

Raspberry Pi-Powered Home Security System With AI Picture Analysis

Kaia Hansen, Enock Omweno, Elena Bourget, Haolan and Spencer Keith

Functionalities and Main Objectives

The Raspberry Pi-Powered Home Security System is a device that acts as an extra layer of protection for your home. It will allow you to see who enters your home, who is leaving, and who is outside your door. It will even be able to tell you if the people at your door are friends or strangers. You will have access to this video feed at all times to give you comfort throughout the day. To access the data and stream from your home security system, there will be a secure website for you.

- AI Picture Analysis
- Zero Spy Camera
- User-Friendly Website

Timeline

Materials - Spencer, Haolan

Physical Components

- Raspberry Pi Zero
 - Case: 3D-printed from original design
 - Power cord: Micro-USB
- Camera
 - Zero Spy Camera for Raspberry Pi Zero

Database Setup - Enock, Haolan, Spencer

Create a MySQL database hosted on University of Wisconsin - Eau Claire servers for storing image and video files recorded by the camera. Coordinate setup with CS Admin.

- MySQL database
 - University of Wisconsin - Eau Claire servers
- MySQL Workbench (IDE)

Data Collection - Kaia, Elena, Spencer

Write software to record and stream a live video feed from the Raspberry Pi camera, which is analyzed by artificial intelligence to detect and recognize faces. The live feed will be accessible from a website (discussed later), locked behind login security credentials. The analysis software will recognize registered users (friends) and unregistered users (strangers).

- Python (language)
- OpenCV (library)

- Artificial intelligence image analysis
- Open source

Data Organization - Spencer, Enock

Save recent data (video and image files) to the SD card attached to Raspberry Pi Zero. At a certain determined capacity, send data to MySQL database (“BLOB” type, send over network), remove files from SD card, and restart the process.

- Python (language)
 - MySQL Connector
- MySQL (language)
- SanDisk 128GB Ultra SDXC UHS-I Memory Card

Website - Kaia, Elena

Display the live video feed and collected data in a user-friendly website. Users can select whether to view the live feed, or to view a saved video recording or images from the database. When a person is recognized (friend), there will be a box with their name visible around them, and if they are not recognized (stranger), this will be indicated as well.

- Web server hosting
 - University of Wisconsin - Eau Claire servers
- HTML (language)
- CSS (language)
- JavaScript (language)
 - Potential back-end language
 - Node.js
- Java (language)
 - Potential back-end language
 - Spring
- MySQL (language)