DOI: http://dx.doi.org/10.26483/ijarcs.v8i9.4875

ISSN No. 0976-5697

Volume 8, No. 9, November-December 2017

International Journal of Advanced Research in Computer Science

RESEARCH PAPER

Available Online at www.ijarcs.info

SMART HOME DEVELOPMENT FOR HOME SECURITY WITH ANDROID BASED

Dwi Nor Amadi
Lecturer, Merdeka Madiun University
Madiun, Indonesia

Joko Triono
Lecturer, Merdeka Madiun University
Madiun, Indonesia

Abstract: Smart technology has applied in various fields, one of them is called smart home, the smart home concept itself is a dwelling equipped with network communication system that connects to different services and an electronic device that allows to monitored and accessed from another place. Smarthome system for home security developed for this research consist of two different module. The first module called detection module and second is called notification module, the detection module consists of camera sensor raspberry pi3 V2 and web server to stored an image. and the notification module consist of raspberry pi3 mini computer and module SMS sim800sl that can send a notification in case of an emergency at home to your android smartphone.

Keywords: smart-home, home-scurity, android, raspberry, sim800l

I. INTRODUCTION

Development of Android-based applications that applied in the fast-growing community began a broad level today we know as a smart city or smart village and the smallest scope we know the term called a smart-home. Nicola King defines smart-home as a shelter equipped with a communications network that connects various services and electronic equipment and allows it to be monitored, accessed and controlled remotely.[6]

Along with the increasingly complex life of the community, increased mobility, more and more severe crime popping up by exploiting the situation and environmental conditions, the most frequent offense is crime of theft and violence in the home environment

the role of the information technology especially smart home is expected to help provide security and comfort for the homeowner. Developed a smart-home application that can monitor the condition of the house when the house is in its owner's residence. Expected by the application of the smart-home the homeowners can monitor the condition of the house remotely and allowing residents to get a warning

The smart home application divided into two modules called the monitoring module with its main component is the camera system with IP cam function. The second module is a warning module in which this module has the primary element of the Arduino Mega ADK based micro-controller. And motion sensors to detect when the house entered by people or animals. The warning module will send an SMS to the mobile phone number of the homeowner so that the homeowner can access the system from Android to monitor the condition of his house.

II. LITERATURE REVIEW

Information technology consists of both computer hardware technology and software to process and store information and technology with the aim to transmit data[8]. while according to William & Sawyer, information technology brings together high-speed computing and communications for video data and audio.[10]

Smart-home is a concept of integration of multiple services within the home using the same communication system. And still, ensure the security and comfort with high intelligence function.[7] Meanwhile, according to Berlo, smart-home is a home or workplace, which has the technology to run devices and systems automatically.[2] Python programming language created by Guido van Rossum in the late 1980s was different from other programming languages such as C, C ++, Java and C #. Python strives to provide simple but powerful syntax, python languages widely used for software development in companies and organizations such as google, yahoo, and facebook, experienced programmers, can achieve great things by using python and make it possible to solve problems of interest faster than using other more complex programming languages.[4]

Open cv library is one way to build software used for dynamic and real-time image processing. Open cv created by Intel Corporation and supported by willow garage and Itseez. The software provides a set of image processing functions, as well as image and pattern analysis functions. Functions are optimized for Intel processors and are very useful in utilizing MMX technology. OpenCV is designed to be used in conjunction with Intel® Image Processing Library (IPL) and enhances the final functionality of image and pattern analysis [5].

PIR sensor is a small, inexpensive sensor, requires little power, easy to use and without raising concerns. With the advantages of these PIR sensors found in many household items and gadgets used for home and industrial needs. In the PIR market is often referred to as "passive infrared" "Pyroelectric, or" IR motion "sensor [1]

Sim 800 is a quad-band GSM / GPRS module that works on 850MHz gsm frequency, EGSM 900MHz, DCS 1800MHz and PCS 1900MHz. Features of GPRS class GPRS 12 / class 10 (optional) and supports GPRS CS-1, CS-2, CS-3 and CS-4 encoding schemes.

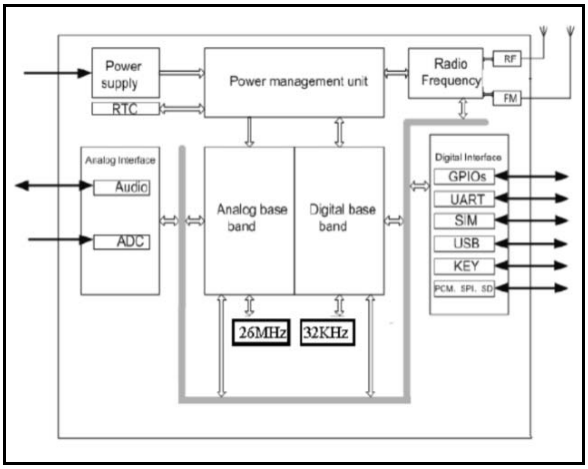

Figure 1. Sim800l Diagram (Simcom)[9]

With a small configuration of 24 * 24 * 3mm, SIM800 can meet almost all the needs of application users, such as M2M, smartphones, PDAs and other mobile devices. SIM800 has 68 SMT bearings and provides all hardware interfaces between modules and customer boards.

III. DEVELOPMENT METHOD

to build the aplication, the researcher used waterfall metodology in this research. there are 6 steps on waterfall metodology. it is system enginering, analysis, design, developing code, testing and maintenance.

At the first steps called system engineering, a study of previous studies concerned with implementation Smarthome android based applications and learn the problems that occur related to the smarthome application system.

then analyzed the findings of problems that occur related to Home Security and the environment of the output of the analysis is that required an application that can monitor the condition of the home environment in real time

From the analysis then its translated into the form of application design and infrastructure that can support the running of the application. The initial stage of application design is to determine the entity entities involved in the smart-home application system. Once it can be defined the entities involved in the system then designed the database to be used on the application.

After the design phase completed the next is to translate the design into the programming language.

From the result of coding, the next step is testing of the program that has developed. The purpose of this test is to find possible program errors.

After the preparation of the program is completed and the implementation of the application, it is necessary to perform maintenance or system maintenance to keep the system running properly

IV. RESULT AND DISCUSSION

According to development method, so at the time researcher was successfully build a system called smart-home for home security with android based. It can access from smartphone to gets report about the home condition. The flowchart of the method can show in figure 2

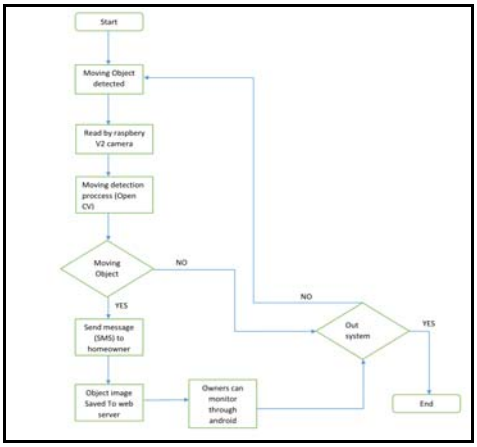

Figure 2. Flowchart System

If objects are moving around the house that is within the range of the raspberry V2 camera lens, then the system will work to process the detection of the movement of the object using openCV.

If there is a movement, then the system will notify the owner of the house through SMS and do image recording and save the image to the web server that has provided. For later the homeowner can monitor through an Android smartphone.

A. Object Detection Module

The object detection module uses a raspberry V2 for the Pi3 camera with 8 MP resolution with nighttime reading capability with infrared.

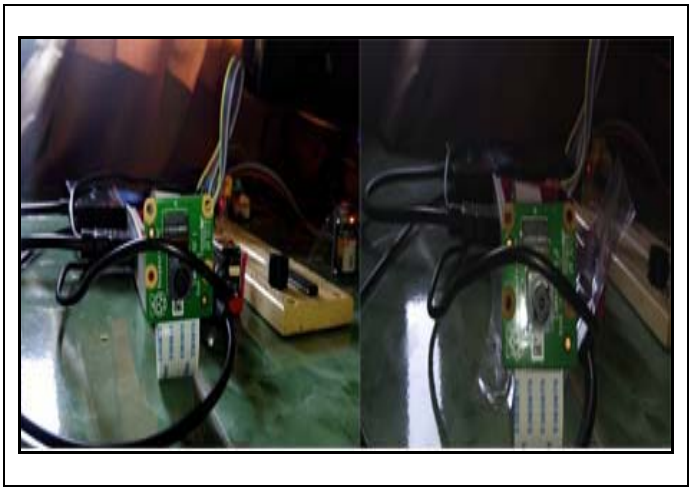

Figure 3. Module Camera Raspberry V2

the camera module can capture moving objects with a 8MP resolution which is considered sufficient to identify moving objects.

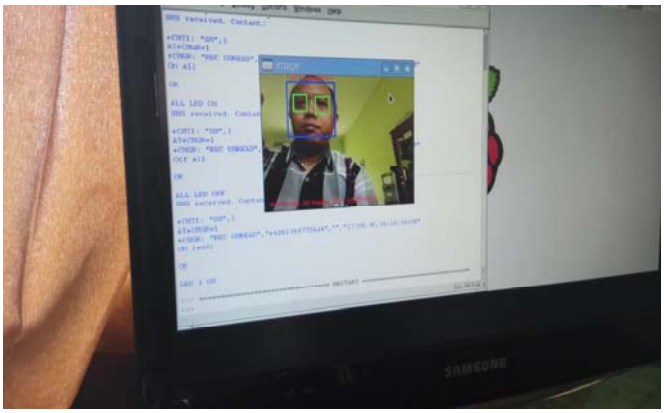

Figure 4. Detection Moving Object

the motion detection module using OpenCV to process motion detection, which is installed and configured in the raspberry module Pi3. There are several steps to installing and configure OpenCV.

- The first step is to update the package inside the raspberry OS Pi3
- the next step is to install the input/output image including the video input/output.
- Next is to install GTK development library so that it can compile high-GUI Which is a sub-module of OpenCV that can be used to display the image on the screen and make the interface look better than the others
- The next step is to install phyton 2.7 to compile OpenCV

- after that the next step is to download the source code from OpenCV and the final stage is setting python, Compile and install openCV.

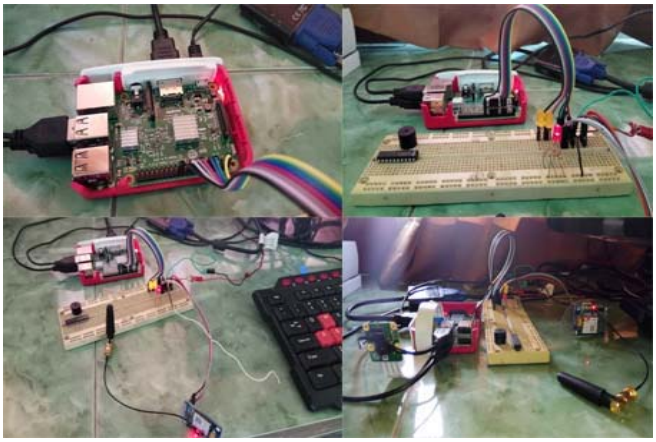

Figure 5. Modul Detection With Raspberry Pi3

B. Notification Module

This notification module is an SMS gateway module with AT command and uses a sim800L module. The sim800L module works with AT_command to send SMS to the homeowner

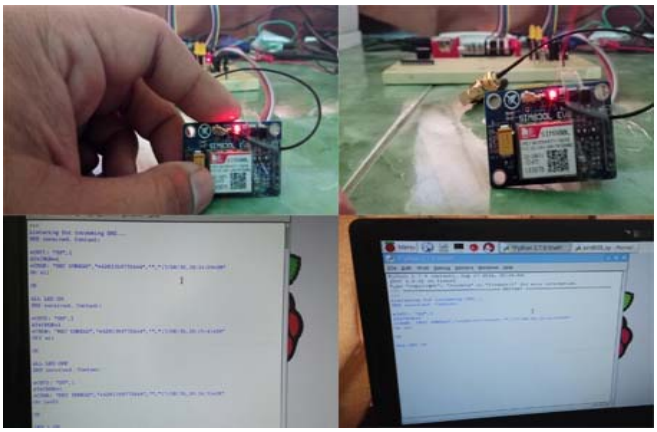

Figure 6. Module Notification SIM800L & AT Command

There are several things to consider in the installation of the sim800L module. Among others are :

- The sim800L module must have its power supply and cannot combine with the raspberry power supply.
- If the sim card used in sim800L module to receive calls, then reads the number is inactive but still, can send SMS notification.
- On the indicator lights sim800L there are two kinds of indicator lights are led ring and led network.
- Led ring will light up continuously if the current voltage is sufficientLed ring will light up if the current voltage is less.
- Led ring will be extinguished if there is an incoming call to the sim card number available in sim800L module.
- Led Net will blink every ¾ second when looking for GSM communication network.
- Led Net will blink every 3 seconds if sim800L is connected with GSM communication network and ready to be used to send notification.

When homeowners get notification of motion monitored at home, the owner can access the image is applied android smartphone.

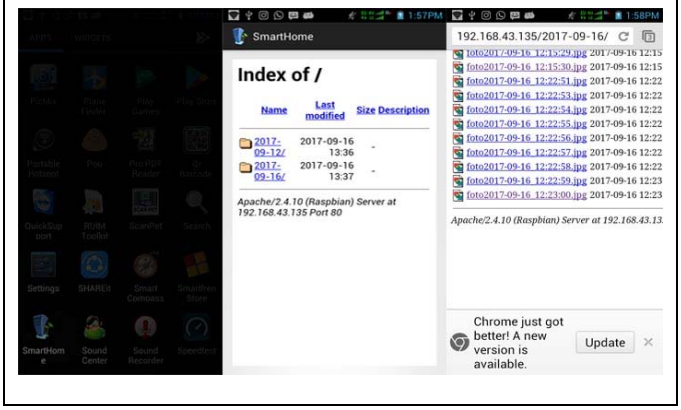

Figure 7. Design Android Aplication

where the application connected to a web server that contains image data generated by object detection module.

V. CONCLUTION

From the stage that has done can be concluded that the development of a smart home for home security with androd based has been successfully done where the system has correctly detected the moving object and successfully send a notification to the homeowner though still not perfect.

VI. REFERENCES

[1] Ada Lady, 2016. PIR Motion Sensor., https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor. Access date august 19, 2017

[2] Arduino, 2011. Datasheet Arduino UNO.,http://arduino.cc/en/Main/arduinoBoardUNO Accessed date April 24, 2017

[3] Berlo A. V, Bob A, Jan E,Klaus F, Maik H, & Charles W., 1999., Design Guidelines on Smart Homes, A COST 219bis Guidebook. Brussels, Belgium: Eur. Commission.

[4] Halterman R, 2017 Fundamentals of Python Programming, Southern Adventist University

[5] Intel, 2001. Open Source Computer Vision Library Reference Manual., http://developer.intel.com . downloaded date august 20, 2017. USA: Intel Corporation

[6] King, Nicola. 2003. Smarthome – A Definition, intertek Research and Testing Center.

[7] Lutolf R. 1992. Smart Home concept and the integration of energy meters into a home basedsystem, in Proc. 7th Int. Conf. Metering Apparatus Tariffs Electr. Supply, page. 277–278.

[8] Martin, E. 1999. Managing Information Technology What Managers Need to Know (3rd ed.). New Jersey: Pearson Education International.

[9] Simtech, 2014. SIM800_Hardware_ Design_V1.5 Smart Machine Smart Detection, SimCom.

[10] William, sawyer, 2007. Using Information Technology. English : McGraw-hill.