



INVENTOR : SYED SYAFIQ BIN SYED ALIAS
FACULTY : FACULTY OF COMPUTING
UNIVERSITY : UNIVERSITI MALAYSIA PAHANG
EMAIL : SYEDSYAFIQ12@GMAIL.COM
CO-INVENTORS : DR. NUR SHAMSIAH BINTI ABDUL RAHMAN
 DR. ANIS FARIHAN BINTI MAT RAFFEI



Product Background

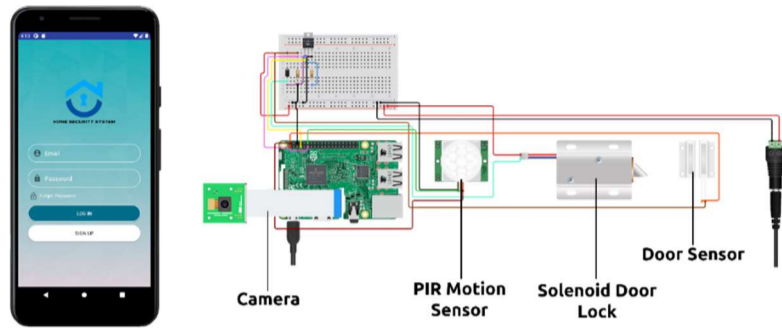


Figure 1 Home Security System application and Raspberry Pi module

- This is a Home Security System that focuses on using face recognition. The system is divided into two main parts which are an Android application and Raspberry Pi module. Using the Home Security System application, the user will be able to sign up, sign in, reset password, upload face images (for face recognition), retrieve uploaded images, retrieving door status and motion detection history and view CCTV footage. Raspberry Pi module is equipped with a camera module (face recognition purpose), passive infrared (PIR) motion sensor, door sensor and solenoid door lock.

Methodology



Figure 2 Agile Software Development Cycle

- In the first phase the requirement of the HSS is elicited and recorded in the Software Requirement Specification (SRS) document.
- In the second phase, the system design is developed and recorded in the Software Design Document (SDD).
- In the third phase, the function will be developed.
- In the fourth phase, the developed function will be tested.
- In the fifth phase, the function will be deployed to the user.
- In the final phase, the function will be reviewed and decided to make improvement or move on to developing another function.

Benefits

- House will be guarded at all times by the system and the user will be notified if a variable is detected by the camera module, motion sensor and door sensor.
- The cost of installing HSS is cheaper than most security systems. The parts are easily replaceable and cheap but reliable.
- The user can see what happens at their house surrounding at all times by accessing the Home Security System application.

Environmental Impact

- Reduce the need for the user to buy and duplicate keys.
- Reduce energy consumption.
- Low energy requirement to keep the house more safe.

State of Art

- The main focus of this invention is the face recognition function.
- OpenCV, which is a library for programming, will be used in the system to develop a real-time computer vision application.
- The Haar Cascade algorithm will be used to look for frontal faces from uploaded images and extract data for the specific user's faces to be registered into the system. It will use Haar-like features to detect a face.
- The Haar-like features will show a box with a light side and a dark side, which is how the machine determines what the face feature is.

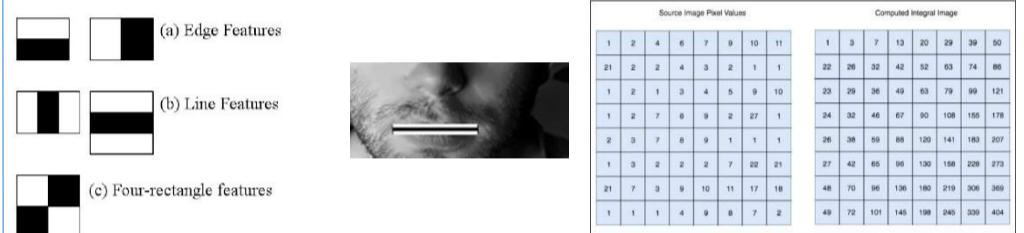


Figure 3 Haar-like features, application of line feature and integral image concept

- Edge features will be used to detect eyebrows as the shade of the pixel on an eyebrow in an image will be darker and abruptly gets lighter, differentiating between the skin and the eyebrow.
- The line feature is best to search for the lips of the face as the region of the lips on the face goes from light to dark and light again.
- As the image features have been detected by the algorithm, the value of a feature will be calculated by using integral images because it will help to perform intensive calculations quickly so the system can understand whether a feature of a number of features fits the criteria or not.
- As the features have been detected and calculated, the data will be stored in a yml file to be used later for detecting faces that have been learned by the system.

Novelty

Table 1 Comparison of existing system

Security System Name	ADT Pulse	Ring Alarm Security Kit	Home Security System
Component	1. Arduino Mega 2. Z wave thermostat 3. Wireless motion sensor 4. ADT security camera	1. Base station 2. Keypad 3. Contact sensor 4. Motion sensor 5. Range extender	1. Camera module 2. Motion sensor 3. Door sensor 4. Solenoid door lock 5. CCTV
Access from third party device	Yes	No	Yes
Facial Recognition	No	No	Yes
Notify user	No	No	Yes