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Self Protecting Smart House Using Pervasive Computing

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Abstract

Emerging pervasive computing solutions provide anytime, anywhere computing by decoupling users from devices and viewing applications as entities that perform tasks on user behalf. A context-aware application uses an entity context to modify its behavior to best meet the user needs in that context. Such applications can be used in various application domains, such as smart homes. A self protecting smart home uses networked sensors, devices, and appliances to build an intelligent environment in which many features outside the home are automated and where devices and services seamlessly cooperate to support user. Infrastructure and commercial products exists for home automation. The popularity of home automation has increased but ubiquitous living has not been adopted in everyday life yet even though the visions for it has been around for several years. In this paper we looks into self protecting smart homes and evaluates existing and planned ubiquitous interfaces intended for the home use. In this paper, we propose a context-aware infrastructure for building applications in a self protecting smart home environment.

Keywords: *Force Senser, IHCI, PIR Sensor, Rotating Camera*

INTRODUCTION

A smart environment is "a physical world that is richly and invisibly interwoven with sensors, actuators, displays, and computational elements, embedded seamlessly in the everyday objects of our lives, and connected through a continuous network". A self protecting smart home is a residence that this statement applies to and can be used to enhance the security of house. Technologies which disappears into the everyday life and required minimal or no explicit input from its users are the pervasive computing technologies or Ubiquitous.Ubiquitous computing strives to enhance the human computer interaction by having several invisible distributed but connected devices working for the user. self protecting smart homes has the potential to improve home security ,privacy , comfort, convenience. The benefits of smart technology at home could be apparent to everyone if this potential is fulfilled. It is considered that the need for smart technology at home is most obvious for security of house. Home automation has become popular but ubiquitous computing intended for self protecting smart homes has not yet had a similar breakthrough. ubiquitous computing has been more focused on supporting people at work rather than at home even though people spend more time at home than at work. A ubiquitous smart home system should be able to make the lives of the occupants safer, supportive, convenient, pleasant, enjoyable entertaining and relaxing. And the system has to be usable and useful, socially acceptable, it should be able to protect the privacy and have low cost.

CASE STUDY

For these purpose study different home automation and home security system. In android based Home Automation Using Raspberry Pi system use wifi network for connectivity. They have not used sensors due to which the project does not provide the base for an automated system and home security. Home automation using raspberry pi system provide much better benefits than other system but this system is not work automatically and doesn’t provide proper solution for home security. Also this system is not user friendly.

PROPOSED SYSTEM ARCHITECTURE

Home security is major issue in our society. Everyone need to security and privacy for home. So we proposed system provide best solution for home safety, security and

privacy. The system are user friendly also it work automatically when any object detected in monitoring area near by home. figure 1 show Architecture, in this system take input from rotating camera, PIR sensor and force sensor which is placed near to door and window. Local system process on that input and send message/image on user android mobile.

User give response on that message/image. If user response is positive then system is pause but user give negative response system generate alert to neighborhood or nearest police station. The automatic working system is placed in home and it work like local server. Different component of system is follows:

1. Rotating Camera

In the present application, the object will be tracked as long as it is in the line of sight of the camera. The camera is mounted on a stepper motor so that it can rotate in clockwise and counter-clockwise direction. The stepper motor is used to get an accurate position. Whenever the object goes out of boundary of the camera, the motor will rotate to keep the object in the frame. For the present application, step size of the motor should be small so that the camera can cover larger area. There are algorithms to move the motor for tracking the object. Interfacing of stepper motor with embedded board is easy using motor driver IC. Choosing camera is important task for user because every embedded board does not support all the cameras. So it is responsibility of user that he should check camera compatibility of embedded board first.

2. Force Sensor

Force sensor measure the force applied by whatever is put on them within their range. Although the force sensors are accurate enough to detect a change in weight, they are not accurate enough provide a precise measurement. Force sensors are usually flexible. Force sensors can accurately measure weight up to their limit. **See Figure: 1**

3. PIR Sensor

A passive infrared sensor (PIR) sensor is used in the home to detect the intrusion by sensing motion. A PIR sensor is an electronic sensor that measures IR light radiating from objects and senses the movement of people, animals or other objects in its field of view. PIR sensors are used as proximity sensor and are made from

pyroelectric materials. They have an effective range of about 6m, and a field of view less than 180. All objects with a temperature above absolute zero emit heat energy in the form of radiation. Usually this radiation is invisible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such purposes.

The term passive refers to the fact that PIR devices do not generate or radiate any energy for detection purposes. They work by detecting the energy given off by other objects in its field of view. It is important to note that PIR sensors dont detect or measure heat per se; instead they detect the infrared radiation emitted from an object. The sensor has three terminals, viz., Vcc, GND and Vout. When the sensor detects any motion it provides +5V output otherwise 0V.

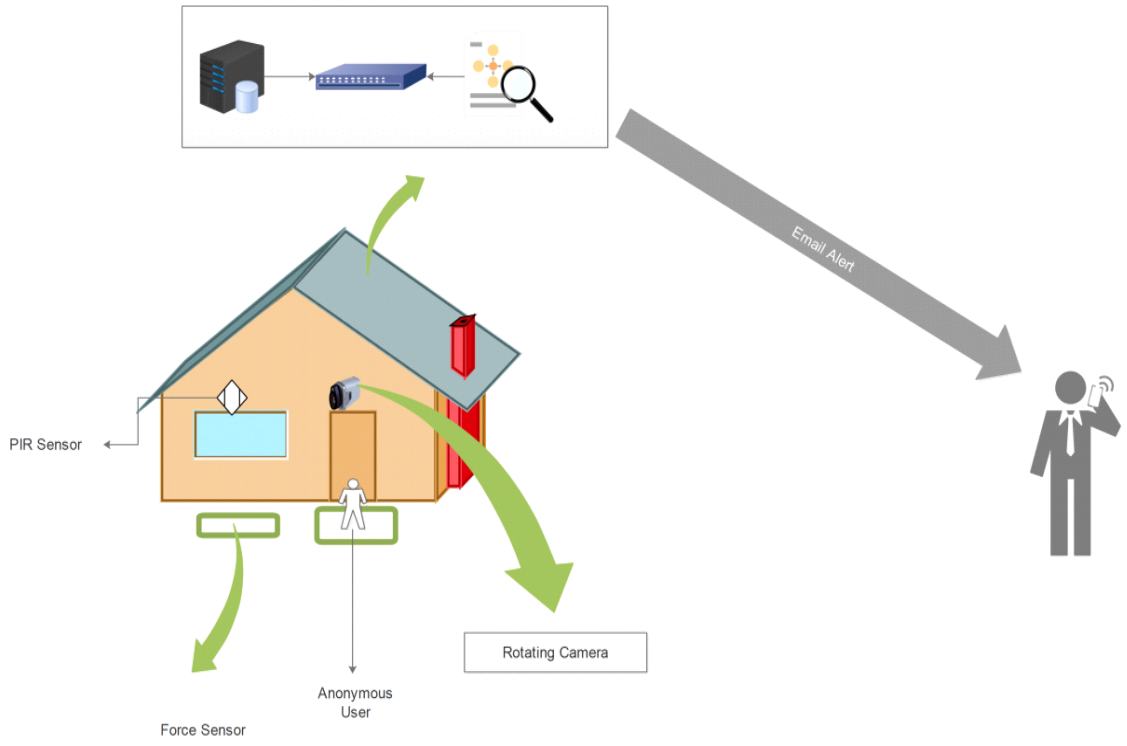

Figure1: System Architecture

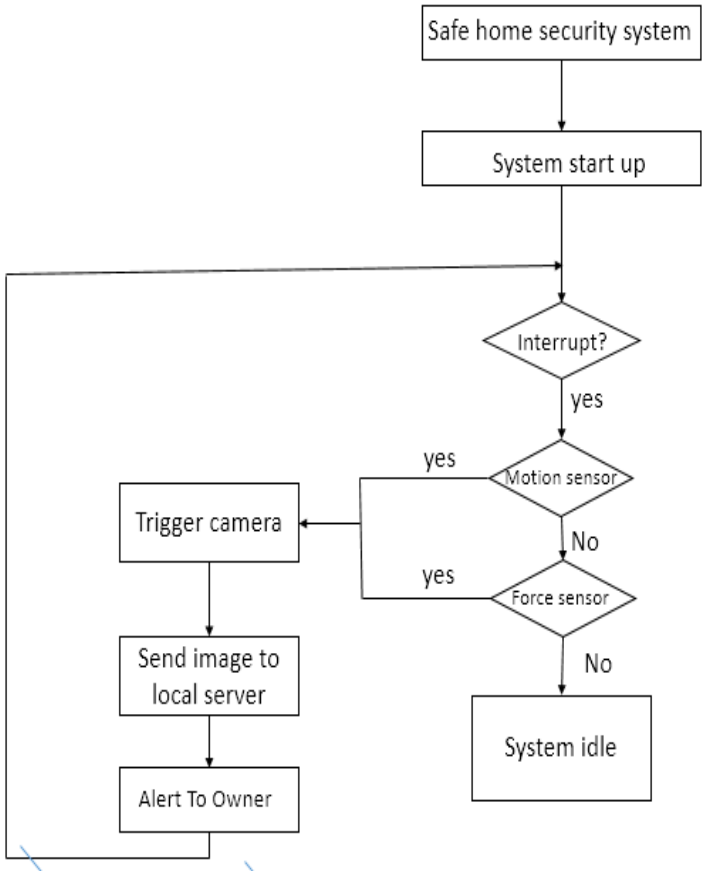

Figure 2: Flow chart of system.

4. LOCAL SERVER

Local server it may be PC or Laptop. Local server store database which contain different types entries of object like people ,animal or other object for human (image, name, Mobile number) this having this type entry. For capturing object through the camera which is mounted on stepper motor, server will send signal then stepper motor will rotate. After capturing image, this image will received to server then server will use algorithm are used for image comparison and sent SMS to user. if user want to insert any entry permanently, then user must have logged on from user.

5. ANDROID APPLICATION

Android application is install on user's smart phone for give the response to local server. There is implicit human computer interaction between local system and user. System do work automatically and user give only response through this application. Number of functions are available in application for user.

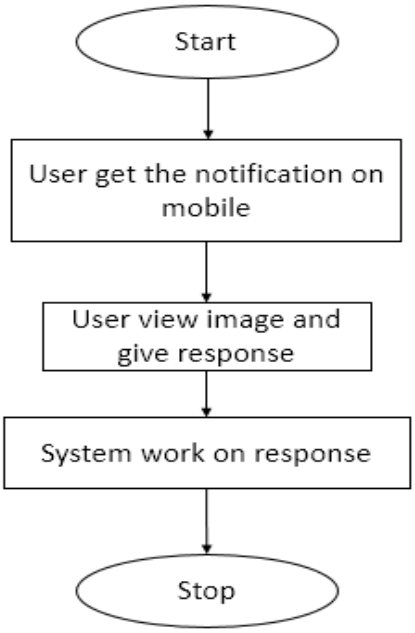

Figure 3: Flow chart of local system and user interaction.

6. RASPBERRY PI 3 BOARD

Raspberry pi3 board used remotely connect user mobile phone Raspberry pi3 board feature such as quad core processor with 1.2GHZ clock speed,1 GB RAM,4 USB port,on board Ethernet and 802.11 n wireless LAN,power supply 5v.

RESULT

- System works automatically so it reduces human effort.
- To avoid Burglary or decrease chances of Burglary.
- This system provides better security and protection for home also it is cost eficient system.

CONCLUSION

As the system is dependent on the users discretion and judgeability of the situation (whether it is a guest or an intruder entering his house) the use of a camera connected to the microcontroller might help the user in taking decisions whether to activate the security system or welcome the guest. The captured picture of the guest or intruder after face detection, can be mailed to the user. The user can further forward the same

photograph to the police station if he wishes. Further the system may be made more synchronised by integrating the voice call feature within the same.

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