EVERYTHING THAT MOVES ALARM

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A security system known as "Everything that moves Alarm" is a combination design of hardware and software. This design can be applied anywhere and it can be utilized for any environment and also it is an easy application system. The specialty of this system is, it can be "ON" by using our normal hand phone and we will get feedback from the operational of the alarm system. The system is firstly built in a hardware design for the motion detector and the connector of the detector to the input of the system by using the RJ 45 cable connector to the hardware from the computer. This Motion Detector is trigger by using Short Message System (SMS) technology, where control takes place by means of SMS (Short text Messages Service). When the motion detector receives a predefined text message, the circuit automatically recognizes it as a command, and switches the output accordingly. Besides switching the port on, the user can pulse it for a short period (e.g. "Reboot remote server"). The Short Message System (SMS) function is created by using the Visual Basic C++ software and this software is using a special command for the Nokia brand phones and it is specified for it. By introducing this technology, the system can be fully controlled by the devices.
ABSTRAK

CHAPTER I

PROJECT INTRODUCTION

1.1 INTRODUCTION

A security system known as “Everything that moves Alarm” is a combination design of hardware and software. This design can be applied anywhere and it can be utilized for any environment and also it is an easy application system. The specialty of this system is, it can be “ON” by using our normal hand phone and we will get feedback from the operational of the alarm system. The system is firstly built in a hardware design for the motion detector and the connector of the detector to the input of the system by using the RJ 45 cable connector to the hardware from the computer.

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1.2 PROBLEM STATEMENTS AND PROJECT OBJECTIVES

1.2.1 Problem:

i) Most of the houses or machine appliances are only uses sensor detection in the doors to prevent any misuse.

ii) Using a switch system, to “ON” detector.

iii) Most security product is fully wired and easily can be deactivated.

1.2.2 Objective:

i) To create a hardware system of a motion detector which is known as an Ultrasonic Motion Detector and it is function on detect human or beast, when it is moving.

ii) Develop a software system which will work as the intermediate or interface between the phone and the motion detector and this system will fully control the motion detector.

iii) Develop a motion detector which is fully controlled by Short Messaging System (SMS) technology.
1.3 SCOPES OF WORK

The scopes of the motion detector device is only detects motion of movement from 3.5 to 6 meters away and as the device detects movement, a red Light Emitting Diode (LED) lights. The device is “ON” via Short Messaging System (SMS) and the Short Messaging System circuit is design specified for the electronic devices. Phones that can be used only, Nokia models, such as model 8850, 8210 and 3610 and it's using RJ 45 serial cable as a connector. Intermediate for the phone and detector is a computer with a modem and function by an interface and the firmware can only run in Windows 98.

1.4 PROJECT METHODOLOGY

The SMS message used to “ON” the detector is sent from a mobile phone 1, to mobile phone 2, which is connected to the PC. Then the SMS message passes through the mobile network or PSTN (or both) and finally reaches at the receiver. The Mobile phone is connected through serial port by a cable. As the serial port receives the SMS, the program will run the command and passes through the message to the Data Pin status of the PC parallel port. Parallel port will send the data to a hardware system; electronic device control and it will function according to the command that receives and operate the motion detector. If the motion is detect any motion it will “ON” the alarm and at the same time it will feedback again to the sender.
1.5 EXPECTED RESULTS

To create a security system known as ultrasonic motion detector which can detect human movement. This system consists of two point, software and hardware. The software will work as interface between the phone and motion detector and is fully controlled by Short Messaging System (SMS) technology.
1.6 FLOW CHART

Flow Chart 1.1: Project Flow
Flow Chart 1.2: Project Flow Continue
CHAPTER II

HARDWARE

2.1 ULTRASONIC MOTION DETECTOR

2.1.1 Circuit Description

The schematic for the Ultrasonic Motion Detector is shown in Fig. 2.2. A 12-volt DC supply directly provides from power source to the circuit. The transmitter section of the Detector is basically a crystal-controlled relaxation oscillator built around a 4069 hex inverter, IC2. One of the 4069 sections, IC2-c, along with resistors R21 and R22, and capacitors C11 and C12, "pings" the 40-kHz crystal into sustained oscillation. The remaining 4069 sections act as linear buffers to drive a 40-kHz ultrasonic transmitting transducer, BZ2. The receiver section of the circuit is made up of four AC-coupled stages, each built around one of four sections of a TL 084 op-amp IC1. In the first stage, the input voltage developed across R1 and R2 is modulated by a 40-kHz, ultrasonic receiving transducer, BZ1, and is then fed to IC1-a, where it is amplified. The receiving transducer detects any reflected sound
produced by the transmitting transducer, BZ2. If there is no movement, the resulting envelope signal is just a straight line: diode D1 and resistor R8 operate as a negative peak detector to recover the envelope signal. In the second stage, which is built around IC1-b, the recovered signal is again amplified. The time constant of IC1-b is quite slow so that the envelope can be followed; the output of the second stage is a DC level that represents the strength of the envelope. If there is movement, the envelope will reflect it in the form of a positive or negative signal. At the input to the third stage a differential amplifier built around IC1-c there are two diodes, D2 and D3. They detect both positive and negative pulses. When there is no movement, the voltage at pin 7 of IC1-b is half the supply voltage and neither D2 or D3 can conduct. The voltage at pin 8 of IC1-c is then low. If the signal rises above +0.7 volt (a silicon diode's breakdown voltage), D3 conducts causing the output on pin 8 to go high. If the signal falls below 0.7 volt, D2 conducts, which also causes the output to go high. Thus we have a window detector. It detects voltages that move both below and above a given range. The fourth stage, built around IC1-d, is set up as a monostable flip-flop. That stage converts any signal that gets through the filter into a pulse substantial enough to turn on transistor Q1. When Q1 conducts, LED1 turns on and an output signal is provided to drive a separate relay or any other device connected to the circuit. The time constant of the monostable flip-flop is about half a second and is set by C8 and R18. Diode D4 is used to separate the charge and discharge time constants. It lets the circuit switch on immediately when movement is detected, but allows about a half-second delay for the reset.
Figure 2.0: When detector on stand by mode

Figure 2.1: When the sensor detect movement

Figure 2.2: Circuit Diagram
2.1.2 Component

2.1.2.1. Ultrasonic Transducer

Figure 2.4: Motion Sensor
An ultrasonic transducer is a device capable of converting electrical energy into high frequency sound waves or vice-versa. There were several in-depth studies of ultrasonic transducer which could be broken down into various topics like the transmitted energy, frequencies, wave type, directional characteristics, and the interaction of ultrasonic waves with various medium, etc. However, in these studies, we will only be reading on what is necessary for the project implementation.

Ultrasonic transducer can be generated using many different ways like piezoelectric, electrostatic, and electromagnetic transduction principle. A recent addition to piezoelectric transducer material is PVDF or polyvinylidene fluoride which is supposed to be better in many ways than the commonly used ceramic material. Some of these advantages compared to the ceramic material include higher bandwidth, lower coupling coefficient, and acoustic impedance. The bandwidth of the ultrasonic transducers in this project is critically important since we need to be powering up audible range of up to 5 KHz of audio sound. Ceramic piezoelectric transducer has a resonant frequencies of about 1~3 KHz.
The HCC4069UB (extended temperature range) and HCF4069UB (intermediate temperature range) are monolithic integrated circuit, available in 14-lead dual in-line plastic or ceramic package and plastic micro package. The HCC/HCF4069UB consists of six COS/MOS inverter circuits. This device is intended for all general purpose inverter applications where the medium-power TTL drive and logic-level-conversion capabilities of circuits such as HCC/HCF4049B Hex Inverter/Buffers are not required. The medium-speed operation is, $t_{PHL}, t_{PLH} = 30\text{ns (typ.) AT 10V}$. A 20V Quiescent current is specified to HCC. The characteristics are a standardized symmetrical output. The parametric ratings are 5V, 10V, and 15V. The input current for HCC device is 100nA at 18V and 25°C. The component is meets all requirements of JEDEC TENTATIVE STANDARD N°13A,”STANDARD SPECIFICATIONS FOR DESCRIPTION OF”B” SERIES CMOS DEVICES”
2.1.2.3 2SA 1015: General Purpose PNP Transistor

Figure 2.7: Transistor layout

Audio frequency general purpose amplifier applications driver stage amplifier applications.
2.1.2.4 TL 084: Quad Operational Amplifier

The specialty of the amplifier is, it a low-power consumption device. It wide common-mode and differential voltage ranges. It also has a low input bias and offset currents. The short circuit output is protected and low total harmonic; it has a 0.003% Typ distortion. The input impedance is equal to JFET-Input stage and has a internal frequency compensation.
2.1.2.5 2SC 1815: General Purpose NPN Transistor

Figure 2.9: NPN Transistor

2SC 1815 is NPN silicon epitaxial transistor designed for RF, AF amplifier and general purpose applications.
2.2 PARALLEL PORT CIRCUIT

2.2.1 Circuit Description

The Parallel Port circuit contains eight identical switched relay positions, power input positions to the relays (either 2.5mm jack centre positive, or via the terminal block) and a DB25 connector to the parallel port of a PC. A 12-volt DC supply directly provides from power source to the circuit. To keep the hardware simple no input latches have been put on it. If the board is accidently disconnected from the parallel port then the 10K pull down resistors will turn the relay off. The diodes protect the transistors from the back-emf which occurs when the relay is turned off and its magnetic field collapses. The resistors were into place first. The relays were mounted last. The relays are under direct control of the output byte (8bits) from the parallel port. When a pin is high a nominal 5V is presented to the base resistor R1. Since there is a fixed 0.6V drop across the BE junction of Q1 there is 4.4V across R1 (5V - 0.6V). So by Ohms law 1.33 mA flows through the 3K3 resistor. There is also 0.6V across the 10K pull down resistor which draws 0.06mA. If we assume an $h_{FE}$ of 100 for Q1 then 127mA flows through the CE leads of Q1 when it is turned on ($IC = IB.h_{FE}$). Since the 12V relay turns on at around 30mA this current is more than enough to turn on the relay. The relay has a coil resistance of around 400 ohms and a coil power consumption of 30mW.
Figure 2.10: Parallel Port Circuit

Figure 2.11: Parallel Port Circuit in Proteus Software
2.2.2 Component

2.2.2.1 ULN 2803 A: 8CH Darlington Sink Driver

![ULN2803A Diagram]

Figure 2.12: ULN2803A IC Design

The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or MOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications. All devices feature open collector outputs and free wheeling clamp diodes for transient suppression. The ULN2803 is designed to be compatible with standard TTL families.
2.2.2.2 12 V Relay RWH-SH-112D

Figure 2.13: Relay

RW Series Relay covers switching capacity by 10A is spite of miniature size to comply with user's wide selection. RWH is approved C-UL & TÜV safety standard. The employment of suitable plastic materials is applied under high temperature condition and various chemical solutions. Complete protective construction is designed for dust and soldering flux. If required, plastic sealed type is available for washing procedure. 12A at 120VAC for RW & 12A at 240VAC for RWH are UL approved. The application is on domestic appliances, office machines, audio equipment, coffee-pots, control units, etc.
2.3 OTHER DEVICES

2.3.1 Parallel Port

PC parallel port can be very useful I/O channel for connecting circuits to PC. The PC's parallel port can be used to perform some very amusing hardware interfacing experiments. The port is very easy to use to handle circuits. PC parallel port can be damaged quite easily if make mistakes in the circuits that connect to it. If the parallel port is integrated to the motherboard (like in many new computers) repairing damaged parallel port may be expensive.

To transfer data from the computer, a parallel port has been used. This port will transfer data from the computer to an external device requires an interface circuit that controls the signals representing the data. The two most common interface circuits are the parallel port and the serial port. The parallel port had the capability to transfer 8 bits of data at time whereas the serial port will transmit one bit at a time. The parallel port is an inexpensive and yet powerful platform for implementing projects dealing with the control of real world peripherals.
2.3.1.1 Parallel Port Connections

PC parallel port is 25 pin D-shaped female connector in the back of the computer. It is normally used for connecting computer to printer, but many other types of hardware for that port is available today. Not all 25 are needed always. Usually can easily do with only 8 output pins (data lines) and signal ground. Those pins in the table below shows the output pins are adequate for many purposes.

Pin function

2  D0
3  D1
4  D2
5  D3
6  D4
7  D5
8  D6
9  D7

Pins 18,19,20,21,22,23,24 and 25 are all ground pins.

2.3.1.2 Port Assign

Each port consists of three port addresses: data, status and control port. These addresses are in sequential order. That is, if the data port is at address 0x0378, the corresponding status port is at 0x0379 and the control port is at 0x037a.

The following is typical.

<table>
<thead>
<tr>
<th>Printer</th>
<th>Data Port</th>
<th>Status</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPT1</td>
<td>0x0378</td>
<td>0x0379</td>
<td>0x37a</td>
</tr>
<tr>
<td>LPT2</td>
<td>0x0278</td>
<td>0x0279</td>
<td>0x27a</td>
</tr>
</tbody>
</table>
2.3.1.3 Pin Outs

The parallel port consists of a connector with 17 signal lines and 8 ground lines. The signal lines are divided into three groups namely; Control (4 bi-directional lines), Status (5 input lines) and Data (8 output lines). As originally designed, the Control lines are used as interface control and handshaking signals from the PC to the printer. The Status lines are used for handshake signals and as status indicators for such things as paper empty, busy indication and interface or peripheral errors. The data lines are used to provide data from the PC to the printer, in that direction only. The parallel port signals and functions are shown in Table while Figure shows a male DB-25 connector.

![Figure 2.14: View looking at a male DB-25 Connector](image-url)