CSE
Tomorrow's Technology through Today's Education

Intelligent Door Lock
Team Black Theory
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Black Theory

Purpose and Background

The purpose of this project is to help modernize how one goes about home security and home development. Using a raspberry pi and AWS services this project uses sophisticated facial recognition in order to pass judgements on allowable profiles.

Background of software:

o   AWS Rekognition provides two API sets: Video and Image. Both APIs analyze images and videos to provide insights we use for facial recognition. When a customer uploads a video, a profile is made allowing anyone with a profile to access the door via facial recognition. When a profile user approaches the door, AWS will search for known faces in stored videos.

o   Rekognition Video is a video recognition service that detects activities and understands movements of people in a frame. It detects persons and tracks them through the video even when their faces are not visible. Keeping a history of activity on a cloud where you can view a log of door activity with dates and times.

Conclusion

AWS Rekognition was a reliable service that provided ease of use and powerful features used for facial recognition. The depth information development was delayed and could be an excellent continuation of this product.
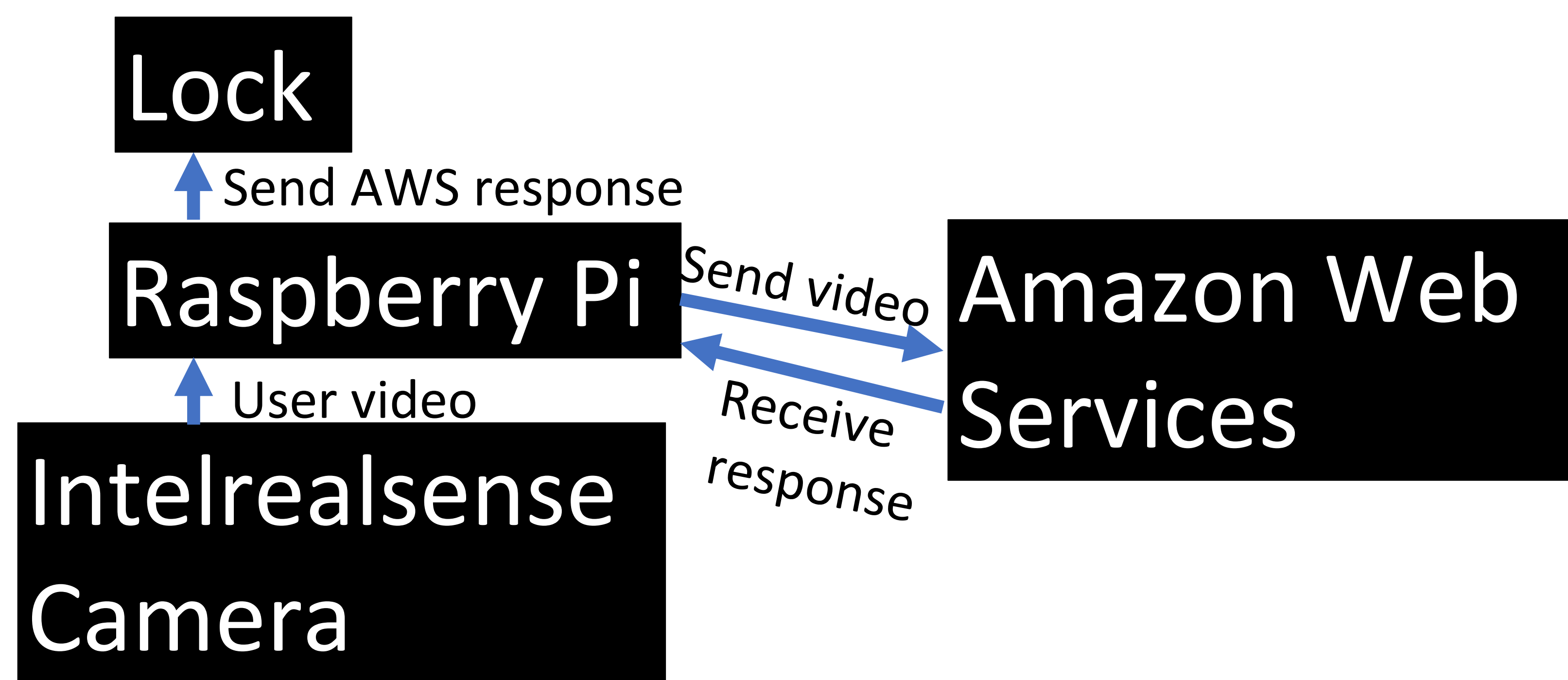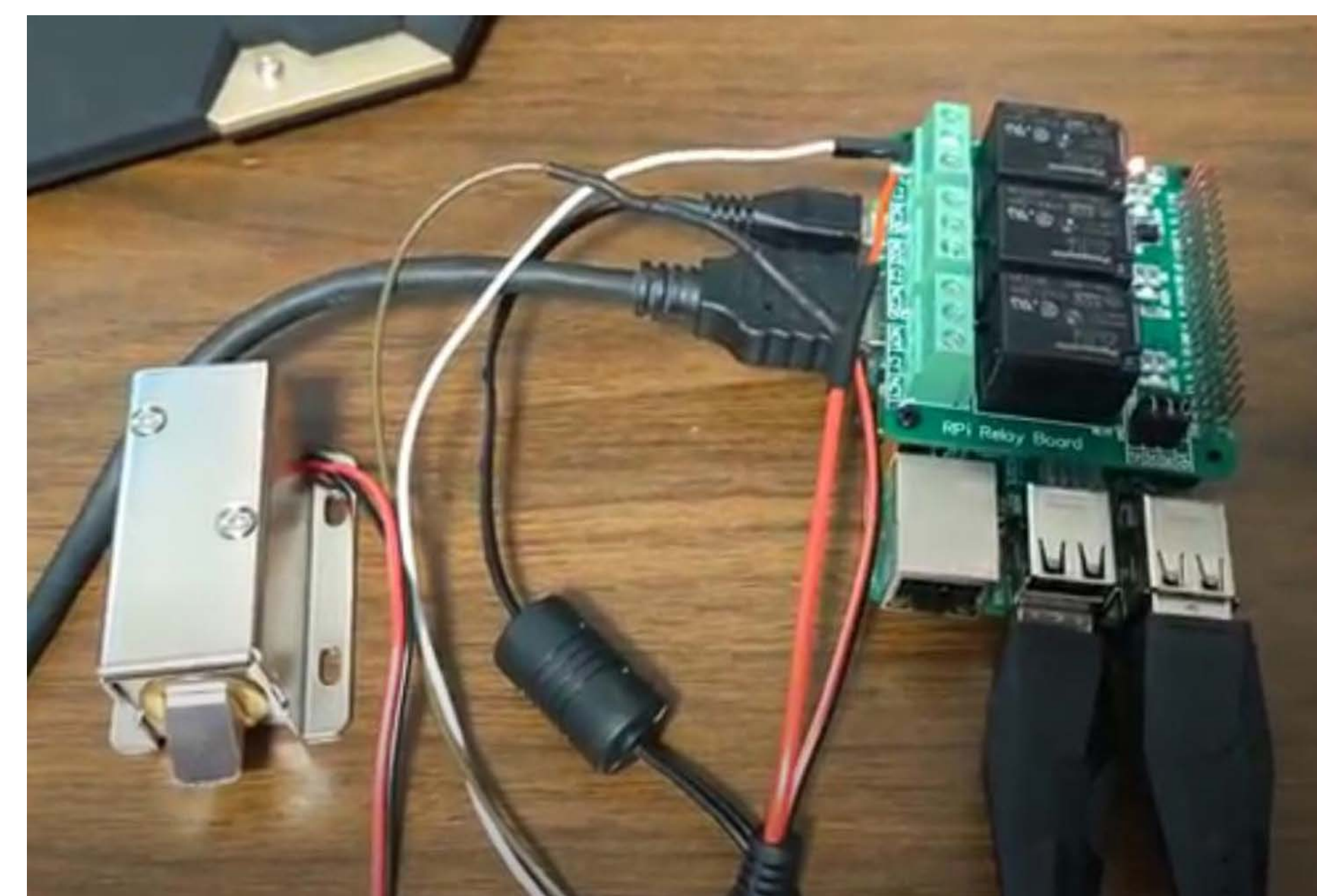
Acknowledgements:
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Solutions & Illustration

We will provide the following services with an easy to set up smart lock:

- Ultrasonic Senor to sense movement
- Raspberry Pi to package the video and send to AWS
- Amazon Web Services to process the video and send if it is a match to user profile
- LED to show the user current step in process
- Magnetic Sensor to automatically lock when door is closed
- Intelrealsense camera to detect if it is a human

Intelligent Door Lock

Lock
↑ Send AWS response

Raspberry Pi → Send video → **Amazon Web Services**
← Receive response

↑ User video

Intelrealsense Camera

Implementation

Cameras
An Intel RealSense RGB-D camera was used to take both regular color pictures and depth data (using computer stereo-vision) to achieve the requirements of the project.

Facial Recognition
Using Amazon Web Services, we were able to implement quick and efficient cloud based facial recognition which receives a 5 second video and sends back a match or not.

Spoof-Proofing
An algorithm was developed to use incoming depth data to determine whether the profile user is live or is trying to spoof the system.

Sensors and Pi
Through the use of a Raspberry Pi 3B, we were able to connect and manage numerous sensors that had specific tasks necessary for the functionality of the product. An ultrasonic sensor was used to activate the script to being the facial recognition process (capturing of the video, sending it to the cloud, and receiving a reply). A lux sensor was used to measure the luminosity of the environment and use that information to determine whether we should activate our flash for better visual fidelity. A magnetic sensor was used to determine if the door is closed or not, delaying the locking of the door if it is ajar.