

ZIGBEE BASED 7 IN 1 SECURITY SYSTEM FOR INFRASTRUCTURE AUTOMATION

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Abstract—These The security system designed here is intended to use for multiple applications like anti-theft alarm, touch me not frightening device, light alarm, noise or sound alarm, gas leakage detector, intruder detector, missing device detector. These are the 7 different security systems integrated together to keep the home or industry in secured zone. Entire security information can be transmitted through Zigbee module and this remote monitoring device can be handover to our neighbour when we are away from our home.

Keywords—Zigbee, ATMEL89C51, Stunn gun,TGS 813, Hall effect sensor

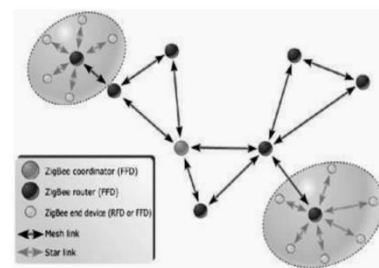
I. INTRODUCTION

As technology advancement is on process, security systems became smarter reliable and more smarter. These days by adapting latest home security technology or devices, the crime rate created by the burglars has been reduced considerably. Technology advancement has made security systems more capable, more affordable and more approachable to every one. Modern security systems provide owners with more access and flexibility with their systems because technology has simplified the system, anyone can easily and quickly install a security unit in there work place or home and control the unit from home.

II. ZIGBEE

The innovation in wireless technology has seen the development of numerous principles, particularly in the mechanical, logical and clinical radio band. There have been a huge number of restrictions for control applications, which abrupt interfacing. Requirement for a broadly acknowledged standard for correspondence between sensors in low information rate remote systems was present. As a response to this situation, numerous organizations produced a union to make a standard which would be recognized and encouraged around the world. It was this Zigbee Alliance that made Zigbee. Bluetooth and Wi-Fi ought not be mistaken for ZigBee. Both Bluetooth and Wi-Fi have been created for correspondence of enormous measure of information with complex structure like the media documents and

programming, etc. Zigbee then again has been formed investigating the necessities of correspondence of information with straightforward structure like the information from the sensors.



1. Zigbee network

Fig.

III. ATMEL 89C51

ATMEL 89C51 is a micro controller which is used for this security system, this IC comes under 8051 family. This microcontroller has 128 bytes of RAM, 4K bytes of ROM. It also has one serial port, two timers, and four ports. As the CPU can work on only 8-bits of data at a time, so this IC is also called as 8 bit processor. The 8051 is having four ports and each port contains 8 input lines and 8 output lines.

IV. DIFFERENT SECURITY SYSTEMS

A. Anti theft alarm

The anti theft alarm also known as touch sensitive alarm which is to be attached with the handle of locker or handle of a door which is designed with copper conductor pattern. This electrically conducted copper pattern is isolated with each other and meshed with each other with a little gap. This pattern must be flexible such that it should adapt the design of the handle of locker or any other container which is used to store valuable items.

The anti-theft alarm also known as touch sensitive alarm which is intended to attach with the handle of cupboard or handle of a store room door is designed with copper conductor

pattern. This electrically conducted copper pattern is isolated with each other and meshed with each other with a little gap. This pattern must be flexible such that it can be surrounded with the handle of door or any other box type container which can be used to store valuable items. A small solid copper laminated plate is used. The copper pattern looks like a puzzle image and whenever any person touches this plate with finger and due to the static energy produced by the human body, the output of touch plate can generate little voltage which is sufficient to energize the transistor.

B. Frightening device

The frightening device designed here is nothing but an electric shock weapon which is intended to generate low voltage, low current and high frequency pulses from an electronic circuit built with 555 timer IC & pulse transformer. The shock pulses produced by this circuit and though they are not hazardous for humans, they can frighten the humans and popularly these are known as electronic stun guns. A stun gun is used to produce a low current signal, high voltage used mostly as a weapon to send shock waves to the target with the intention to weaken it.

C. Light alarm

In field of security alarm systems, light alarm or light intensity alarm also plays dominant roll for specific applications. In general in locked houses or locked cold storages, all lights will be switched off to save the electric energy. If thief enters in to the house by smashing the main door lock, he must be energizing any light source like torch light or electric light because the burglar can't steal the valuables in dark. In such case when any light source is energized, the circuit designed with LDR & 555 timer chip will be activated automatically and generates logic low signal for the microcontroller. Based on this signal, the main processing unit constructed with 89C51 controller chip displays the information in the form of text message, i.e., "Light on" and the same message will be transmitted and it will be displayed in wireless monitoring station. As usual alarm also will be energized to alert the concern persons.

D. Noise alarm

In general, locked houses remain at silence atmosphere because there is no one to break silence. In such case if any thief entered in to the house illegally while opening a iron safe or cupboard, defiantly some sound will be produced which breaks the silent atmosphere by which the device can people about something dangerous that is happening in the house. Means the sound sensor can be arranged near the iron safe or some where else at suitable place and whenever sound is raised from any corner of that particular room, the associated circuit designed with LM386 & LM324 chips can generate a logic high signal for the microcontroller chip. Based on this signal, the controller chip displays that "sound sensor is activated" and this information will be passed to the receiver through wireless communication system designed with Zigbee device.

There are many ways to detect intruders into a home or some other building. The concept presented here is one way to detect the thief who is trying to open the locked iron safe or cupboard. Whenever the sound sensor is interrupted by receiving the sound signals, its out put in the form of audio

signals will be generated for which condenser microphone is used as a sound sensor. The condenser microphone used here is very sensitive such that it can detect low level noise signals also.

E. Gas leakage detector

The system designed with gas leakage detector is quite useful for the kitchens at domestic side and in the industries at commercial side. Gas detector is a device, which detects the presence of gas in the air in a closed room. Usually gas detectors are aimed to detect all sorts of petroleum vapors including smoke. Gas leakages are hazardous to humans, therefore as a part of safety device to warn about gas leakages, this system is developed by which concern person at remote site will be alerted. Gas detectors can be used to detect combustible, toxic (poisonous) and CO₂ gases. Here TGS 813 is used as a gas sensor.

F. Intruder detector

This system should be activated before locking the door. The process begins with the intruder sensors, detects the presence of a person who enters the house through window or by smashing the lock is done by infrared sensors. When the IR energy sense any object, some of the energy will be reflected, the energy which is reflected will be detected by IR sensor. This principle applied here is when someone tries to enter the house. An interruption occurs to the IR beam sensor, results in the generation of a logic high signal from the trigger circuit output. Based on this signal, the information will be transmitted from the microcontroller unit which is interfaced with ZigBee.

G. Missing device detector

This part of the project work is designed to detect the valuable device like jewelry box when it is removed from its place. For this purpose Hall Effect sensor is used which will be activated automatically when any permanent magnet brought near to it. Means the jewelry box must be attached with a magnet at one side must be placed in its specific allotted place in the cupboard where Hall Effect sensor is placed. Means the magnet attached to the box must be near to the sensor by which the sensor remains in magnetic field. As long as the sensor remains with in the area of magnetic field it remains in activated mode by which it generates a logic high signal. For this purpose special arrangement must be added to the cupboard such that whenever the box is lifted from its place, the sensor output will become zero. Based on this signal, means when the box is lifted from its place, the controller gets logic low signal by which it is programmed to display the message like "Box is missing" and the same information is also transmitted to raise an alarm in the receiver unit.

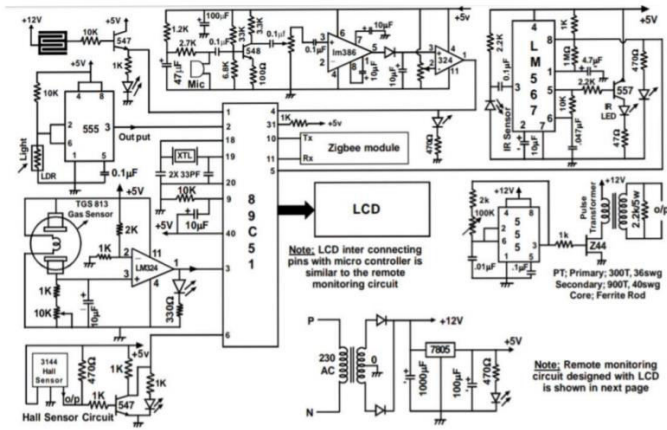


Fig. 2. Circuit diagram of zigbee 7 in 1 security system

V. COMPARISON OF ZIGBEE WITH OTHER TECHNOLOGIES

TABLE I.

Parameters	ZigBee	Bluetooth	Wi-Fi
Range	10-100 meters	10-100meters	50-100 meters
Network topology	Ad hoc, peer-to-peer	Ad hoc	Point to hub
Frequency	2.4GHz	2.4GHz	5GHz
Power consumption	Very low	Medium	High
Complexity	Simple	Very complex	Complex

VI. ADVANTAGES OF ZIGBEE SECURITY SYSTEM

- Low cost
- Highly secure and reliable
- Supports multi networks topologies
- Data rate speed is 250kbps
- Good sound to noise ratio(SNR)

VII. CONCLUSION AND FUTURE SCOPE

It can be used as a full fledged security system which protects the home from burglars in all aspects. The system is designed as user friendly and its operation is quite simple, simply place the sensors at different locations where required in the home and connect all the sensors outputs to the main processing unit. Little bit care must be taken while arranging the sensors at suitable places, for example, the gas leak detector must be placed in the kitchen preferably near the mouth of gas cylinder. Similarly the intruder detector circuit designed with IR sensors can be arranged near to the main entrance at covenant place by which entering person interrupts the IR signal. Like wise all other sensors can be installed in its place by which it can guard our house perfectly.

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