



DEVELOPING A NOTIFICATION SYSTEM FOR AN ELECTRIC KETTLE

CEE 5440 – S2021 PROJECT PRESENTATION

SANTIAGO BERTERO

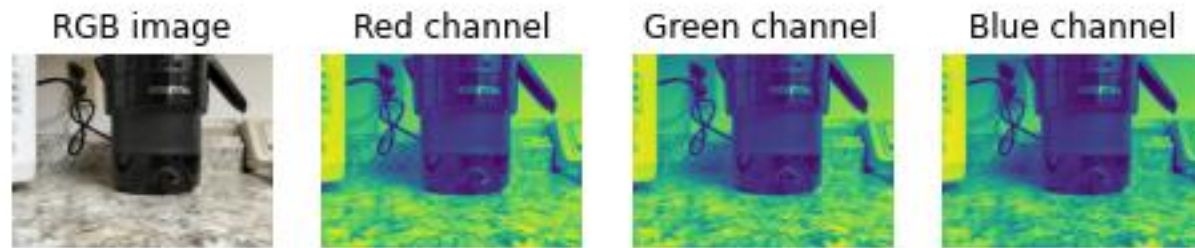
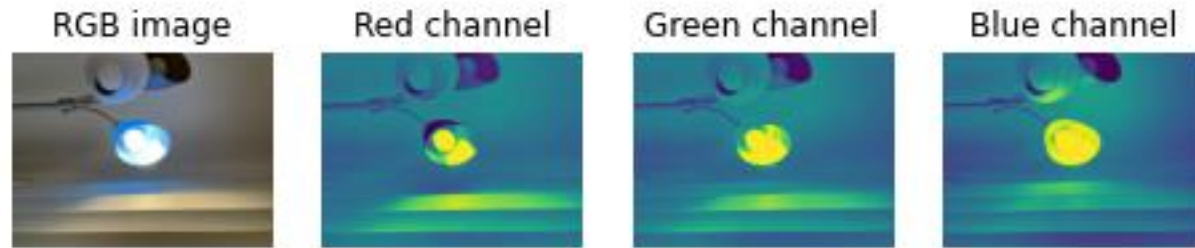
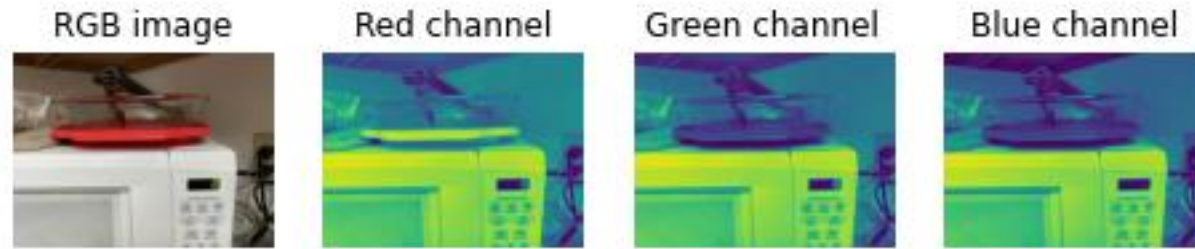




MOTIVATION

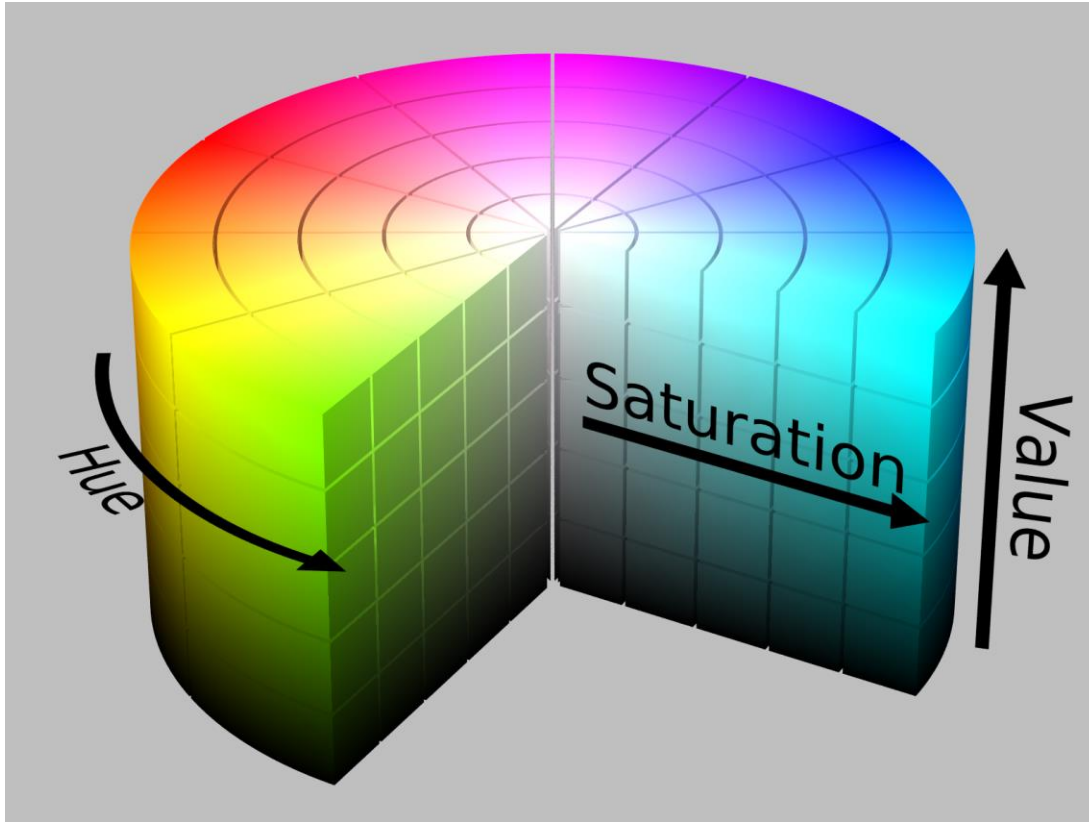
- Kettle does not turn off after reaching desired temperature
- How can we add “Smart” features to it?

(COLOR) LIGHT DETECTION



RGB IMAGES

- Red-Green-Blue representation mixes color with light
- How can I distinguish a red object from a red light?



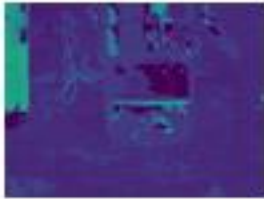
HSV TRANSFORMATION

- How humans “interpret” color and brightness
- Distinguish between Hue (color), Saturation and Value (light)

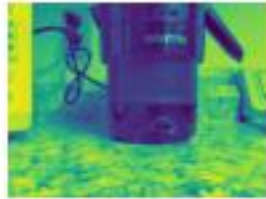
RGB image



Hue channel



Value channel



Saturation channel



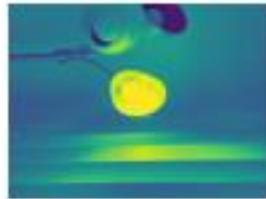
RGB image



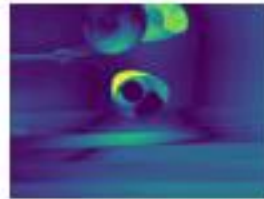
Hue channel



Value channel



Saturation channel



RGB image



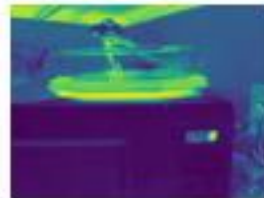
Hue channel



Value channel



Saturation channel



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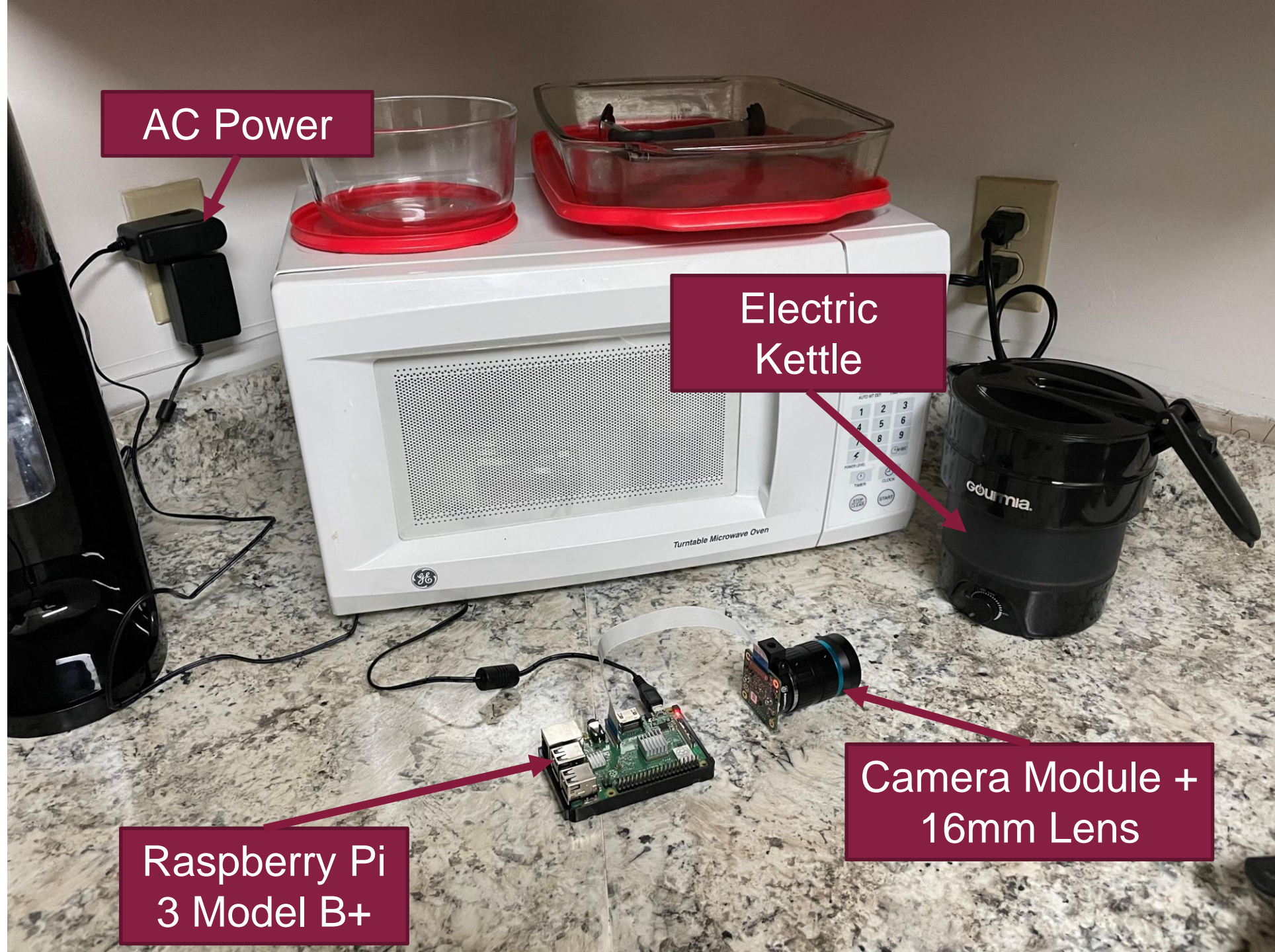
TEST SETUP + ALGORITHM

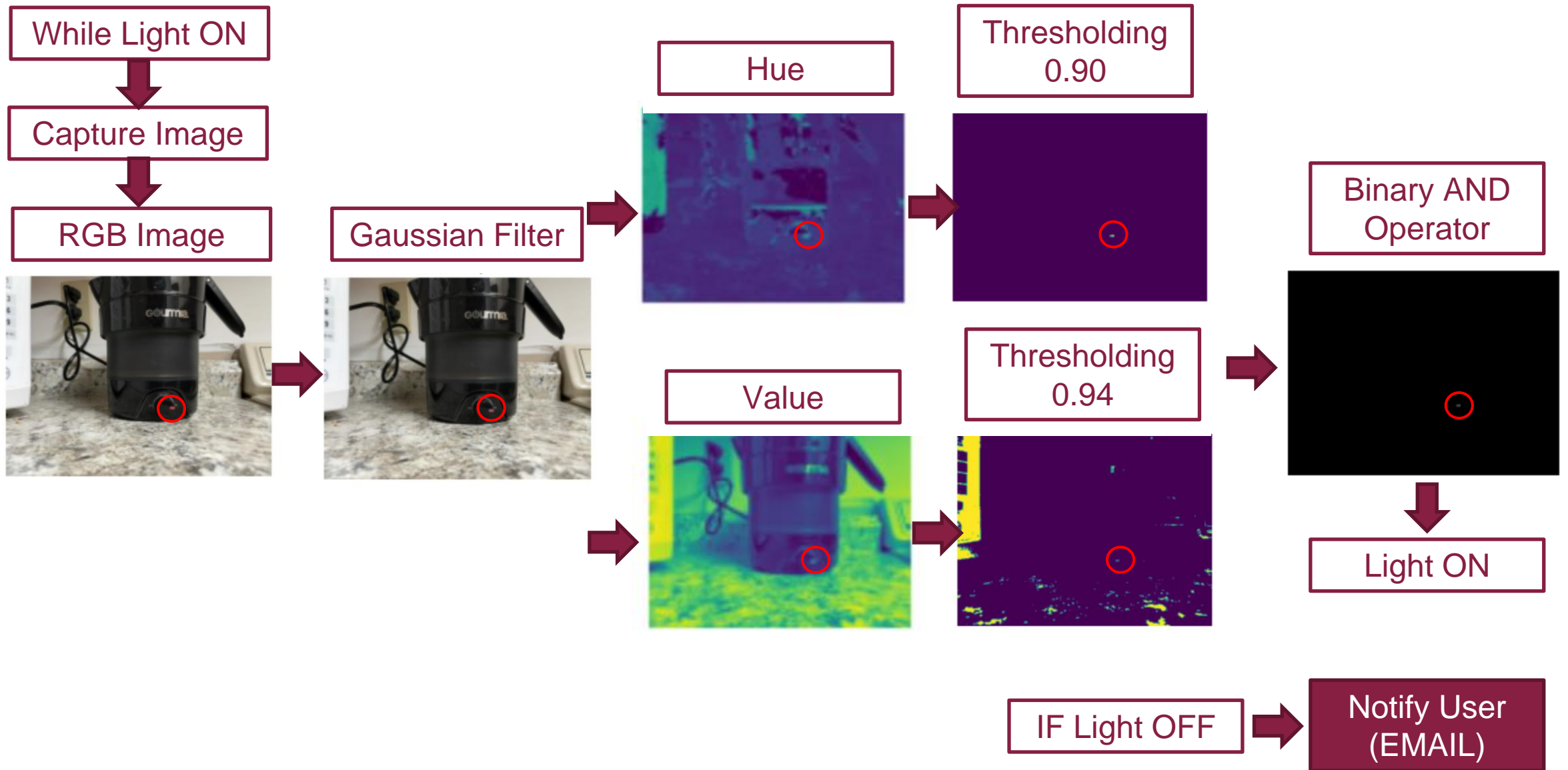
AC Power

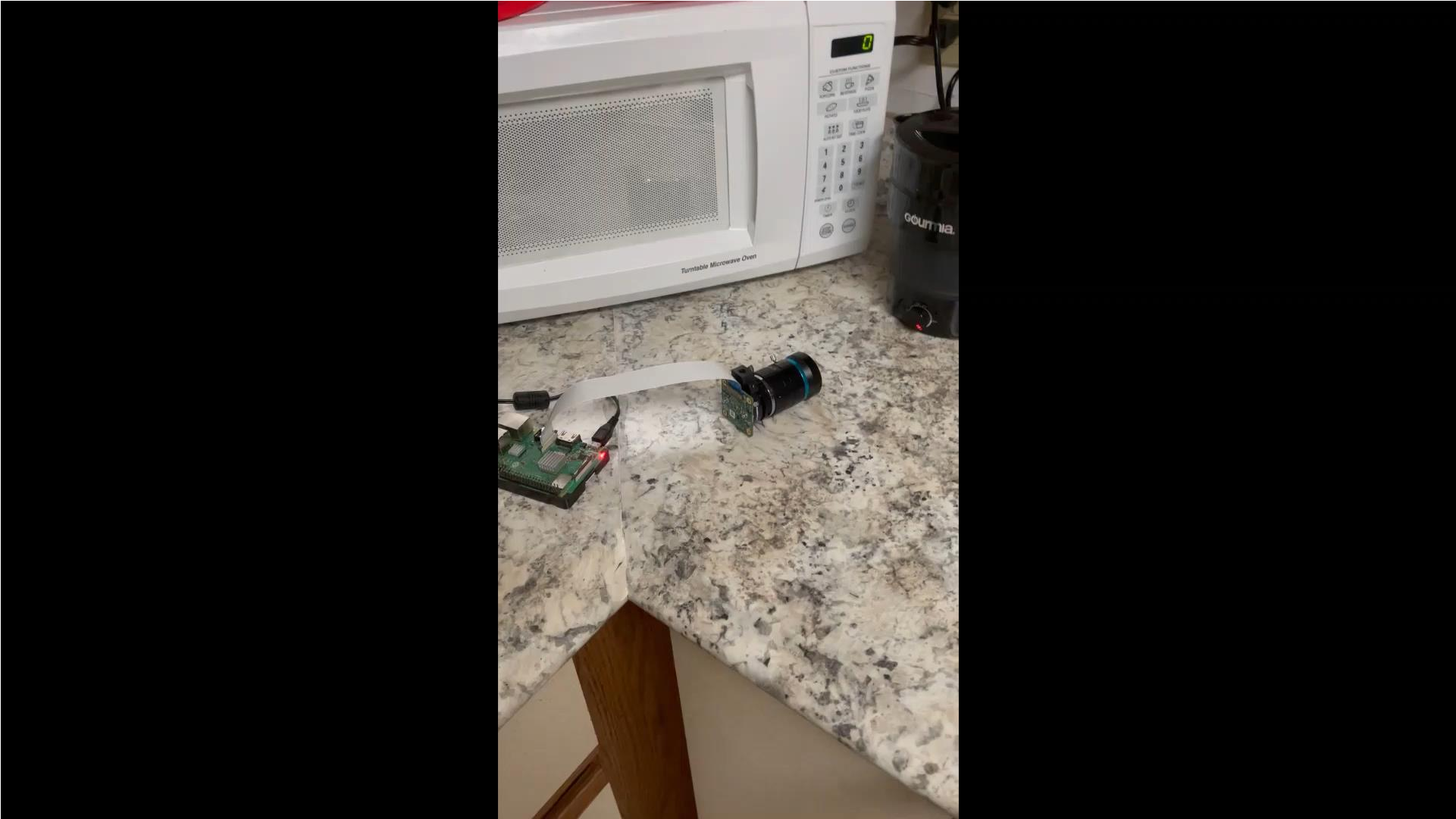
Electric Kettle

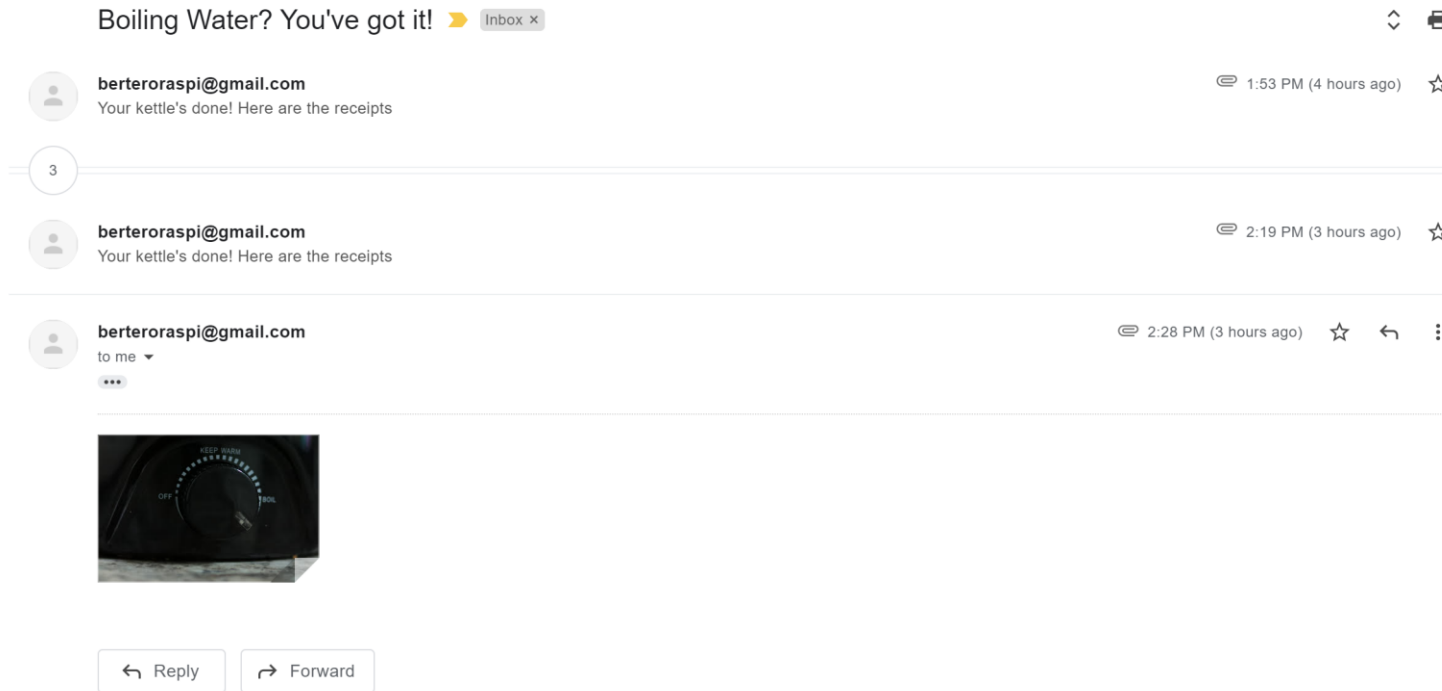
Camera Module +
16mm Lens

Raspberry Pi
3 Model B+









NOTES

- Up to 10s delay (5s wait time for focus + processing time + emailing)
- 100% success rate (so far) under different lighting conditions in the kitchen



FINAL THOUGHTS

- Avoid idle time for faster response time: Camera and processing in parallel; Don't refocus each time
- Highly flexible method can be adapted to other problems (e.g.: traffic lights in self-driving car)
- Any ideas for your own use?