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VLSI Based Accident Prevention System

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ABSTRACT: Accident prevention system based on VLSI is expedient to avoid the accidents. The accident locality of the vehicle is sent by using GSM module. Accident of the vehicle is perceived by using ultrasonic sensor, eye scanner which is accompanying in the vehicle. The vibration sensor is fixed in the vehicle to sense the vibration of the accident. The location of the vehicle is identified with a technique called GPS technique. The accident prevention system used to diminish the accident by sensing the obstacles around the vehicle. The automatic BP monitoring system were also used. The eye scanner is added to scan the eyes of the driver.

KeyWords: VLSI, GSM, GPS, BP Monitoring System

1. INTRODUCTION

The lots of accident are getting occurred in the world due to the illness of the health and the carelessness of the drivers. Unfortunately if the accident had occurred, the accident information will get reach to the hospital in late manner. By our innovative idea we can prevent accident which get occurs and the accident message will also send to the hospital automatically.

In this project we are using the FPGA (Spartan-3E) kit for this hitch. If we refer the statistics of the road accident in India of the year of 2011 total accidents occurred is 4.97 lakh (annual) (1 every minute). The death status in India of the year of 2011 is 1, 42,485(one death every 3.7 minutes).in the world each and every minute one accident is getting occur.

Likewise if we refer the statistics of 2014 in India totally 37% accidents had occurred due to the over speed driving. At the year of 2014 the total accidents is 4.7 lakh, the death status is 1.4 lakh and the 4.8 lakh of people had got injured in the year 2014. The speed of the vehicle will get reduced, suddenly the message will pass to the registered number in the GSM modem.

If the accident occurs also the message will be pass by using the GSM modem immediately. This is our innovative idea to prevent the accident while driving the vehicle.

1. BLOCK DIAGRAM

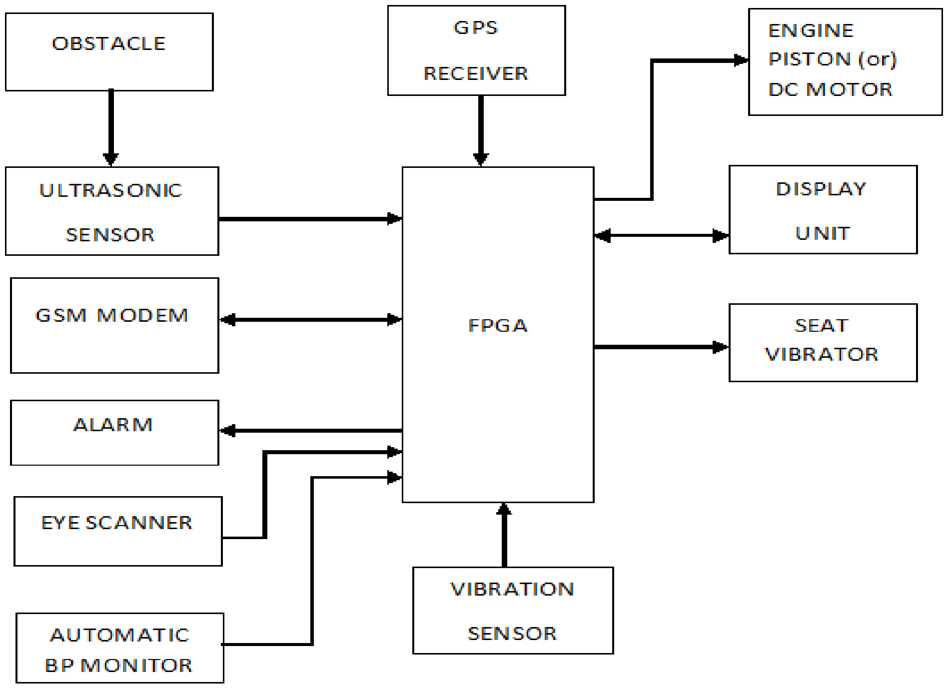


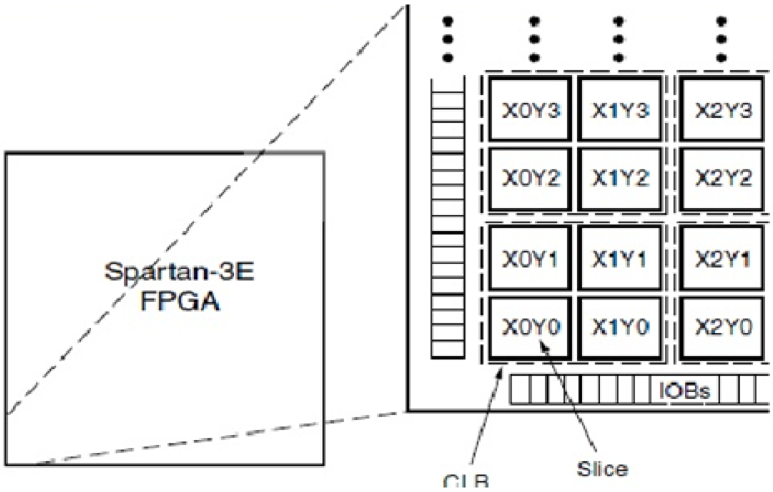
Figure 1.VLSI BASED ACCIDENT PREVENTION SYSTEM

2. METHODOLOGY

The Spartan-3E family of Field-Programmable Gate Arrays (FPGAs) is specifically designed to meet the needs of high volume, cost-sensitive consumer electronic applications. The five-member family offers densities ranging from100,000 to 1.6 million system gates. The Spartan-3E family builds on the success of the earlier Spartan-3 family by increasing the amount of logic per I/O, significantly reducing the cost per logic cell. New features improve system performance and reduce the cost of configuration. These Spartan-3E FPGA enhancements, combined with advanced 90 nm process technology, deliver more functionality and bandwidth per dollar than was previously possible, setting new standards in the programmable logic industry, Because of their exceptionally low cost, Spartan-3E FPGAs are ideally suited to a wide range of consumer electronics applications, including broadband access, home networking, display/projection, and digital television equipment. The Spartan-3E family is a superior alternative to mask programmed ASICs. FPGAs avoid the high initial cost, the lengthy development cycles, and the inherent inflexibility of conventional ASICs. Also, FPGA programmability permits design upgrades in the field with no hardware replacement necessary, an impossibility with ASICs.

1.1. FEATURES I/O CAPABILITIES OF SPARTAN 3E

The Spartan-3E FPGA Select IO interface supports many popular single-ended and differential standards.Spartan-3E FPGAs support the single-ended standards like 3.3V low-voltage TTL (LVTTL), Low-voltage CMOS (LVCMOS) at 3.3V, 2.5V, 1.8V, 1.5V, or 1.2V, 3V PCI at 33MHz, and in some devices, 66 MHz, HSTL I and III at 1.8V, commonly used in memory applications, SSTL I at 1.8V and 2.5V, commonly used for memory applications. Spartan-3EFPGAs also support most low voltage differential I/O standards like LVDS which is called as low voltage differential signaling , Bus LVDS, mini-LVDS, RSDS, Differential HSTL(1.8V, Types I and III), Differential SSTL (2.5V and 1.8V, Type I), 2.5V LVPECL inputs.



1.1. INPUT/OUTPUT BLOCKS

The Input /Output Block (IOB) provide a programmable, unidirectional or bidirectional interface between a package pin and the FPGAs internal logic. There are three main signal paths within the IOB and they are the output path, input path, and 3-state path. Each path has its own pair of storage elements that can act as either registers or latches.

4. WORKING PROCESS

4.1 ULTRASONIC PROCESS

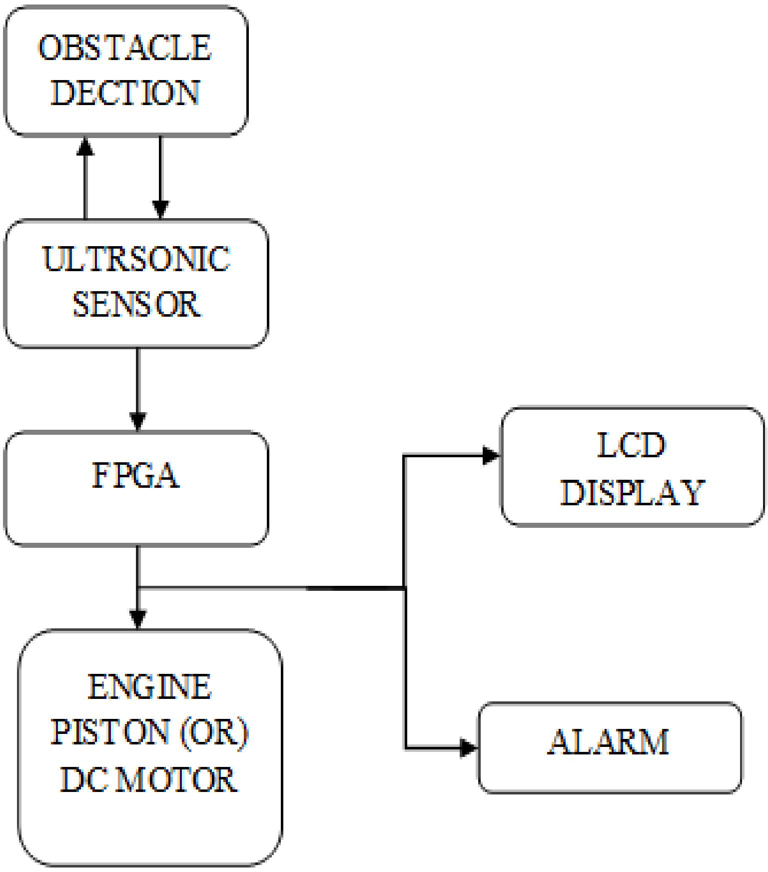


Figure 3: ULTRASONIC PROCESS FLOW CHART

The process of ultrasonic sensor had shown in the above figure 3. In this process the Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor.

Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object (obstacle).At once the echo signal had got received by the ultrasonic sensor then the signal will pass to FPGA (Spartan 3E). As the program had got dumped in to the FPGA the engine piston will get slow down and get too stopped. Immediately the alarm will get glow. This is the process will undergo in the ultrasonic sensor.

4.2. EYE SCANNER PROCESS

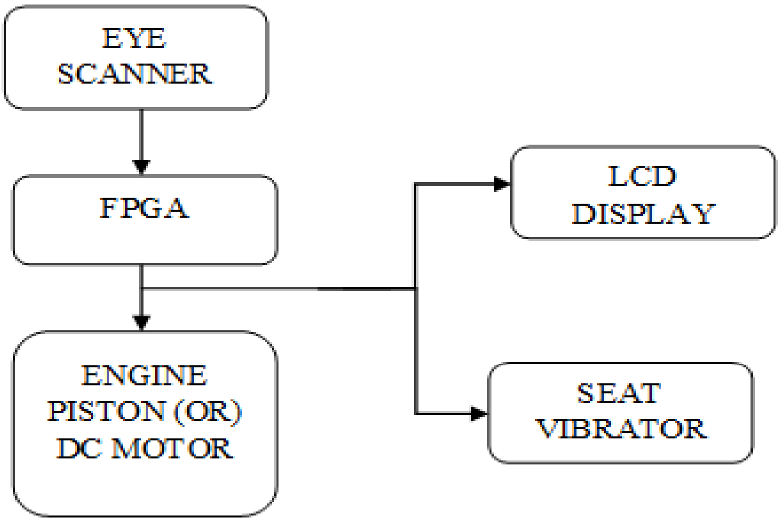


Figure 4: EYE SCANNER PROCESS FLOW CHART

The process of eye scanner had shown in the above figure 4. In this process the IR sensor will get fixed in the glass. The IR sensor fixed glass should get were by the driver at the time of driving the vehicle. Normally the human will not blink their eyes more than 2 seconds, if the eyes were closed more than 2 seconds means the human had got started to sleep. Normally IR sensor will get transmit in to the eyes if the eyes were closed more than 2 second the IR rays will get fall on the skin and it will get reflect back to the IR receiver. That received signal will get pass to the FPGA kit. As the program got dumped into the FPGA the engine piston will get slow down and get too stopped. At once the set vibrator will also get start to vibrate to wake up the driver from the sleep. This is the process of the eye scanner.

4.3. BP MONITOR PROCESS

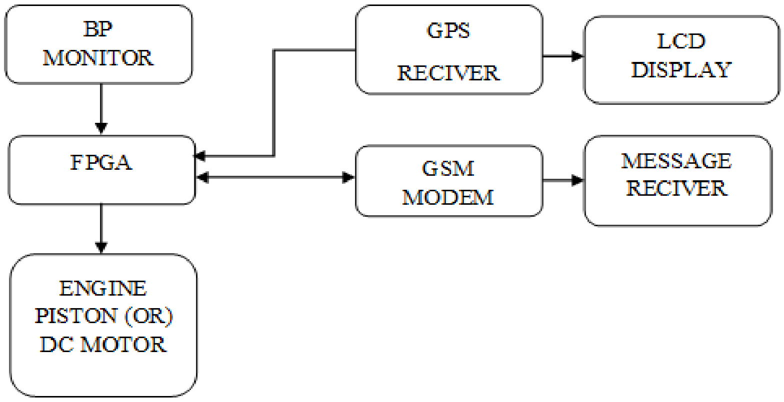


Figure 5: BP MONITOR PROCESS FLOW CHART

The process of BP monitoring had shown in the above figure 5. In this process the BP of the driver will get monitor continuously by using the pressure sensor, if there is any variation in the normal human BP level then at once the signal will get pass to the FPGA and then the engine piston will get slow down and get too stop. Additional the sport of the vehicle ie the attitude and longitude of the vehicle will get noted by the GPS receiver. The noted attitude and longitude of the vehicle will get pass to the FPGA and then the message will get pass to the registered number in the GSM modem.

4.4. VIBRATION SENSOR PROCESS

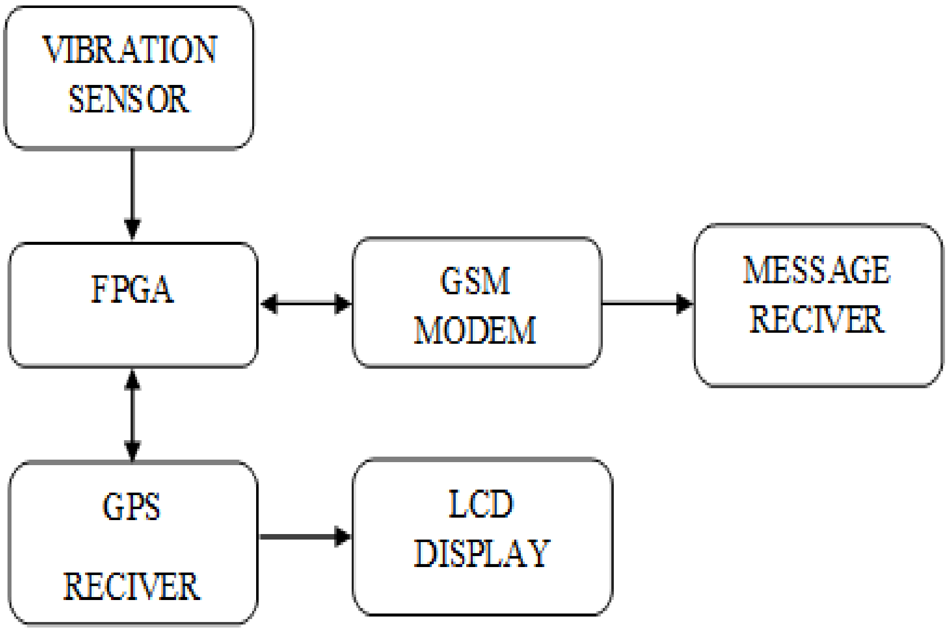


Figure 6: VIBRATION SENSOR PROCESS FLOW CHART

The process of vibration sensor had shown in the above figure 6. In this process if the accident had happen there will be a vibration in the vehicle that vibration will get sensed by the vibration sensor and then the signal had get pass to the FPGA. At one the GPS receiver will identify the attitude and longitude of the accident occurred spot. The identified attitude and longitude will get send through a message to the registered number in the GSM module. This is the process of the vibration sensor.

5. CONCLUSION

The entire project is simulated by using Xilinx simulation software. The accident location will be detected using GPS and the attitude and longitude of the accident location will be communicated to the number of the hospital which get resisted in GSM modem. The accident is avoided using thus by sensing the obstacles around the car using the ultrasonic sensor and sensed signal will be sent to the FPGA kit and then the engine speed decreases by the dumped FPGA program in Spartan-3E kit. Likewise the eye scanner will scan the eyes if the eye had been closed for more than 2 seconds then the signal will pass to the FPGA kit then the engine speed will decrease and the seat vibrator will vibrate. If there is any change in the normal blood pressure level of the driver, the speed of the engine will decrease. By using our innovative technique the occurrence of an accident can be reduced and if unfortunately accident had occur the message will pass to the registered number in the GSM. We had simulated the blocks separately with the Spartan-3E kit. Now we are trying to combine the all blocks with the Spartan-3E kit as a accident prevention system.

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