Women Wearable Safety Device & Tracking System Using Atmega328 Microcontroller

Prof. M.P Dongre[1], Kalika Uttalwar[2], Niketa Patre[3], Samiksha Butle[4], Anjali Patil[5]

[2,3,4,5] *UG student, E&TC department, Government College of Engineering, Chandrapur*
[1] *Project Guide, E&TC department, Government College of Engineering, Chandrapur*

ABSTRACT

Today, the safety of women is a crucial issue. The number of victims is increasing day by day, we have proposed a model to help ensure the safety of women and children globally. We have used different kinds of sensors such as heartbeat sensors, Temperature sensor, Flex sensors and accelerometers and also the platform of microcontrollers. These are used for detection of Heartbeat, sudden temperature changes and user movement of victims. We have also used GPS, which will help to detect the location of the device (corresponding to the location of the victim). The GSM used in the model is used to send an alert message to the victim's relatives and the Police station also. We have suggested a wearable device in this model which will be easy for women to carry with them such as wristband (or back belt)

KEYWORDS: - Wearable Safety Device, Atmega328 Microcontroller, Heartbeat Sensors, Flex Sensors, MEMS Accelerometers

INTRODUCTION

In this project we have made a wearable and easy to use device for safety as well as for tracking of location. The model is built using sensors such as temperature sensor, heartbeat sensor, flex sensor and MEMS accelerometers for detection of increased pulse rate and sense the fast moments. The Interfacing device used for the device is ATMEGA328 Microcontroller. The device is wearable and therefore easy to carry. There is Continuous measurement of different parameters of the sensors used in the device. In many of the safety system based devices on women and (children), the victims are supposed to press the emergency button, but pressing the button in an emergency may not be possible. In the "Targeting a friend's mobile tracking app", the tracking application software must be installed on the mobile phone, and the friend must register in the application's friends group in advance. In order to track their friends, both parties need mobile Phones. In the feminine security intelligence system based on RFID and GPS technology , there are some limitations in terms of cost, signal interference, and access to information by invalid and unauthenticated users and the reaction in speech might be considered as a comparable sort of weight on every single sound circumstance over the speech. With the progress of human machine collaboration innovation, an easy to understand interface is ending up increasingly imperative for speech concerned applications. The main disadvantage of these applications and services is that the initial operation must be triggered by the victim which usually does not happen in this case. Therefore, the focus is on establishing a solution to work autonomously in the circumstances encountered .This model proposes a new method to protect women or (children) by ringing the buzzer and sending the location to the nearby police station where the victim is located.

ARCHITECTURE OF DEVICE :-

In this Proposed Model we are using ATMEGA328 Microcontroller as the interfacing device. The Input devices are sensors that are Heartbeat sensors, temperature sensor, flex sensors, MEMS accelerometers. The Sensors provide input signals to the microcontroller. The output devices used here are buzzer or siren, GSM Module and the GPS module is input to atmega328 for location tracking.

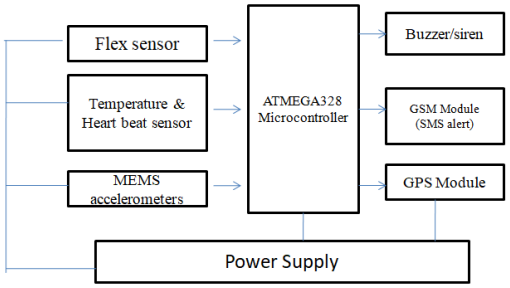

Figure1:- Block Diagram of Proposed Model

PRINCIPLE AND WORKING OF THE DEVICE :-

The architecture of the proposed system includes the ATMEGA328 microcontroller as the Interfacing device for receiving input signals from the sensors used in the device. All the sensors receive input signals from threatened victims. The sensors described in this architecture are Temperature Sensors, MEMS Accelerometers, Heartbeat Sensors, Flex Sensor. GSM is used to send an alert message to the registered contact number in order to Track the location of victim (females). The principle behind this model is to detect the body parameter signals generated from the corresponding sensors in contact with the victim in a threat state such that after detecting the signal, the sensor sends an electrical signal to the microcontroller. The atmega328 microcontroller receives the signal from the sensor as an analog input signal, so it generates output parameters for each sensor. Each sensor is used to detect the signal of a person (female) who is in an abnormal or panic situation. If the value of any of the sensor's generated signals exceeds a threshold limit or value indicating that the woman is in a threat state and depends on the victim condition immediately the buzzer/siren will activate when 3 out of the 4 sensors exceed the threshold limit, then the GPS will send the location to the atmega328 microcontroller, which then will send the signal to GSM Module. Finally, the alert message "I am in danger" and the latitude and vertical position are sent to the registered contact number. Thus, the activation of the sensor and buzzer uses GPS to track the victim's location and, with the help of the GSM 800L used, sends the location message to the corresponding contact with a 10 second delay.

HARDWARE DESCRIPTION

1. ATMEGA328 Microcontroller :-

The Atmel 8-biT AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter, programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz ATmega328 is an 8-bit and 28 Pins AVR Microcontroller, manufactured by Microchip, follows RISC Architecture. It has an EEPROM memory of 1KB and its SRAM memory is of 2KB.It has 8 Pin for ADC operations, which all combines to form Porte (PA0 - PA7).It also has 3 built-in Timers, two of them are 8 Bit timers while the third one is 16-Bit Timer. You must have heard of Arduino UNO, UNO is based on the atmega328 Microcontroller. It's UNO's heart.

FIGURE1:- ATMEGA328 CHIP

2. FLEX SENSOR:-

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuck to the surface, and resistance of the sensor element is varied by bending the surface. Since the resistance is directly proportional to the amount of bend it is used as goniometry, and often called flexible potentiometer. Flexible motion detection of victims as shown in fig. Place the sensor on your hand to detect the change in resistance at a specific location of the sensor. This depends on the change in resistance due to sudden bending of the body or hand or other factors. Therefore, this allows the sensor to sense and detect outliers to detect the output.

Figure2:- flex sensor

3. HEART BEAT SENSOR:-

Pulse Sensor is a plug-and-play heart-rate sensor for ATMEGA328. It can be used by students, artists, athletes, game & developers easily heart-rate projects.

makers, and mobile who want to incorporate live data into their Essentially it is an integrated optical amplifying circuit and noise eliminating circuit sensor. There is also a LED in the centre of this sensor module which helps in detecting the heartbeat.

Pulse sensor consists of three pins: VCC pin GND pin & OUT pin.

FIGURE 3:- HEART BEAT SENSOR AND PULSE SENSOR

4. TEMPERATURE SENSOR:-

We can measure the body temperature using various temperature sensors. For instance, LM35 has a series of precision integrated circuit sensors whose output voltage is linearly proportional to the Celsius temperature. It operates linearly +/- 10.0Mv/°C scale factor with 0.5°C accuracy. In emergency cases body temperature varies drastically which can trigger the atmega328 module, sending an input signal for rescue. It can easily be interfaced with any Microcontroller that has ADC function or any development Platform like Arduino. If the temperature is 0°C, then the output voltage will also be 0V. There will be a rise of 0.01V (10mV) for every degree Celsius rise in temperature. In this model temperature sensor is a input device for microcontroller as soon as the range of this sensor increases linearly with the victim body temperature the signal is sent to

microcontroller indicating threat state.

FIGURE 4:- TEMPERATURE SENSOR

5. MEMS ACCELEROMETERS :-

An accelerometer is an electromechanical device that will measure acceleration forces. These forces may be static, like the constant force of gravity pulling at your feet, or they could be dynamic-caused by moving or vibrating the accelerometer. In this system we use the triple axis accelerometer sensor which is used to measure the acceleration produced from the victim who is in tragedy.

e Communications (GSM) SIM card is inserted into the mobile device to send and receive messages using GPRS. The GSM SIM card number is already registered in the system. GSM is used to transmit data from the control unit to the base station. We can use the GSM 800A with a frequency of 900MHz. It has an uplink frequency band of 890MHz to 915MHz and a downlink of 935MHz to 960MHz GSM, with the advantages of FDMA and TDMA. In the 25 MHz BW, 124 carriers are generated with a channel spacing of 200 KHz (FDMA). Each carrier is divided into 8 time slots (TDMA). In any given instance of time, 992 voice channels are provided in the GSM 800L.

Figure 6:- GSM Module

GPS MODULE:- The Global Positioning System (GPS) is a navigation and precision positioning tool that tracks the position of the Earth's longitude and latitude based on the time difference of signals from different satellites. Arrived at the receiver. On six different orbits about 12,500 miles from Earth, 24 MEO (Medium Earth Orbit) satellites orbit the Earth for 24 hours, transmitting once per second. It receives the location data and transmits it to the ATmega328 microcontroller. Therefore, the ATmega328 microcontroller receives the signal from the GPS, so it performs further operations.

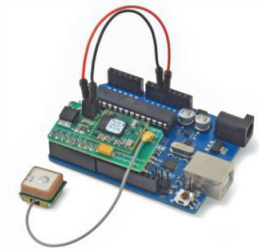

Figure 7:-GPS Module

ADVANTAGES OF THE DEVICE:-

- The device is wearable and easy to carry for both females as well as children.
- Multiple sensors used here helps to detect the exceeding signals sent through them in the victim's danger state.
- This is different from the conventional safety devices because of the fact that the sensors are automatically working for signal transmission to

the microcontroller platform used in the model due to which the victim does not have to press any button or use mobile for communication in the panic state.

FUTURE SCOPE:- This system can overcome fear and make every woman as well as children in the the country is afraid of her safety. As it is convenient and easy to handle . Alert systems are basic need of every safety device.

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