ANTI THEFT SYSTEM FOR ELECTRONIC EQUIPMENTS

USING INTERTIAL MEMS SENSOR AND ZIGBEE

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ABSTRACT

As modern electronic goods such as computers, mobile phones, portable players, laptops and palmtops are becoming smaller and more sophisticated, they can be more easily targeted for theft in the home and business environment. Many present protection systems are done with mechanical (mercury) switches which initiate an alarm when a certain preset level of motion is detected. These units are bulkier and it cannot be easily integrated with the existing compact electronic systems.

This project overcomes the drawbacks of present systems. It takes advantage of the dramatic advances in micro machined semiconductor product technology and employs a tri axis micro machined accelerometer integrated on a chip which is mounted into the system to be protected. MEMS accelerometer can sense motion on all the 3 axes.

To lock the system, the user must keep the device in rest state (independent of position and direction) and press the lock button.

Alert a control unit at a remote location through a zig-bee wireless modem

Disable further operation of the system

Audible alert through a buzzer or siren.The system remains in this state until the remote control unit transmits an emergency password which must match the 10 digit device identification number stored in the nonvolatile memory space.

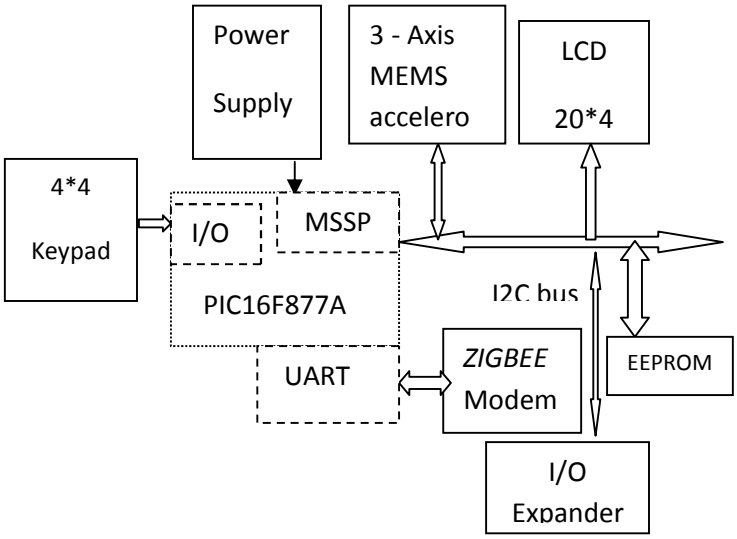
INTRODUCTION

Anti theft system is implemented for an innovative device that acts as city road guiding equipment. The device aims at informing people about the city bus numbers for the places they wish to go. A unique code number has been assigned to all the places in a city. The user simply enters the two digit number, using the keypad, that represents the destination place and our system, in response, provides the information of all the bus numbers available for that particular destination.

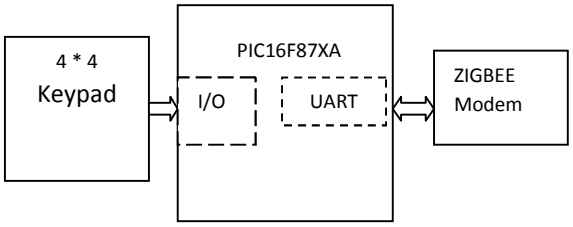
The database is stored in the external memory chip. The entire system is based on the Master-Slave architecture of I2C network. The I2C network consists of PIC microcontroller which acts as the bus master and all other nodes viz. MEMS accelerometer, serial EEPROM memory, serial LCD display acting as slave devices.

BLOCK DIAGRAM

Anti Theft Equipment



Remote Control



HARDWARE REQUIRMENT

1: Power supply Unit

2: Microcontroller

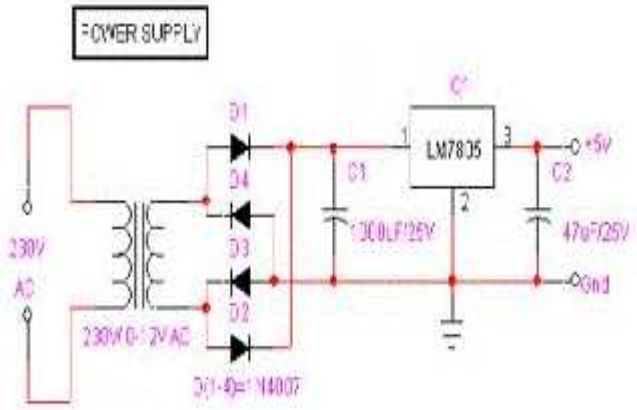
3: LCD

4:MEMS accelerometer

5**:** Zigbee

1: Power Supply Unit

The power supply section is the important one. It should deliver constant output regulated power supply for successful working of the project. Here we are giving 220 v A.C supply but for our project we need 5v dc supply so here we have to step down this voltage, and a 0-12V/1 mA transformer is used for this purpose, and this will convert 220v A.C current into 12v A.C. The primary of this transformer is connected in to main supply through on/off switch& fuse for protecting from overload and short circuit protection. The secondary is connected full bridge rectifier to convert 12V AC to 12V DC voltage. And filtered by the capacitors, which is further regulated to +5v, by using IC 7805 which is a voltage regulator. Now this will removes the ripples and also remains at the same dc value even if the input dc voltage varies or load connected to the output dc voltage changes. So basically it is a fixed three terminal voltage regulator IC which has an unregulated D.C input voltage and regulated D.C output voltage. And it contains the circuitry for reference source, comparator amplifier, and control device and overload protection all in a single IC.



2: Microcontroller

2.1 Introduction

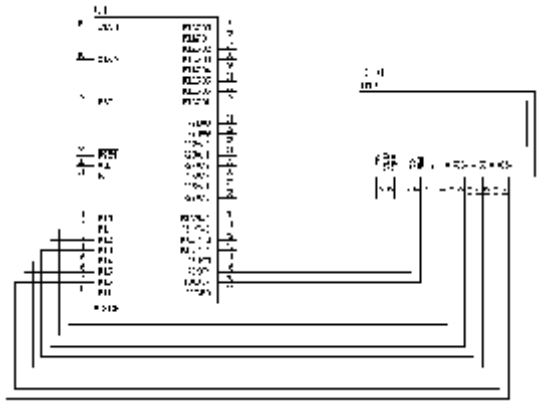
A **microcontroller** (sometimes abbreviated **µC**, **uC** or **MCU**) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications.

Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, toys and other embedded systems. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. Mixed signal microcontrollers are common, integrating analog components needed to control non-digital electronic systems.

A microcontroller can be considered a self-contained system with a processor, memory and peripherals and can be used as an embedded system. The majority of microcontrollers in use today are embedded in other machinery, such as automobiles, telephones, appliances, and peripherals for computer systems. While some embedded systems are very sophisticated, many have minimal requirements for memory and program length, with no operating system, and low software complexity. Typical input and output devices include switches, relays, solenoids, LEDs, small or custom LCD displays, radio frequency devices, and sensors for data such as temperature, humidity, light level etc. Embedded systems usually have no keyboard, screen, disks, printers, or other recognizable I/O devices of a personal computer, and may lack human interaction devices of any kind.

3: LCD

LCD which we are using in our project is character based and worked on Hitachi's HD44780, Which is used to drive Alphanumeric display.LCD founds in the market are of one line, two line and four line and supports up to 80 character in one line , Now the LCD which supports 80 character in one line uses only one controller and if it supports more than 80 character in one line the it uses two controller.Lcd with one controller uses 14 pins and with two controller uses 16 pins ,2 more pins for light the LCD. The LCD standard requires 3 control lines and 8 I/O lines for the data bus. 8 Data Pin D7:D0, And it is bidirectional data/command pin and from here alphanumeric values are send in the ASCII format, RS: Register Select and if it is set to zero then it means that command register is selected else if it is one then data register is selected, E: Enable Latch, And Used to latch the data present on the data pins. A high-to-low edge is needed to latch the data. The 8 data lines are connected to PORT 1 of 8051 microcontroller. The three control lines (RS, RW and EN) are connected to PORT 3.5, 3.6 and 3.7 respectively.



4: MEMS ACCELEROMETER

An accelerometer is a device for measuring acceleration and gravity induced reaction forces. Single- and multi-axis models are available to detect magnitude and direction of the acceleration as a vector quantity. Accelerometers can be used to sense inclination, vibration, and shock. They are increasingly present in portable electronic devices.

Modern accelerometers are often small micro electro-mechanical systems (MEMS), and are indeed the simplest MEMS devices possible, consisting of little more than a cantilever beam with a proof mass (also known as seismic mass). Mechanically the accelerometer behaves as a mass-damper-spring system; the damping results from the residual gas sealed in the device. As long as the Q-factor is not too low, damping does not result in a lower sensitivity.

Under the influence of gravity or acceleration the proof mass deflects from its neutral position. This deflection is measured in an analog or digital manner. Most commonly the capacitance between a set of fixed beams and a set of beams attached to the proof mass is measured. This method is simple and reliable; it also does not require additional process steps making it inexpensive. Integrating piezoresistors in the springs to detect spring deformation, and thus deflection, is a good alternative, although a few more process is needed. For very high sensitivities quantum tunneling is also used; this requires specific fabrication steps making it more expensive. Optical measurement has been demonstrated on laboratory scale.

Another, far less common, type of MEMS-based accelerometer contains a small heater at the bottom of a very small dome, which heats the air inside the dome to cause it to rise. A thermocouple on the dome determines where the heated air reaches the dome and the deflection off the center is a measure of the acceleration applied to the sensor.

Most micromechanical accelerometers operate in-plane, that is, they are designed to be sensitive only to a direction in the plane of the die. By integrating two devices perpendicularly on a single die a two-axis accelerometer can be made. By adding an additional out-of-plane device three axes can be measured. Such a combination always has a much lower misalignment error than three discrete models combined after packaging.

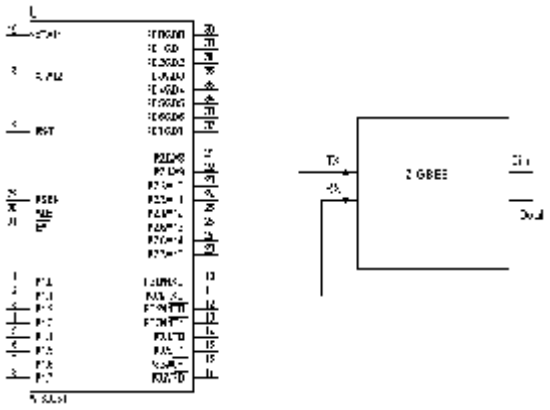
Micromechanical accelerometers are available in a wide variety of measuring ranges, reaching up to thousands of g's. The designer must make a compromise between sensitivity and the maximal acceleration that can be measured.

5: Zigbee

It is a specification for a suite of high level communication protocol using small, low power digital radios based on IEEE802.15.4 standard for WPAN. The

standard takes full advantage of the IEEE 802.15.4 physical radio specification and operates in unlicensed

bands worldwide at the following frequencies: 2.400–2.484 GHz, 902-928 MHz and 868.0–868.6 MHz, With a different data rates of 250 kbps, 40 kbps, 20 kbps. And each band has a 16 number of fixed channels. And need 3.3 to 5v to power it up.



It has a standard size of 23 mm in diameter, and can be activated within or less than 15 ms.It can be used as transmitter as well as receiver. In our project the TX and RX pin of Zigbee are connected with the TX and RX pin of AT89C51 microcontroller, and the data from the microcontroller is serially transmitted to other Zigbee module via UART port. The Zigbee when transmit the data to another Zigbee then it transmit from Dout pin and at the other side it receives from the Din pin of another Zigbee.

APPLICATION

1. City road guide
2. Easy way we can find the buses number where we want to go from one place to another place.

ADVANTAGES

1: Portability: The device simple can be carried easily and can be moved easily because of the less weight. This makes the device Portability.

2: Repeatability: We can take the values at any number of times, this makes the device can work repeatedly.

3: Work at Nights: There is no particular time to use the device. We can use the device at any time. Even in nights also the device can be used with accurate.

4: Easy to Use: Operation so simple so that anyone can operate easily.

FUTURE ENHANCEMENT

By Using MEMS accelerometer and zigbee we can develop easy communications for unknown person.

CONCLUSION

The project Anti theft system for electronic equipments using inertial MEMS sensor and zigbee based on city route guide system has been completed and working .The input the data through the 4x4 matrix keypad and show the output in liquid crystal display. The system will be lock when we have to put in anti theft mode then the keypad will not work if any changes in MEMS sensor then they will indicate the moment and buzzer will give the sound after that system will be automatic locked then nothing we can do .If again I want to do work it then open the system by the remote then it will work.

ACKNOWLEDGEMENT

I would like to thank esteemed Bharath University Department of Research and Development and also to thank Department of Electronics and Telecommunication, Chennai -73.

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