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Implementation of Integrity of Voice and Face Recognition for Home Security by Using GSM and ZIGBEE

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Abstract*— Home security is very popular in present days in its simplest form home controlling is the ability to control lighting , household and image reorganization appliances remotely with this device automation safety from theft, leak in of raw gas and fire is also the most important requirement of home for people by combining wireless sensor net work and GSM technology, In this proposes a new solution for remote home security and device control system. The system is composed of the ARM7 based WSN center node with GSM module, data collecting node, device control node and mobile phone. The WSN data collecting node module is connected with PIR, temperature sensor, smoke detector and gas sensor separately and send data to the data collecting node. Advances in the field of Information Technology also make Information Security an inseparable part of it. In order to deal with security, Authentication plays an important role. This paper presents a review on the Voice authentication techniques and some future possibilities in this field. In Voice & face, a human being needs to be identified based on some characteristic physiological parameters. A wide variety of systems require reliable personal recognition schemes to either confirm or determine the identity of an individual requesting their services. The purpose of such schemes is to ensure that the rendered services are accessed only by a legitimate user, and not anyone else. By using Voice & face it is possible to confirm or establish an individual's identity. The position of biometrics in the current field of Security has been depicted in this work. We have also outlined options about the usability of voice and face authentication systems. The data collecting node will send encoded alarm signal to the WSN center node through WSN sensor network established in home . Once the WSN center node receives alarm signal, it will send alarm SMS to the users through the GSM module and GSM network immediately.

Index Terms— **Voice, pattern, IRIS, authentication, GSM, Smart Sensors, Zigbee, SMS, A/ D Converter, Embedded C, Flash magic.**

I. INTRODUCTION

Security has been an important issue in the smart home Applications. Conventional security systems keep homeowners, and their property, safe from intruders. A smart home security system [5], however, offers many more benefits. A Smart home or building is a home or building, usually a new one that is equipped with special structured wiring to enable occupants too remotely or program an array of automated home electronic devices by entering single command. The SN data collecting node module is connected with PIR, temperature sensor, smoke detector and gas sensor separately. When PIR finds that some people intrudes in to the house or when the temperature sensor detects too high indoor temperature or when the Gas sensor detects leakage gas ,the data collecting node will send encoded alarm signal to the WSN center node through WSN sensor network established in home . Once the WSN center node receives alarm signal, it will send alarm SMS to the users through the GSM module and GSM network immediately. Similarly the user can also control the various devices connected with device control unit through MS. Using Bio sensors to measure the heart rate and blood pressure from human body.BIO sensor senses data and send to the owners or users mobile phone similarly the user can also control the various devices connected with device control unit through SMS. The WSN center node will send the SMS received from the user to the device control unit through the same WSN sensor network established in home. Depends on the SMS received the device control unit will control the corresponding device. The system provides ideal solution to the problems faced by home owners in daily life. The system is wireless therefore more acceptable and cost-effective.

II. SYSTEM ARCHITECTURE AND PRINCIPLE

A. *Face Recognition Technology*

A facial recognition technique is an application of computer for automatically identifying or verifying a person from a digital image or a video frame from a video source. It is the most natural means of biometric identification .Facial recognition technologies have recently developed into two areas and they are Facial metric and Eigen faces. Facial metric technology relies on the manufacture of the specific facial features (the system usually look for the positioning of eyes, nose and mouth and distances between these features), shown in figure 1 and 2.

Fig 1. Recognition of Face from Body

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The face region is rescaled to a fixed pre-defined size (e.g. 150-100 points). This normalized face image is called the canonical image. Then the facial metrics are computed and stored in a face template. The typical size of such a template is between 3 and 5 KB, but there exist systems with the size of the template as small as 96 bytes. The figure for the normalized face is given below.

Fig. 2. Normalized Face.

The Eigen Face method (figure 3) is based on categorizing faces according to the degree of it with a fixed set of 100 to 150 Eigen faces. The Eigen faces that are created will appear as light and dark areas that are arranged in a specific pattern. This pattern shows how different features of a face are singled out. It has to be evaluated and scored. There will be a pattern to evaluate symmetry, if there is any style of facial hair, where the hairline is, or evaluate the size of the nose or mouth. Other Eigen faces have patterns that are less simple to identify, and the image of the Eigen face may look very little like a face. This technique is in fact similar to the police method of creating a portrait, but the image processing is automated and based on areal picture. Every face is assigned a degree of fit to each of 150 Eigen faces; only the 40 template Eigen faces with the highest degree of fit are necessary to reconstruct the face with the accuracy of 99 percent. The whole thing is done using Face Recognition software's.

Fig 3. Eigen Face.

B. IRIS Technology

This recognition method uses the iris of the eye which is colored area that surrounds the pupil. Iris patterns are unique and are obtained through video based image acquisition system. Each iris structure is featuring a complex pattern. This can be a combination of specific characteristics known as corona, crypts, filaments, freckles, pits, furrows, striations and rings. An IRIS Image shown in figure 4.

Fig 4. Image of IRIS

The iris pattern is taken by a special gray scale camera in the distance of 10-40 cm of camera. Once the gray scale image of the eye is obtained then the software tries to locate the iris within the image. If an iris is found then the software creates a net of curves covering the iris. Based on the darkness of the points along the lines the software creates the iris code. Here, two influences have to take into account. First, the overall darkness of image is influenced by the lighting condition so the darkness threshold used .To decide whether a given point is dark or bright cannot be static; it must be dynamically computed according to the overall picture darkness. Secondly, The size of the iris changes as the size of the pupil changes. Before computing the iris code, a proper transformation must be done. In decision Process, the matching software takes two iris codes and compute the hamming distance based on the number of different bits. The hamming distances score (within the range 0 means the same iris codes), which is Then compared with the security threshold to make the final decision. Computing the hamming distance of two iris codes is very fast (it is the fact only counting the number of bits in the exclusive OR of two iris codes). We can also implement the concept of template matching in this technique. In template matching, some statistical calculation is done between stored irises Template and a produced. Depending on the result decision is taken

C. *Speaker Recognition Technique*

Voice is also physiological trait because every person has different pitch, but voice recognition is mainly based on the study of the way a person speaks, commonly classified as behavioral. Speaker verification focuses on the vocal characteristics that produce speech and not on the sound or the pronunciation of speech itself. The vocal characteristics depend on the dimensions of the vocal tract, mouth, nasal cavities and the other speech processing mechanism of the human body. It doesn't require any special and expensive hardware. Speaker recognition uses the acoustic features of speech that have been found to differ between individuals. These acoustic patterns reflect both anatomy (e.g. size and shape of the throat and mouth) and learned behavioral patterns.(e.g. voice pitch, speaking style) . Speaker recognition system employs three styles of spoken input and they are listed below. (a) Text dependent (b) Text prompted (c) Text independent Text dependent involves selection and enrollment of one or more voice passwords. Text prompted is used whenever there is concern of imposters. Various technologies used to process and store

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voice prints include hidden Markov models, pattern matching algorithms, neural networks, metric representation and decision tree. Some technology also uses "anti maker" techniques, such as cohort models, and world models.

In the above Fig.5 shows the block diagram of remote home security system using WSN and GSM technology. In this PIR detects the presence of human in the home Voice changes due to aging also need to be addressed by recognition Systems. Capture of the biometric is seen as non-invasive. The technology needs additional hardware by using existing microphones and voice transmission technology allowing recognition over long distances via ordinary telephones (wire line or wishes). And generate pulse which is read by the ARM processor, when the temperature sensor detects too Indoor temperature, and at the same time the smoke sensor detects over smoke content or when the gas sensor detects over proof gas combustible gas concentration the sensors will send a encoded alarm message to home control center through the wireless sensor network established in the home. Once wireless control center receives the alarm signal it will send alarm short message to GSM module immediately and send to user's or house owner's mobile phone. The application of our system comes in handy when people who forget to do simple things such as turn ON or OFF devices at their home or in their office. They can now do so without their presence by the transmission of simple text message from their mobile phone. This development we believe will ultimately save a lot of time especially when people don't have to come back for simple things such as to turn ON or OFF switches at their home or their office once they set out for their respective work. The devices control system block diagram is shown below in figure.5.

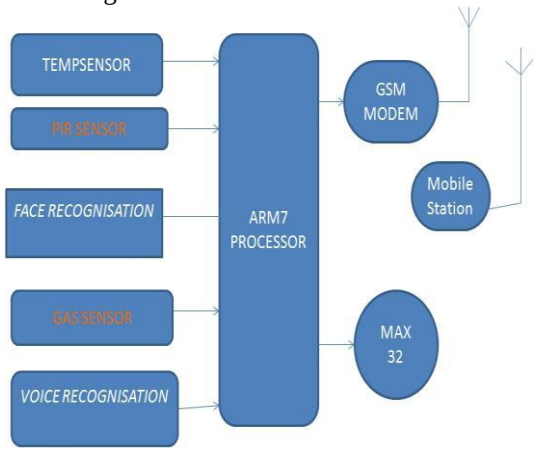

Fig.5 .System Block Diagram

III. DESIGN OF SYSTEM HARDWARE

In this system hardware consists of data collection node module, wireless center node module, sensor nodes, ARM controller, GSM module and power management module. The data collecting module consists of sensors and analog to digital data conversion module.

The system structure is composed of the MCU based home wireless control center, one WSN center node module, and several data collecting nodes, GSM module, GSM network and mobile phone. The WSN data collecting node modules are connected with IR detector, temperature sensor or PIR sensor and smoke detector. When IR detector finds that some people intrude into the house abnormally or when the temperature sensor detects too high indoor temperature and at the same time ,when the gas sensor detects over proof combustible gas concentration the sensors will send encoded alarm signal to the home control center through the wireless sensor network established in home. Once the wireless control center receives alarm signal, it will send alarm short message to the users through the GSM module GSM network immediately. Here we use only two ZIGBEEs and GSM for prototype development

A. Selection of ARM Processor:

In this using Arm7 for controlling purpose.ARM7 is the advanced RISC machine family of 32 bit general purpose processor which offer high performance for very low power consumption and price. The ARM7 architecture is based on RISC principles, and the instruction set and related decode mechanism are much simpler than those of micro programmed CISC. This simplicity results in a high instruction throughput and impressive real time interrupt response from a small and cost effective chip. Pipelining is employed so that all parts of the processing and memory systems can operate continuously. Typically while one instruction is being executed, its successors being decoded, and a instruction is being fetched from memory. ARM7 LPC2148 is ARM7TDMI-S core microcontroller that uses 16/32 bit 64 pin microcontroller No LPC2148 from Philips (NXP).All resources inside LPC2148 are quite perfect, so it is the most suitable to learn and study because the user can learn and understand the applications of all resources inside MCU well, it makes user can modify apply, and develop many excellent applications in the future. Because hard ware system of LPC2148 includes the necessary devices within only one MCU such as USB, ADC ,DAC, timer/counter,PWM,I^2C,SPI,UART etc.

B. Zigbee:

ZIGBEE technology is a low data rate, low power consumption; low cost wireless networking protocol targeted towards automation and remote control applications. IEEE 802.15.4 committee started working on a low data rate standard a short while later. Then the ZIGBEE [4] alliance and the IEEE decided join forces and ZIGBEE is the commercial name for this technology.ZIGBEE is expected to provide low cost and low power connectivity for equipment that needs battery life as long as several months to several years but does not require data transfer rates as high as those enabled by Bluetooth. In addition ZIGBEE can be implemented in mesh networks larger than is possible with

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Bluetooth. Zigbee compliant wireless devices are expected to transmit 10-75 meters, depending on the RF environment and the power output consumption required for a given application and will operate in the unlicensed RF worldwide (2.4 GHz global, 915 MHz Americas, or 868 MHz Europe) The data rate is 250kbps at 2.4GHz, 40kbps at 915MHz and 20kbps at 868 MHz IEEE and ZIGBEE Alliance have been working closely to specify the entire protocol stack. IEEE 802.15.4 focuses on the specification of the lower two layers of the protocol.

C. GSM module:

A GSM [1] is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial up modem. The main difference between them is that a dial up modem sends and receives data through a fixed telephone line while a wireless modem sense and receives data through radio waves.GSM 35 integrated global GSM wireless modem designed for mobile, marine and automotive applications. The real time devices GSM 35 wireless GSM modem unit provides a direct and reliable GSM connection to stationary or GSM 900/1800 mobile fields around the world's connectivity is achieved using the SiemensTC35 engine. This unit works in the 900/1800MHz band supporting GSM 02.22 network and service provider personalization. The GSM 35 is capable of powerful communication over a speed of 9.6kbpsor CSD up to 14.4kbps.It is capable of Fax and SMS text messages. The data terminal rate is 9600 baud for all host commands(AT commands).The GSM35 modem module antenna interface connector uses an OSX connector. The mating antenna connectors and cables are supplied from RTD Final and. Temperature monitoring is possible using the onboard temperature sensor. Limited data can be interrogated from the GSM35 status register bits 2-3.

IV. DESIGN OF SOFTWARE MODULE

The system software developed in Embedded C language has the ability of collecting, wireless receiving and transmitting data and can send a piece of alarm short message to the user's mobile phone, when some dangerous condition has been detected. With the advantages of reliability easy usage, wireless and low power consumption, the system also has practical value in other fields. In this software is developing in wireless center node module and GSM communication. This software is executed in keil MDK ARM software. This software is dumped in the ARM processor.

V. SYSTEM TESTING

According to figure 1 and 2 set up simple prototype system. First ARM7 is chosen as data processing unit of WSN center node module and data collecting node module. Temperature sensor embedded that can detect the in room temperature. After hardware connection, the appropriate software developed with embedded C on microcontroller based indoor wireless control center is installed. Then it can start test with this prototype system by changing the present temperature threshold. When the actual in room temperature exceeds this preset temperature threshold. When actual Temperature sensor embedded that can detect the in-room temperature. After hardware connection, install the appropriate software developed with Embedded C on Micro controller-based indoor wireless control center. Then, it can start test with this prototype system by changing the preset temperature threshold. When the actual in-room temperature exceeds this preset temperature threshold, the control center will immediately trigger TC35 GSM module to send an alarm and user send message to automatic control of devices in home.

VI. CONCLUSION

This paper presents one solution for establishing a low power consumption remote home security alarm system. The system based on the ZIGBEE and GSM technology, can detect the theft, leaking of raw gas and fire and send alarm message remotely and user can remotely control any of the device in the home This Proposal has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully. Thus contributing to the best working of the unit. Secondly using highly advanced IC's and with the help of growing technology this has been successfully implemented.

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