International Journal of Engineering & Technology, 7 (2.12) (2018) 84-86

International Journal of Engineering & Technology

Website: www.sciencepubco.com/index.php/IJET

Research Paper



Development of autosensing for self-protection device based IOT

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Abstract

Background/Objectives: There is the needs for the service not only to keep a user informed of access to potentially dangerous people approaching from the rear by alarm sound or vibration through automatic sensor installed the device but to transmit location as well as sensing time to guardian through smartphone appwhen women are going off the beaten track on the way home late at night
Methods/Statistical analysis :It is composed of app that is interlocked with a protection device installed human body detection sensor and camera capable of autosensing potentially dangerous people approaching according to proximity sensor. This autodetection makes it possible not only to inform user on approaching the people by alarm sound as well as vibration but to transmit sensor detecting time and location to guardian.
Findings: Self-protection device based IoT which not only is informed approaching a dangerous person by alarm and vibration using a device attached sensor in case of sensing the people's approaching but catches danger through smartphone application to take a picture and images included time and location is developed in this study.
Improvements/Applications: This device will be expected to use not only women but students who are bullied at school. Pictures at school violence are transmitted to guardian if the student who has a device attached to the front of himmay occur school violence. Other improvements including if the device is dropped or handled roughly are under active consideration to send pictures or explanation of situation for guardian.

Keywords: *IOT; Self-Defense; Crime Prevention; Motion Sensor; Human Body Monitoring*

1. Introduction

A number of victims of violent crimes have been steadily increasing 15,515 people in twenty years from 9,762 people in 1995 to 25,277 people in 2014. The proportion of women in the victims of violent crimes was 6,587 people in 1995 that was 67.5% of the total victims while the proportion number was 21,729 in 2014 as a 86% among total victims and the proportion have increased almost four times over nine years [1], [2]. The percentage of women victims and crimes has become increasingly larger as more and more sale of self-protection devices records rapid growth. Therefore, the development of self-protection device for women which not only can be detected dangerous person in advance in case of going a woman alone in the middle of nowhere late at night but can prevents crimes is necessary [3], [4]. Firstly, user should establish a range of approaching to operate alarm sensor within the range and vibration or alarm sound is to inform user while sensing time and its location are transmitted guardian when the sensor is operating. Secondly, Picture and images are automatically taken and are automatically sent guardian [5], [6]. Thirdly, design should be pretty and unique enough not only to use accessory normally but to use only self-protection device in time of emergency. Malfunction rate of sensor should be reduced and picture and images with clear shooting at night should be provided. Manufacturing device with sensor and camera as well as application capable of transmitting sensing time, location, picture and images are to be developed [7], [8].

2. Development of self-protection device based iot

Human body detection sensor which is able to detect human within 2m is supposed to provide alarm sound. Application of low light level sensor is use to identify at night and transmission technology is also used to send user as well as guardian a series of photos which had been taken by different time frame like one second or two second. Each photo was taken after sensor detecting through device. Sensor has been detected and data will be transmitted to user and guardian's mobile phone. Sensor detecting time and its location is recorded in app and taken photos are stored in user and guardian's app through WiFi. The product in this study is composed of human body detection sensor and app that in connected to self-protection device installed camera. The device can usually be worn with different types of accessory like necklace and brooch while sensor and camera are operated if the device power is to turn on and then app is to work when women are going off the beaten track on the way home late at night [9].
The device installed human body detection sensor and camera is capable of autosensing potentially dangerous people approaching according to proximity sensor. This autodetection makes it possible not only to inform user on approaching the people by alarm sound as well as vibration but to transmit sensor detecting time and location to guardian. Photois shot at the same time and transmitted it to a user and guardian. It is possible for potentially dangerous people to warn a sign that taking photos are in progress when woman is wearing the installed LED around device and to

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notify guardian the location over time through the function of care her way home [10].

2.1. Development of human body detection sensor

Detection sensor using ultrasonic and infrared sensors is automatically operated to alarm sensor when humanis approaching within 5m. Development concept of human body detection sensor is shown in Figure1.

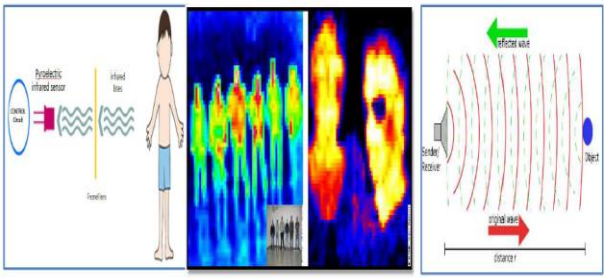


Fig. 1:.Development of Human Body Detection.

2.1.1. Camera photographing

Infrared lamp and illuminance sensor which is capable of identifying at night are used. Transmission technology is also used to send user as well as guardian a series of photos which had been taken by different time frame like one second or two second. It is also implemented that sensor detecting data is sent user's and guardian's mobile phone through WiFi and sensor detecting time and location is recorded in app. Taken photos and image are not only stored in app of user and guardian through WiFi but capable of watching them.

2.1.2. Hard circuit diagram

Hardware circuit diagram applied in this study is shown in Figure2.

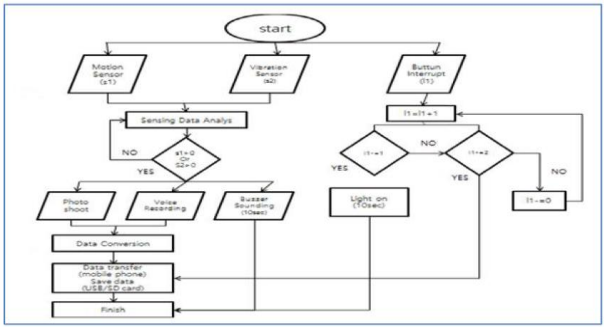


Fig. 2: Hardware Circuit Diagram.

2.1.3. Prototype specification

1) Application of CPU-V3 and PMIC-AXP209.
2) Camera Module: Application of Sony iMX291 module.
3) Memory: Application of 16MB Serial NOR Flash and 256MB DDR3.
4) WiFi Module: Application of 802.11 b/g/n, 2.4GHz, 1-chip, and XR819.
5) LED: Application of four 3-color RGB LED.
6) External F /Charge and I: application of Micro USB port.
7) Motion Sensor: Application of VL53L0X (Maximum 2m).
8) Camera Flash: Application of Max 500mA type White Power LED.
9) MIC: Application of Analog MIC.

2.2. Research drawing

Circuit diagram of power supply and camera is shown in Figure 3

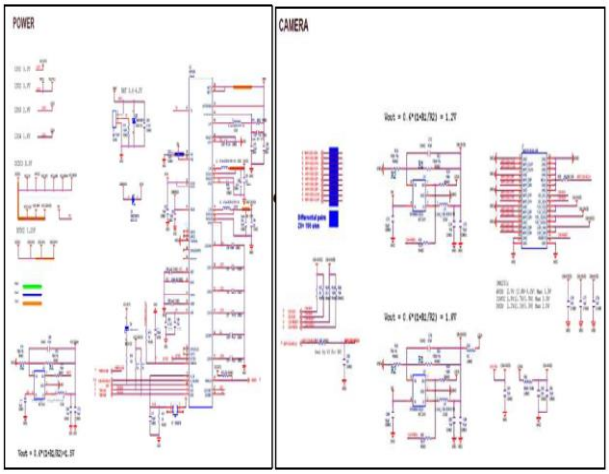


Fig. 3: Circuit Diagram of Power Supply and Camera.

Sub Board and Block Diagram are shown in Figure 4.

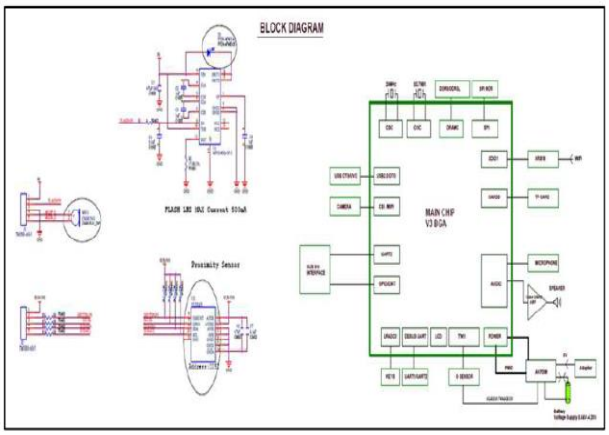


Fig. 4: Sub Board and Block Diagram.

Product specification of microphone is shown in figure 5.

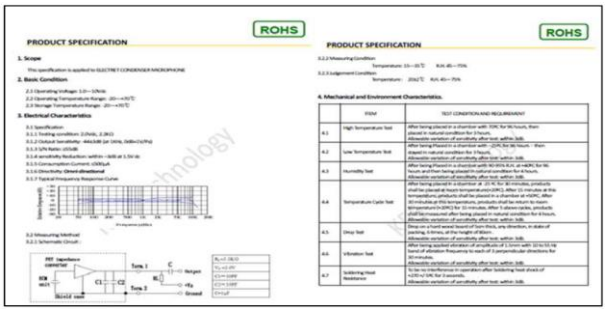


Fig. 5: Product Specification of Microphone.

Part of implemented app is shown in Figure 6 and 7.

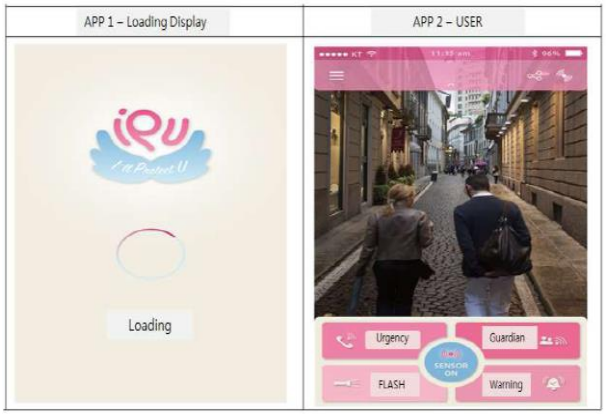


Fig. 6: Screen of App Loading.

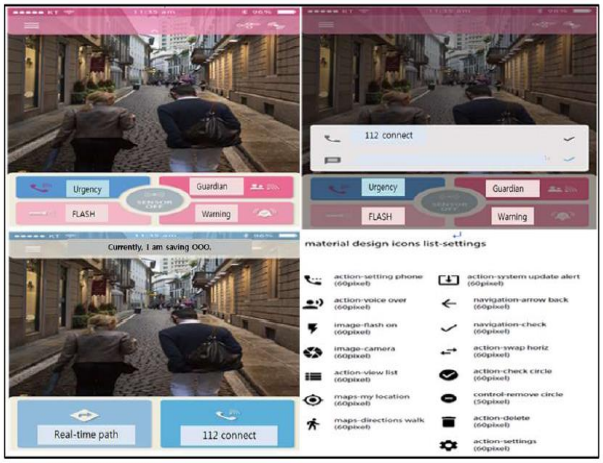


Fig. 7: Part of Apps for Careers.

Screen of manufacturing working mock-up and device is shown in Figure 8.



Fig. 8: Mock-Up and Device.

Final output of prototype is shown in Figure 9.



Fig. 9:.Final Output of Prototype.

3. Conclusion

The development product is consisted of an application which is connected motion sensor and self-protection device with attaching camera in this study. This device is designed to normally wear accessory such as necklace or brooch while an application is operating sensor and camera which is able to not only detect automatically approaching a dangerous person by motion sensor but be informed user approaching a dangerous people by vibration or alarm but be informed guardian sensor detecting time and user's location. It is possible to prevent crime through the device due to an identification of site picture by guardian even though user could not realize the danger. The product is expected to contribute to prevent crimes reliably because guardian could identify the site of picture even though user could not realize the danger, and a dangerous person could cut off approaching at first.

Acknowledgment

This Study was conducted by a research funds from Chosun University.

References

[1] Cherney, A., Exploring the concept of research utilization: Implications for evidence-based crime prevention,CRIME PREVENTION AND COMMUNITY SAFETY. 2009, 11(4), pp. 243-257.
[2] Cannavino, Michael, Using Design to Reduce Crime How Crime Prevention through Environmental Design (CPTED) can improve and reduce crime in your park, Parks and Recreation. 2016, 51(3), pp. 60-66.
[3] Malloy, Thomas E. , Kinney, Lorin, Implications for the self determine benevolence and self-protection in intergroup relations, SELF AND IDENTITY. 2017, 16(2), pp. 171-193.
[4] Risco, C., Self-protection and survival of arbovirus-infected mosquito cells, CELLULAR MICROBIOLOGY. 2011, 13(2), pp. 300-315.
[5] Guo, L.-X. , Zhang, Y.-M. , Zhao, L.-P., Motion Navigation and Fuzzy Control of Mobile Robots in Wireless Sensor Networks, Sensor letters. 2011, 9(5), pp. 2000-2005.
[6] Kock, G. , John, M. , Klose, S. , Ernst, T. , Popescu, F., Sensor fusion and motion analysis for medical rehabilitation - the Fraunhofer FIRST Motion Technology Validation Lab, SYSTEMS SCIENCE -WROCLAW-. 2010, 36(1), pp. 41-53.
[7] Jiao, Y. , Young, C. W. , Yang, S. , Oren, S. , Ceylan, H. , Kim, S. , Gopalakrishnan, K. , Taylor, P. C. , Dong, L., Wearable Graphene Sensors With Microfluidic Liquid Metal Wiring for Structural Health Monitoring and Human Body Motion Sensing,
[8] IEEE SENSORS JOURNAL. 2016, 16(22), pp. 7870-7875.
[9] Olivares, A. , Olivares, G. , Mula, F. , Gorriz, J. M. , Ramirez, J., Wagyromag: Wireless sensor network for monitoring and processing human body movement in healthcare applications, Journal of systems architecture. 2011, 57(10), pp. 905-915.
[10] Park, J., IoT–Cloud collaboration to establish a secure connection for lightweight devices, WIRELESS NETWORKS. 2017, 23(3), pp. 681-392.
[11] Wu, C.-C. , Hu, N.-C. , Chen, J.-N. , Chang, H.-I., Parameterised LED current regulator for pulse width modulation switch delay for accurate colour mixing in multi-LED light sources, LIGHTING RESEARCH AND TECHNOLOGY. 2014, 46(2), pp. 171-186.