SMART SECURITY SYSTEM FOR HIGH ALERT ZONES

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ABSTRACT

Nowadays we are facing many threats regarding security in high alert zones, so in this project to prepare an unmanned automatic bot which will detect the threats by sensors and it will gives the acknowledgement of threats through the buzzer. The controlling action will be performed by the controller with help of communication technology like GSM and Zig-bee. The system will monitors the main physical parameters and movement status continuously. The controller centre receives the information and then it sends the control command then it will decide the angle and direction in which the gun can be fired. The data from bot can be displayed at remote location for further decisions. This bot will work in a dual fashion in autonomous and manual mode. In manual mode the angle of the gun can be changed and set according to operator decisions.

Thus, this designed micro controller based smart protection system which can be proved to be the future protection in high alert zones.

Keyword *: -High alert zone protection, Communication technology GSM & Zig-bee*

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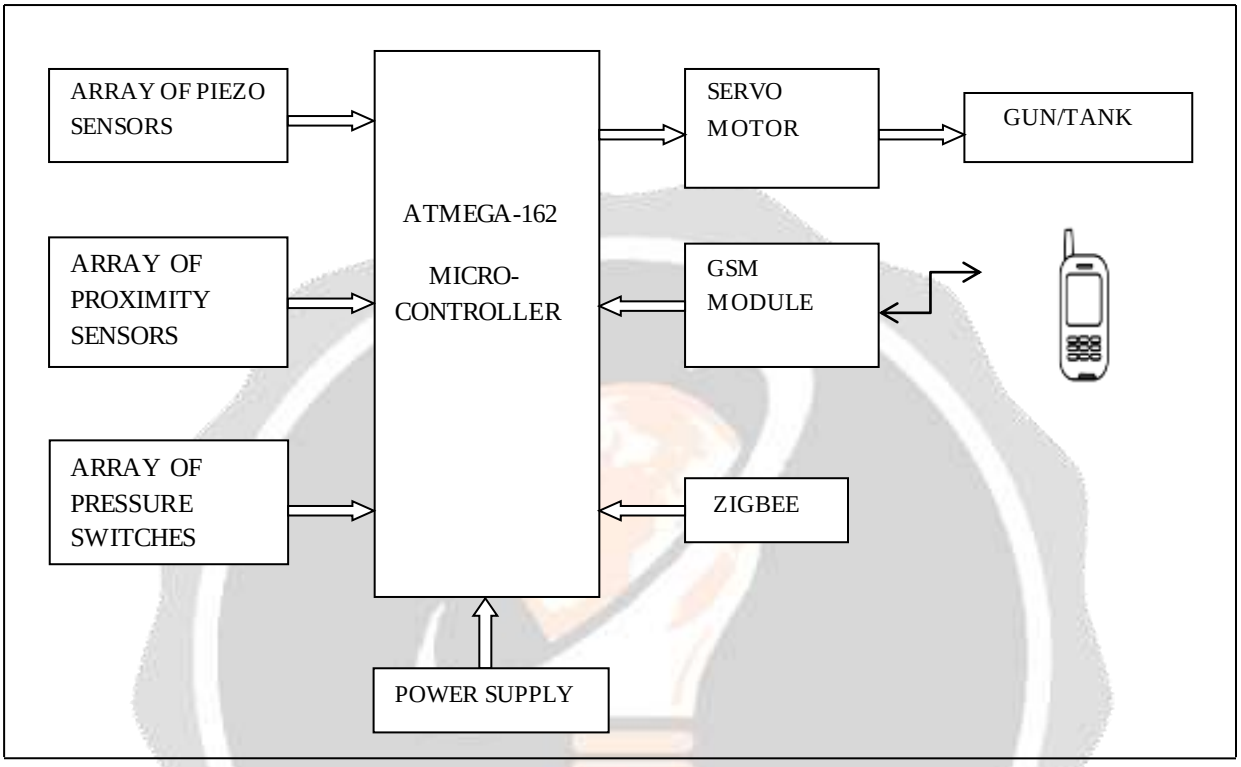
1. INTRODUCTION

In today's geopolitical climate, ensuring the protection of secure facilities or key locations against resourceful and determined intruders is of paramount importance to the defiance of a national border as well as industries of national importance. To assist the security forces operating in high alert areas, smart dust like micro-sensors with wireless interfaces could be utilized to study and monitor these environments from a certain distance for military and for industries and national importance.

The sensors like Piezo sensors, Proximity sensors and Pressure switches are applied as an input to sense the position of threat along with smart communicating technologies like GSM and Zigbee which facilitates manual operation of bot. The robot will work in a dual fashion that is in autonomous and manual mode. The buzzer will indicate the presence of an acknowledgement of an obstacle and the angle of the bot will be changed and set according to the presence of obstacles.

2. DESIGN ASPECT OF PROJECT

2.1 BLOCK DIAGRAM



The block diagram is shown in the figure above consists of microcontroller ATMEGA-162 as a controlling unit and field containing array of piezo sensors, proximity sensors and pressure switches as an input which is employed to sense the position of threat on field. Servo motor is interfaced with controller using motor driver IC L293D which is further connected to the gun/tank.

2.2 DESCRIPTION

A. Piezo electric sensors

A piezoelectric disk generates a voltage when deformed (change in shape is greatly exaggerated).The Curies, however, did not predict the converse piezoelectric effect. The converse effect was mathematically deduced from fundamental thermodynamic principles by Gabriel Lippmann in 1881. The Curies immediately confirmed the existence of the converse effect, and went on to obtain quantitative proof of the complete reversibility of electro-elasto-mechanical deformations in piezoelectric crystals.

B. IR Sensors

In this project, the transmitter section includes an IR sensor, which transmits continuous IR rays to be received by an IR receiver module. An IR output terminal of the receiver varies depending upon its receiving of IR rays. Since this variation cannot be analyzed as such, therefore this output can be fed to a comparator circuit. Here an operational amplifier (op-amp) of LM 339 is used as comparator circuit.

When the IR receiver does not receive a signal, the potential at the inverting input goes higher than that non-inverting input of the comparator IC (LM339). Thus the output of the comparator goes low, but the LED does not glow. When the IR receiver module receives signal to the potential at the inverting input goes low. Thus the output of the comparator (LM 339) goes high and the LED starts glowing. Resistor R1 (100), R2 (10k) and R3 (330) are

used to ensure that minimum 10 mA current passes through the IR LED Devices like Photodiode and normal LEDs respectively. Resistor VR2 (preset=5k) is used to adjust the output terminals. Resistor VR1 (preset=10k) is used to set the sensitivity of the circuit Diagram. Read more about IR sensors.

C. Push Button switch

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, though even many un-biased buttons (due to their physical nature) require a spring to return to their un-pushed state. Different people use different terms for the "pushing" of the button, such as press, depress, mash, and punch.

D. Microcontroller AT-mega 162

Features-

- High-performance, Low-power AVR® 8-bit Microcontroller
- Advanced RISC Architecture
- 131 Powerful Instructions – Most Single-clock Cycle Execution
- 32 x 8 General Purpose Working Registers
- Fully Static Operation
- Up to 16 MIPS Throughput at 16 MHz
- 16K Bytes of In-System Self-programmable Flash program memory
- 512 Bytes EEPROM

E. Servo motor

Table1: Motor Specifications

Modulation	Analog
Torque	4.8V(1.80 kg-cm)
Speed	4.8V(0.10 sec/60 degree)
Dimensions	0.91x0.48x1.14 inches
Motor Type	3-pole
Gear Type	Plastic
Rotational Range	180 degrees
Rotation/Support	Bushing
Pulse Width	500-2500 µs

F. DC Motor

300RPM 12V DC geared motors for robotics applications. Very easy to use and available in standard size. Nut and threads on shaft to easily connect and internal threaded shaft for easily connecting it to wheel

G. GSM Module

GSM stands for Global System for Mobile communications is an open, digital cellular technology used for transmitting mobile voice and data services. GSM supports voice calls and data transfer speeds of up to 9.6 kbps, together with the transmission of SMS (Short Message Service).

H. Zigbee

It is a specification for a suite of high-level communication protocols used to create personal area networks built from small, low-power radios.Though its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics. ZigBee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. ZigBee is typically used in low data rate applications that require long battery life and secure networking (ZigBee networks are secured by 128 bit symmetric encryption keys.). ZigBee has a defined rate of 250kbit/s, best suited for intermittent data transmissions from a sensor or input device. It operates on several different bands, including 2.4 GHz, 915 MHz, and 868 MHz, sending wireless signals to communicate between nodes.

3. WORKING

When any of the sensors will detect the threat, it generates an interrupt signal to microcontroller. According to logic provided to controller it will initiate the position of servo motor at the angle corresponding to the threat. A gun is mounted on assembly of two servo motors designed for 180 degree rotation each.We able to control position of gun by means of wireless control technology called 'Zigbee'. Zigbee can control the position precisely from 1 to 360 degree.GSM is used for controlling positions manually by assigning different codes for each sensor. Command regarding position is provided by means of SMS creating an interrupt to the controller.

4. HARDWARE IMPLEMENTATION

Fig1. Hardware module

5. RESULTS

Considering following positions of sensors used as an input:

A-D: Position of piezo sensors

1-4: Position of IR sensors

a-h: Position of push buttons

Table2 : Result table

Sr. No	Position of piezo-sensor	Position of IR sensor	Position of push buttons	Result
1	A is pressed	-	-	Gun point at A
2	-	1 is pressed	-	Gun point at 1
3	-	-	d is pressed	Gun point at d

6. CONCLUSION

By using microcontroller based smart protection system it is possible to ensure complete safety of man and material with less wastage of resources. Considering cost it is much economical, user friendly as well as flexible protective system. GSM and ZIGBEE facilitates operation from remote location and provides a provision to protect high alert zones where we cannot provide manpower. Hence it can be proved to be the future of protection system.

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8. REFERENCES

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