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Drowsiness Detection and Secure Journey by Respiratory Synchronisation

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Abstract:

The development of technologies for preventing drowsiness at the wheel is a major challenge in the field of accident avoidance systems. Preventing drowsiness during driving requires a method for accurately detecting a decline in driver alertness and a method for alerting and refreshing the driver. As a detection method, the authors have developed a system that uses image processing technology to analyse images of the driver's face taken with a video camera. Diminished alertness is detected on the basis of the degree to which the driver's eyes are open or closed. This detection system provides a noncontact technique for judging various levels of driver alertness and facilitates early detection of a decline in alertness during driving.

Keywords:

ARM Processor,Digital image processing, heartbeat sensor.

I.INTRODUCTION:

The Vehicle accident is a major public problem in many countries, particularly in India. Despite awareness campaign this problem is still increasing due to riders's behaviour such as speed driving, drunk driving, riding with no helmet protection, riding without sufficient sleep, etc. drowsiness is comes under driving without sufficient sleep. The numbers of death and disability are very high because of late assistance to people who got the accident. These cause huge social and economic burden to people involved. Therefore several research group and major vehicle manufactures have developed safety devices to protect riders from accident injuries.

Alternatively, intelligence schemes such as driver face detection and diminished alertness is detected on the basis of the degree to which the driver's eyes are open or closed. This detecting system provides a noncontact technique for judging various levels if driver alertness and facilitates early detection of a decline in alertness during driving.The system consists of cooperative components of a heartbeat sensor and motor driver connected to the ARM7 processor. Here Image processing is a main role plays. We have developed a system that uses image processing technology to analyse images of the driver's face taken with a video camera.

Diminished alert system is detected on the basis of the degree which the driver's eyes are open or closed. And heartbeat sensor is gives the heartbeat of the driver. When driver's eyes are close then heartbeat of the driver will be more, so when it detects the both cases i.e. one is driver's eyes close and heartbeat value exceed the normal value then the motor of the vehicle connected to the ARM7 has been stop.

A high performance 32 bits MCU is used to process and store real-time signal from the heartbeat sensor. The central processing unit can be any of th following microcontroller, microprocessor. A microcontroller is low-cost processor. It 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 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.In this proposed solution, mainly one sensor and image processing is key elements.

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II.SYSTEM ARCHITECTURE:

The system architecture of this proposed system is given below with simple blocks:

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. Heartbeat sensor connected to the processor and L293D is also connected to the ARM7, simple block diagram shown below:

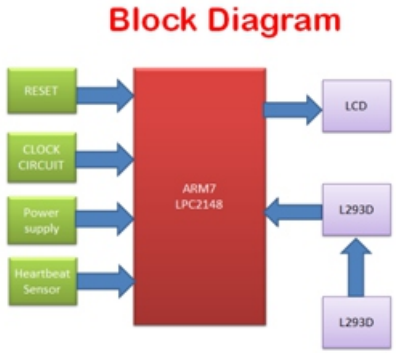

Fig – 1: ARM7 Block Diagram

III.IMPLEMENTATION HARDWARE: 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.

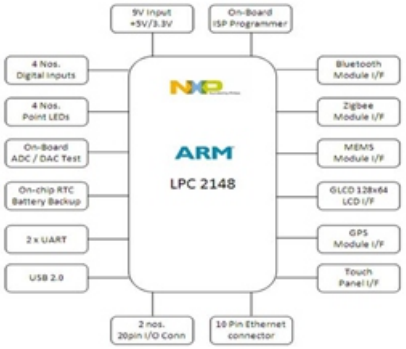

Figure – 2: ARM Overview [LPC2148]

Figure – 3: LPC2148 Development Board.

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

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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.

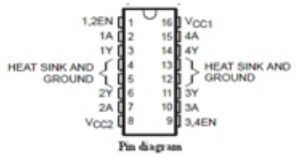

Figure – 4: L293D in diagram

Schematic diagram of ARM7 (LPC2148) has shown below:

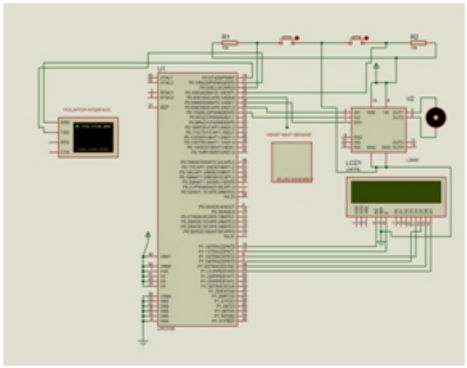

Figure – 5: Schematic Diagram

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: Initialize the LCD, Heart Sensor
Step – 2: If vehicle engine is ON
Step – 3: Check Heartbeat sensor, and also check eye blink data.
Step – 4: if it is exceeds normal heartbeat value and If eye is closed then OFF the motor engine.

FLOWCHART:

The flowchart of this paper is shown below.

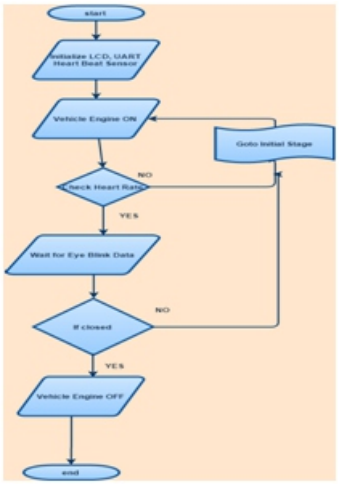

Figure – 6: Flow chart.

IV.RESULTS:

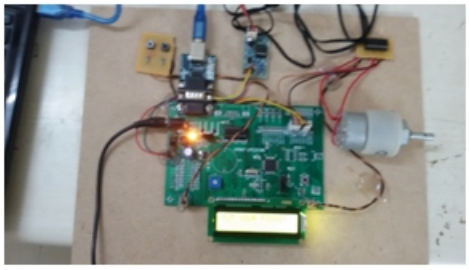

Fig – 7: Final Prototype 1

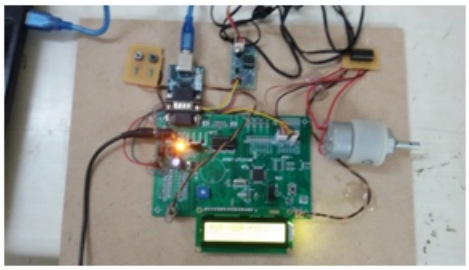

Fig – 8: Final Prototype 2

Fig – 9: Final Prototype 3

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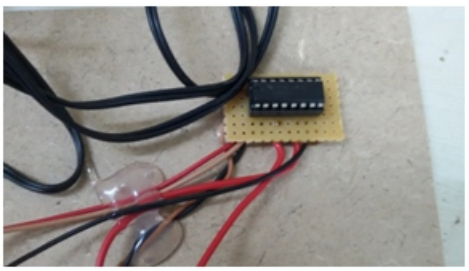

Fig – 10: Final Prototype 4

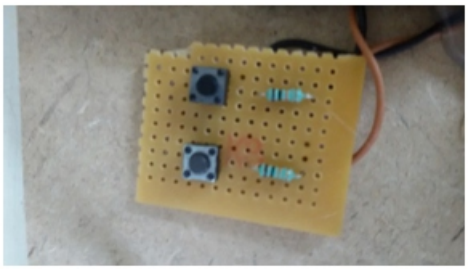

Fig – 11: Final Prototype 5

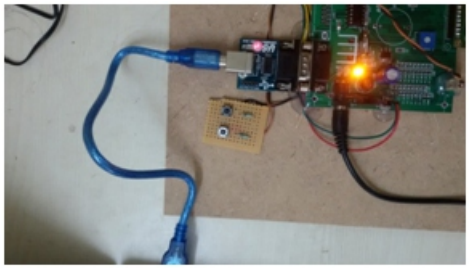

Fig – 12: Final Prototype 6

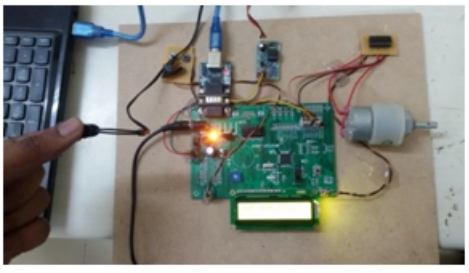

Fig – 13: Final Prototype 7

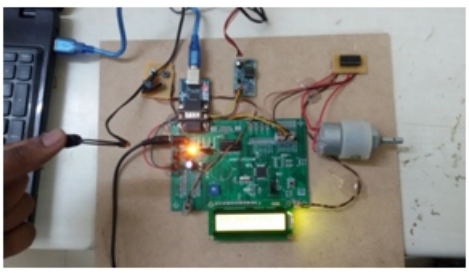

Fig – 14: Final Prototype 5

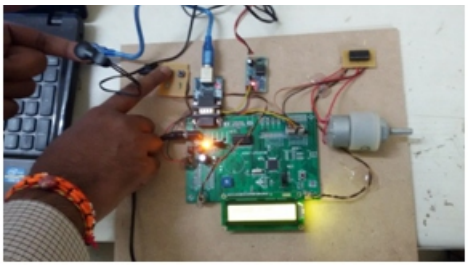

Fig – 15: Final Prototype 5

Fig – 16: Final Prototype 5

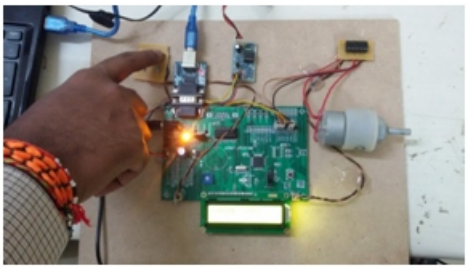

Fig – 17: Final Prototype 5

Fig – 18: Final Prototype 5

V.CONCLUSION:

Here, in this paper we proposed a system to avoid accident occurred when driver is feeling drowsy. Using image processing and the other relevant hardware circuitry the vehicle is automated intelligently.

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