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Prevention of Accidents by Using Two Dimensional Sensor Network

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Abstract—

There have many technologies to prevent the accidents. One of the technologies I have used to prevent the accidents and alerting to be loved ones. In this project I have introduced security alerting system i.e. One vehicle is completely assembled with Ultrasonic sensor and mine sensor, when any vehicle comes near to another vehicle these sensors detects and gives alert by using buzzer.

Keywords—ARM Processor; Ultrasonic sensor; Mine sensor

I. INTRODUCTION

Now-a-days,accidents are increasing day by days and also technologies are also increasing these days to prevent accidents. I have used one of the technologies with my ideology. A simple circuit system interfaced to the vehicle. That will give you alerting and controlling your vehicle when unexpected things have happens. Here ultrasonic sensor and mine sensor are playing major role. When these two sensors detects automatically motor has stopped and it has given buzzer alert.

Security of persons and information has always been a major issue. We need to protect our homes and offices; and also the information we transmit and store. Developing embedded systems for security applications is one of the most lucrative businesses nowadays. Security devices at homes, offices, airports etc. for authentication and verification are embedded systems. Encryption devices are nearly 99 per cent of the processors that are manufactured end up in~ embedded systems. Embedded systems find applications in . every industrial segment- consumer electronics, transportation, avionics, biomedical engineering, manufacturing, process control and industrial automation, data communication, telecommunication, defense, security etc. Used to encrypt the data/voice being transmitted on communication links such as telephone lines. Biometric systems using fingerprint and face recognition are now being extensively used for user authentication in banking applications as well as for access control in high security buildings.

The Central Processing Unit (processor, in short) can be any of the following: microcontroller, microprocessor or Digital Signal Processor (DSP). A micro-controller is a low-cost processor. Its main attraction is that on the chip itself, there will be many other components such as memory, serial communication interface, analog-to digital converter etc. So, for small applications, a micro-controller is the best choice as the number of external components required will be very less. On the other hand, microprocessors are more powerful, but you need to use many external components with them. D5P is used mainly for applications in which signal processing is involved such as audio and video processing.

In this proposed solution, mainly three sensors are the key elements which collect the data from surrounding and give alert to the owner.

II. SYSTEM ARCHITECTURE

The system architecture of this proposed system is divided into two different blocks.

8051 END: Hardware implementation for this proposed system is shown below with the simple blocks. Power supply block is designed and developed to generate power source for the 8051 controller and its relevant components. Reset circuit is designed and developed to reset the program whenever necessary and interfaced to the 8051 controller for greater stable response. Clock circuit is designed and developed to generate

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oscillations and interfaced to the 8051 controller for needy response. A simple block diagram shown below:

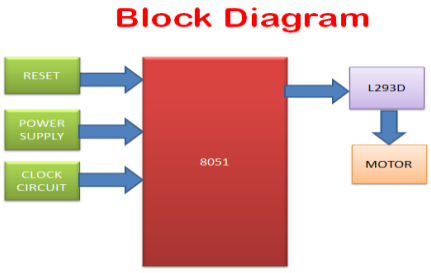

Figure – 1: 8051Block Diagram

ARM7 END: Hardware implementation for this proposed system is shown below with the simple blocks. Power Supply block is designed and developed to generate power source for the ARM processor and its relevant components. Reset Circuit is designed and developed to reset the program whenever necessary and interfaced to the ARM processor for greater stable response. Clock Circuit is designed and developed to generate oscillations and interfaced to the ARM processor for needy response. LCD Display can also interface to the ARM processor for displaying the status of the system for better understanding. A simple block diagram shown below:

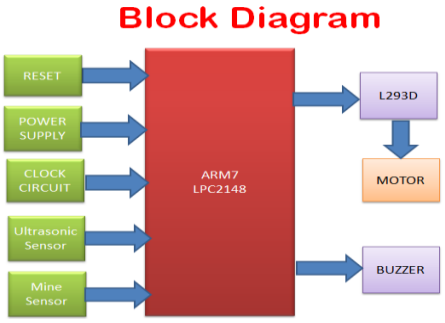

Fig – 2: ARM7 Block Diagram

III. IMPLEMENTATION

HARDWARE:

*8051 END:*In hardware implementation, Vehicle Motors are interfaced with 8051 micro controller.

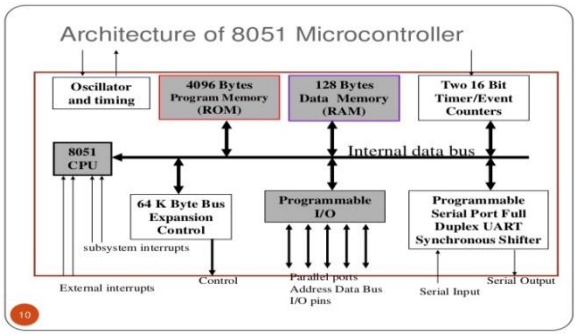

Fig – 3: 8051 Architecture

Motor is connected to the 8051 that means the connection of L293D and 8051 is shown below:

ARM7 END:

In hardware implementation, ARM processor plays a key role in monitoring and controlling the security system. Low-power consumption ARM processor (LPC2148) operating at 3.3V, 50uA is designed and mounted on a PCB along with Reset Circuit and a Clock Circuit. LPC2148, a 32-bit microcontroller with advanced RISC architecture and having 48 GPIO lines with a program memory of 32KB and a data memory of 512Bytes.

And we have 2 UART ports i.e. UART0 and UART1. In this project XBEE connected to the UART0 port of ARM7 (LPC 2148). And 3 Analog to Digital channels, though I connected three Analog sensors to ADC channels of ARM7, so that it converts Analog Values to Digital Values. Those values i have uploaded into ThingSpeak.

Each Sensors and its behaviour explained in below. And ARM7 (LPC 2148) internal architecture overview has shown below as well ARM7 (LPC 2148) with LCD has shown below.

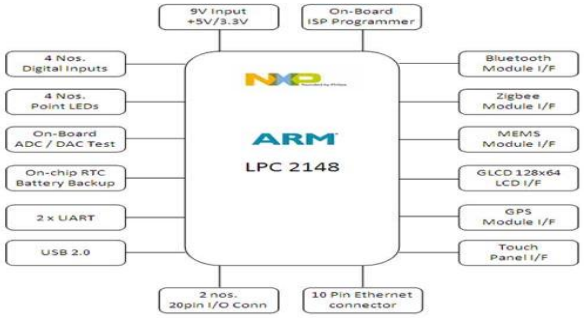

Figure – 4: ARM Overview [LPC2148]

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Figure – 5: LPC2148 Development Board

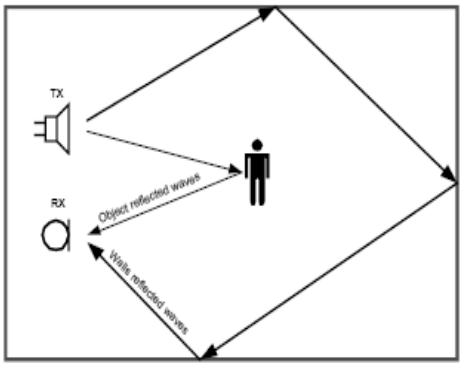

Figure : Basic Sensor Operation Principle

Fig – 6: Sensor operation

*Ultrasonic Sensor:*The sensor is primarily intended to be used in security systems for detection of moving objects, but can be effectively involved in intelligent children's toys, automatic door opening devices, and sports training and contact-less-speed measurement equipment.
Modern security systems utilize various types of sensors to detect unauthorized object access attempts. The sensor collection includes infrared, microwave and ultrasound devices, which are intended to detect moving objects. Each type of sensor is characterized by its own advantages and drawbacks. Microwave sensors are effective in large apartments because microwaves pass through dielectric materials. But these sensors consist of expensive super-high frequency components and their radiation is unhealthy for living organisms.

Infrared sensors are characterized by high sensitivity, low cost and are widely used. But, these sensors can generate false alarm signals if heating systems are active or temperature change speed exceeds some threshold level. Moreover, infrared sensors appreciably lose sensitivity if small insects penetrate the sensor lens. Ultrasound motion detection sensors are characterized by small power consumption, suitable cost and high sensitivity. That it why this kind of sensor is commonly used in home, office and car security systems. Existing ultrasound sensors consist of multiple passive and active components and are relatively complicated for production and testing. Sensors often times require a laborious tuning process.

Mine Sensor: Usually, mine detectors are metal detectors using electromagnetic induction techniques based on either the continuous wave or the pulse induction principle. Vallon original designs in 1965 were based on the continuous wave technique and since 1983 have employed the pulse induction technique.

Vallon metal detectors have a special soil program in order to adapt worldwide the detector to the local soil conductions. The soil program suppresses the undesirable ground effects nearly completely.

Easy operation and a rigid design ensure reliable operation for professional mine and ordnance clearing.

Since 2005, Vallon also offers a Dual Sensor Detector, the Minehound VMR2. This innovative advance technology detector integrates leading edge ground penetrating radar produced by Cobham technical services / ERA Technology int to a high-performance metal detector fomVallon. The unit has been designed specifically for use in the most challenging demining clearance operations of metal and metal-free objects and provides significant improvements in the efficiency of clearance.

The MINEHOUND VMR2 is simple to use and provides the operator with clear audio signals to alert the presence of a potential mine threat. When a threat is located, the MD audio provide accurate position information and mass of metal indication. The GPR audio then provides additional position and depth information, and gauges the radar cross-section of the target. Both detectors can be used separately or together. The GPR responds to even the smallest flush buried object, but not to smaller metal fragments. This means that metallic clutter such as bullet casings, small arms rounds and shrapnel, which commonly causes false alarms, is rejected by thr system.

*L293D:*The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional

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drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications.

All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo- Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications. On the L293, external high-speed output clamp diodes should be used for inductive transient suppression.

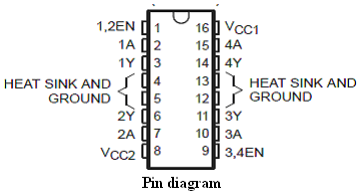

Figure – 8: Soil conductive sensor

Schematic Diagram of 8051 has shown below:

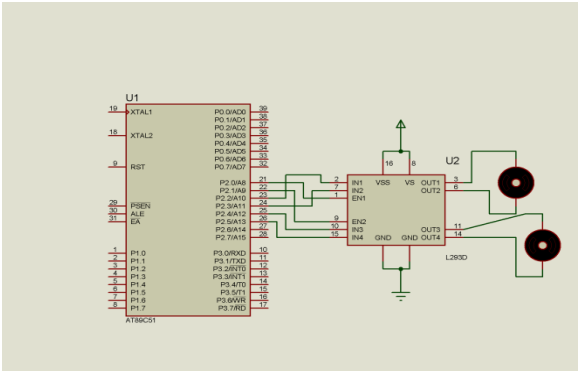

Figure – 7: Schematic Diagram

Schematic diagram of ARM7 (LPC2148) has shown below:

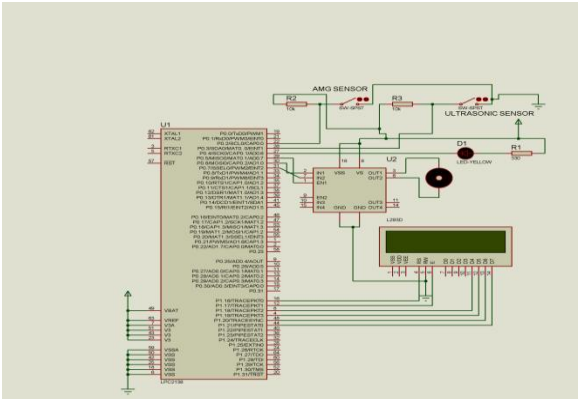

Figure – 8: Schematic Diagram

Ultrasonic sensor (LM 393) connected at P0.3 of ARM7 (LPC 2148), AMG sensor has connected at P0.2 of ARM7 (LPC 2148) and L293D connected at P0.5, P0.6 and P0.7.

SOFTWARE:

Here, to program ARM processor Keil uVision 4 was used as a cross-compiler and Flash Magic was used as a programmer.

ALGORITHM&FLOWCHART

ALGORITHM:

Step – 1: At the 8051 end, Initialize Vehicle and move to running position.

Step – 2: At the ARM7 end, initialize vehicle and move to running position.

Step – 3: Read the AMG sensor and Ultrasonic sensor

Step – 4: If two sensors are detected then stop the vehicle and alert the buzzer.

FLOWCHART:

The flowchart of this paper is shown below.

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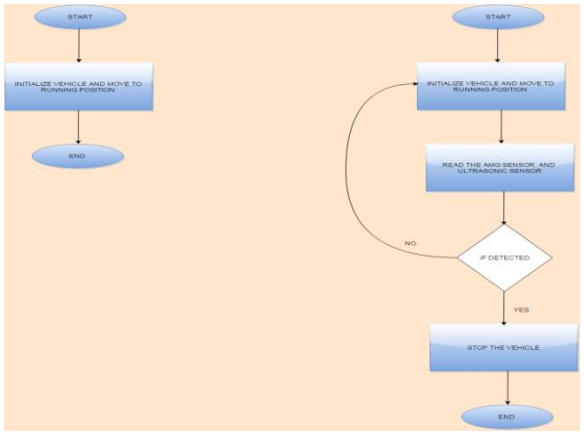

Figure – 9 : Schematic Diagram

IV. RESULTS

Fig – 10: Final Prototype 1

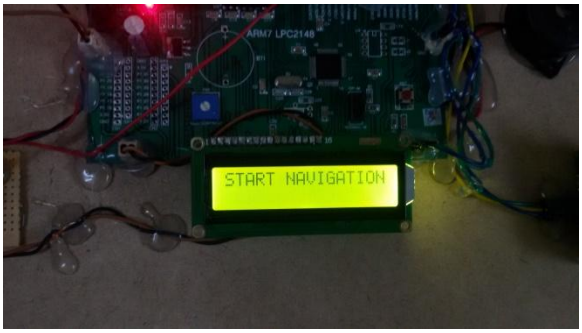

Fig – 11: Final Prototype 2

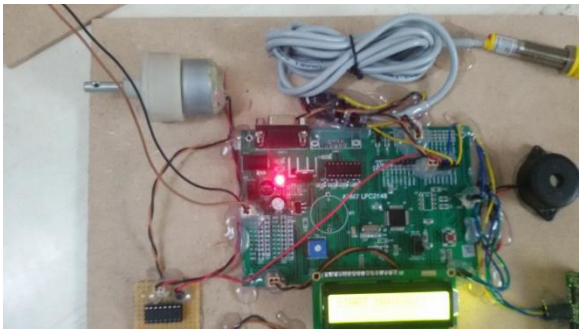

Fig – 12: Final Prototype 3

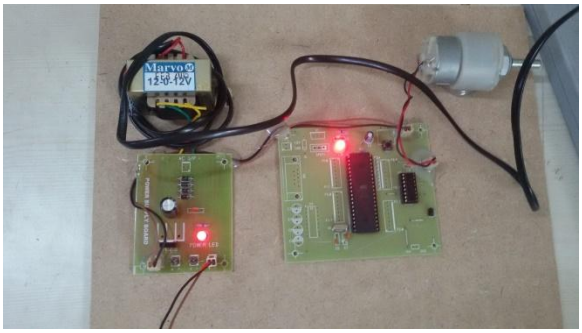

Fig – 13: Final Prototype 4

Fig – 14: Final Prototype 5

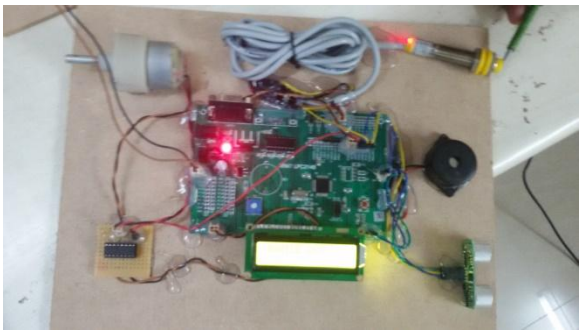

Fig – 15: Final Prototype 6

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Fig – 16: Final Prototype 7

V. CONCLUSION

Here, in this paper we have designed a project which demonstrates 2d concept of different sensors interfaced in one vehicle with reference to another vehicle. This is designed to prevent accident when vehicles moving nearer and the sensors will alert the driver in terms of alarm and there by stopping of vehicle.

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