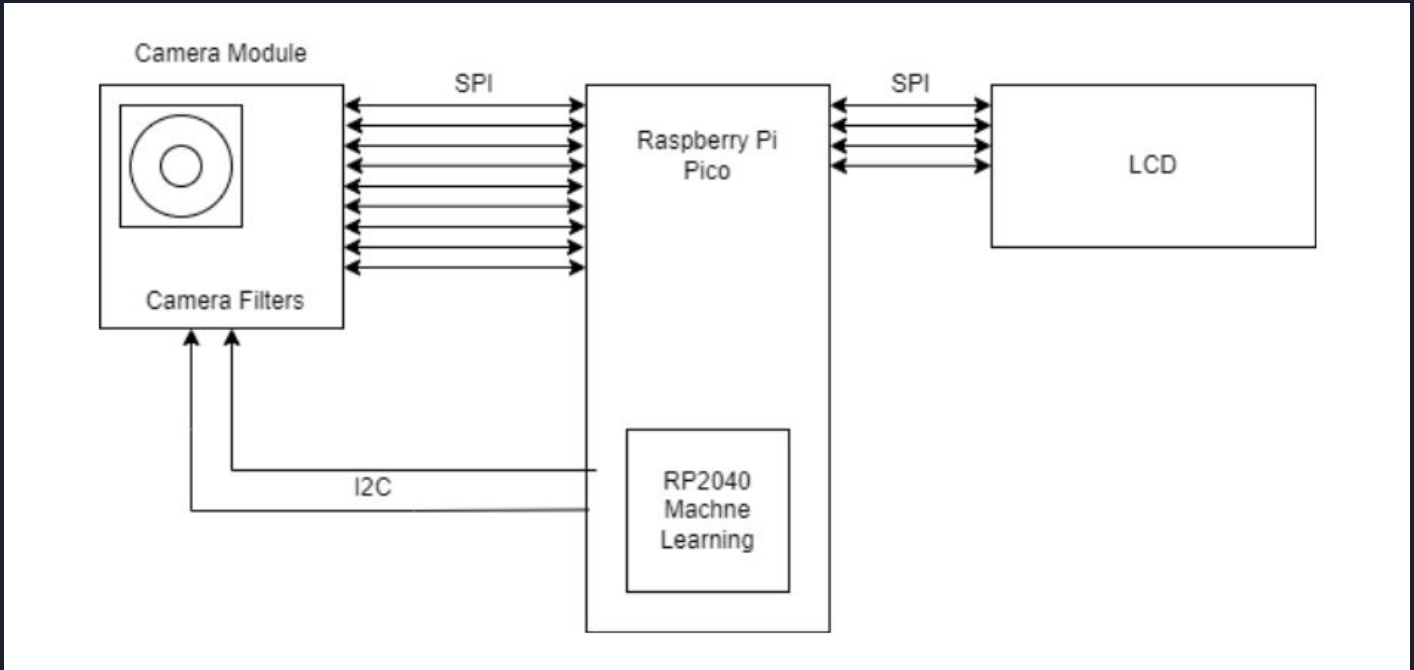
- **Motivation**

  Embedded system for Machine Learning implementation

- **Objective**

  Feasibility of carrying out MNIST digit classification using Raspberry Pi Pico W

Block Diagram(added after presentation)



Contributions

Hemant Hajare (20D070037) (Hardware Interfacing)

- Selection for low cost camera module and IPS LCD
- Interfacing camera module and IPS LCD with Raspberry Pi Pico W using Circuit Python

Tejaswee Sulekh(20D070082) (ML Deployment)

- Finding out simple model to deploy - SVM
- Training the model without suitable parameters and hyperparameters
- Implementation on Raspberry Pi Pico W

Challenges

ML deployment

- Optimizing model to get minimum classification error with memory constraints

System

- Stability of the image object
- Low refresh rate of sensor

Demonstration

Results and Conclusions

- MNIST digit classification can be implemented using Raspberry Pi Pico W
- Tradeoff between image resolution and accuracy
- Very sensitive to motion
- Depends on exact placement of object with the specified FoV
- Link to the demonstratio video can be found here

Thank You