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ADVANCED AUTHENTICATION AND SECURITY SYSTEMS IN VEHICLES

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ABSTRACT

The planned system consists of a wise card capable of storing the fingerprint of the particular person. which is used for authentication of the vehicles. Vehicles like cars and bikes need to have a wise card reader capable of reading the particular license. identical automobile need to have the fingerprint reader device. A person, requires to drive the vehicle, need to insert the cardboard inside the vehicle and swipe his/her finger. If it's matched with the swiped finger print, he/she can proceed for ignition, otherwise ignition will not work. Moreover, the security harness detector verifies thus promotes the user to wear the security harness before driving and alcohol sensor is to boot interfaced throughout this project therewith if the thrust is drunk or beneath the influence of alcohol the ignition will stop working automatically. this may increase the security and safety of vehicles and so the motive force too preventing accidents.

INTRODUCTION

With embedded systems quick increasing its reach, subject material associated with this field is offered in abundance. Whereas functioning on this project we've studied matter from numerous sources like books, on-line articles and reference manuals. The information gained from this activity has been of nice facilitate to USA in understanding the essential ideas associated with our project and has kindled any interest during this topic.

Physically, embedded systems ranges from moveable devices like digital watches and MP3 players, to massive stationary installations like traffic lights, mill controllers, or the systems dominant nuclear energy plants.

We understood the preponderance of the ARM processors within the field of embedded systems and also the options of ARM processors from the document "The ARM Architecture" by Leonid Ryzhyk. The ARM design may be a confluence of the many helpful options that produces it higher than different peer processors. Being little in size and requiring less power, they prove helpful in providing Associate in nursing economical performance in embedded applications.

In previous comes, some researchers have developed a security system in vehicles and a few have developed safety system in vehicles. But I actually have enclosed safety and security for vehicles in my project. In planned system uses ARM small controller LPC-2148. Biometric systems have overtime served as strong security mechanisms in numerous domains. Fingerprints area unit the oldest and most generally used style of identity verification. A essential step in exploring its blessings is to adopt it to be used as a style of security in already existing systems, like vehicles. This analysis work focuses on the employment of fingerprints for vehicle ignition. The image system might be divided into the subsequent modules: fingerprint module that accepts fingerprint images; positive identification reader module; safety harness detector; alcohol device and also the mechanism module. The fingerprint recognition computer code permits fingerprints of valid users of the vehicle to be listed during a information. In order to ignite the vehicle the person fingerprint is matched against the fingerprints within the information whereas users with no match within the information area unit prevented from igniting the vehicle. image is an impetus to drive future analysis, in gear towards developing a additional strong and embedded time period fingerprint based mostly ignition systems in vehicles

SYSTEM DESIGN

The system is designed by mounting a fingerprint scanner as well as RFID reader. The system is designed in such a way that by reading the tag by the RFID reader and by matching the fingerprint of the person the controller detects whether the person is to be authorized or not. If the fingerprint of the person is matched with the already stored fingerprint in the memory of the fingerprint module then the controller also compares with the tag with a specific identity and if the matching criteria is adequate then the ignition of the vehicle is allowed. Here there is a provision for the seat belt detector without which the controller will alert by giving a beep sound. In this way the path is laid for the safety of the driver. There is an arrangement of the alcoholic sensor through which there is a provision for the detection of whether the driver has consumed any liquor then the detector will indicate the level. The indicator is connected to the controller in such a way that if the percentage of consumption is within the allowed levels then the driver is ignition continues. If the alcoholic levels are above the indicated levels then the ignition of the devices to a halt by a preceding indication by the sensor. There is an arrangement of 16*2 LCD to see the reason if the ignition of the vehicle is not allowed and also shows the percentage of alcohol that is consumed by the driver. The controller used in the proposed system is ARM 7 processor based LPC2148 controller. for the purpose of serving the ignition system DC motor is used through which the switching of the vehicle is depicted. the block diagram of the prototype is as shown in the below figure.

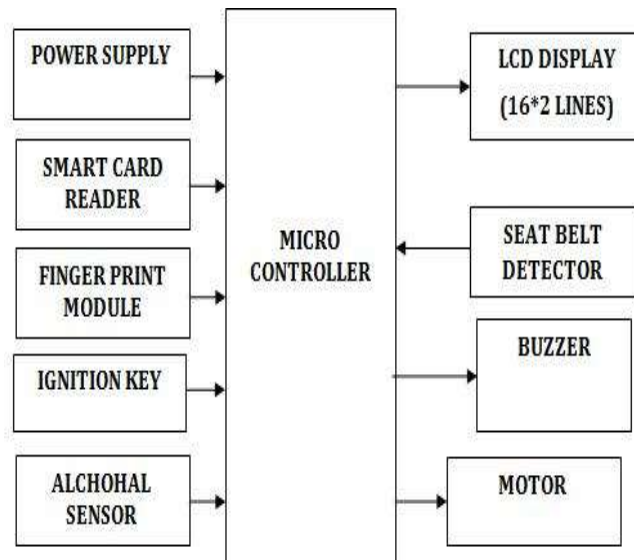


Figure 1 Block diagram.

HARDWARE DESCRIPTION

Controller:

The core device of the project, controller is a ARM 7 series LPC 2148 where LPC stands for low power consumption. The advanced reduced instruction set machine which consists of pipeline execution takes three cycles to execute an instruction.

The registers that are present in the controller are 32-bit registers that is it can store and process 32-bit data. The LPC 2148 consists of two ports port0 port1. In port1 there are 16 pins that is from pin1.16 to pin1.31. Some pins are used for multiple purposes based on the need and up to which the pin can support. The controller can serve in both the 32 bit mode as well as the 16 bit mode. In thumb mode the controller is converted into 16 bit mode. The controller consists of the barrel shifter through which the logical operations are performed at a very less time.

The LPC 2148 consists of two UARTS which are used for serial communication one of the UART is connected to the fingerprint module and the other to the RFID reader.

RFID reader:

RFID Detection system is to facilitate knowledge transmission through the moveable device called tag that's browse with the assistance of RFID reader; and method it as per the wants of an application. data transmitted with

the assistance of tag offers location or identification in conjunction with alternative specifics of product labeled – purchase date, color, and price. Typical RFID tag includes silicon chip with radio aerial, mounted on substrate

The RFID tags square measure organized to retort associated receive signals from an RFID transceiver. this permits tags to be browse from a distance, not like alternative sorts of authentication technology. The RFID system has gained wide acceptance in businesses, and is step by step replacement the barcode system.

The RFID module is working with serial communication. So for communication purpose here I am using UART(Universal Asynchronous Receiving and Transmitting). Generally the LPC2148 microcontroller has 2 UART communication ports those are UART0 and UART1. Here I am using UART1 for interfacing the RFID module. The UART-Tx pin of the microcontroller is connected to RFID-RX pin and UART-RX pin of the microcontroller is connected to RFID-Tx pin. The registers of the UART are already explain. For interfacing the RFID have different functions.

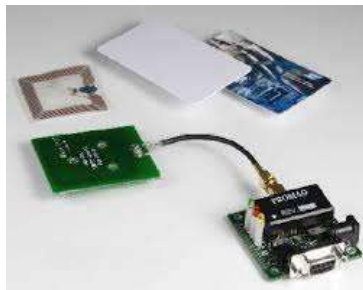


Figure 2 RFID reader and tag.

Fingerprint module:

Fingerprint process includes 2 parts: fingerprint enrollment and fingerprint matching (the matching may be 1:1 or 1:N). Once enrolling, user has to enter the finger twofold. The system can method the 2 time finger pictures, generate a model of the finger supported process results and store the model.

Once matching, user enters the finger through optical detector and system can generate a model of the finger and compare it with templates of the finger library. For 1:1 matching, system can compare the live finger with specific model selected within the Module; for 1:N matching, or looking out, system can search the total finger library for the matching finger. In each circumstances, system can come back the matching result, success or failure.



Figure 3 Fingerprint scanner.

The TX pin of the Fingerprint is connected to UART0-RX pin of LPC2148, and RX pin of the Fingerprint is connected to UART0-TX pin of LPC2148.

L293D driver:

These are current amplifiers since they take a low-current management signal and supply a higher-current signal. This higher current signal is employed to drive the motors. L293D contains 2 built-in H-bridge driver circuits. In its common mode of operation, 2 DC motors will be driven at the same time, each in forward and reverse direction. The motor operations of 2 motors will be controlled by input logic at pins two & seven and ten & fifteen. Input logic 00 or eleven can stop the corresponding motor. Logic 01 and ten can rotate it in clockwise and anticlockwise directions, severally. modify pins one and nine (corresponding to the 2 motors) should be high for motors to start out in operation. once Associate in Nursing modify input is high, the associated driver gets enabled. As a result, the outputs become active and add section with their inputs.

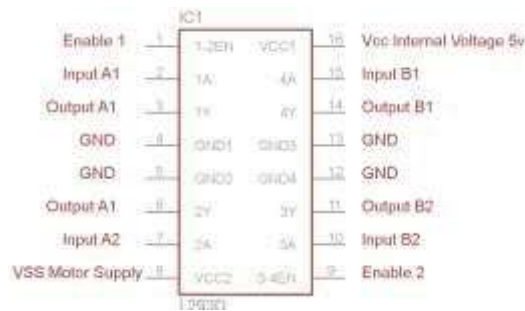


Figure 4 L293D pin description.

16,17,18,19 pins of port1 in the microcontroller are connected to L293D inputs, and outputs are connected to DC Motors.

Alcoholic sensor:

Sensitive material of MQ-3 gas sensing element is SnO_2 , that with lower physical phenomenon in clean air. When the target alcohol gas exist, The sensor's physical phenomenon is a lot of higher at the side of the gas concentration rising. MQ-3 gas sensing element has high sensitivity to Alcohol, and has smart resistance to disturb of petrol, smoke and vapor. The sensing element might be accustomed notice alcohol with completely different concentration, it's with low value and appropriate for various application. Character Configuration are smart sensitivity to alcohol gas, Long life and low value, straightforward drive circuit. Alcoholic sensor is an ADC communication device. The P0.28 pin is connected to Alcoholic sensor.

LCD:

The lcds used completely in watches, calculators and measurement instruments area unit the straightforward seven-segment displays, having a restricted quantity of numeric information. Associate in Nursing alphanumeric display consists of 2 glass panels. The inner surface of the glass plates area unit coated with clear electrodes that outline the character, symbols or patterns to be displayed chemical compound layers area unit gift in between the electrodes and therefore the liquid, to keep up an outlined orientation angle. Here alphanumeric display is present. Here 4- bit mode and is connected to port1 of the controller.

IR sensor:

Infrared LEDs area unit ideal lightweight sources to be used with visual sense glasses, police investigation cameras, medical imaging, recognition and standardisation systems. A photodiode may be a PN junction or PIN structure. once a gauge boson of comfortable energy strikes the diode, it excites Associate in Nursing negatron thereby making a mobile negatron and a charged negatron hole. If the absorption happens within the junction's depletion region, or one diffusion length removed from it, these carriers area unit sweptback from the junction by the intrinsic field of the depletion region., as a result of solely photons with comfortable energy to excite electrons across the material's band gap can manufacture vital photocurrents. P0.27 pin of the controller is connected to IR sensor.

SOFTWARE DESCRIPTION

The software package tool that's utilized in developing this project is: Keil uvision IDE.

The keil IDE provides the platform for writing the ASCII text file, editing, compiling, debugging furthermore on generate the hex file .the hex file that's generated are going to be traced into the disc drive of the LPC 2148, so the controller can work in line with that hex file. Before repeating the hex file we've to clear the present file simply by deleting it. at that time we've to repeat the specified hex file.

The keil window are going to be as shown within the figure below:

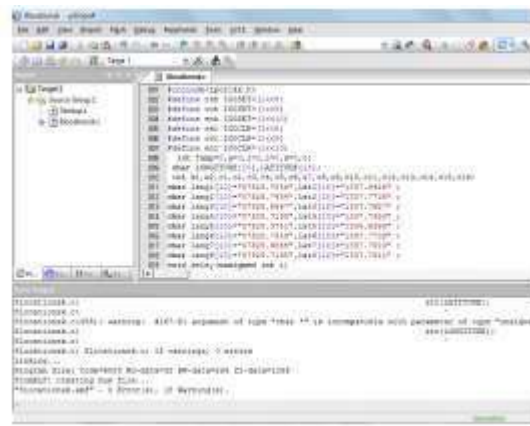


Figure 5 Keil window.

In this way we will have the file dumped into the controller and the device will work. The proteus simulation for the proposed device is as shown in the below figure:

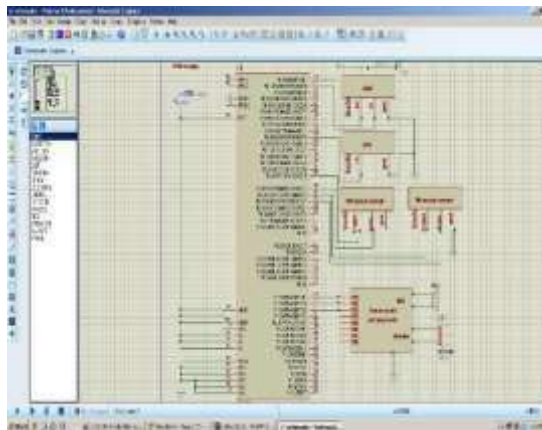


Figure 6 Simulation window in proteus.

IMPLEMENTATION

1. The RFID reader first reads the tag that is provided by the user and verification is performed on for the respective tag ID
2. The user has to place the finger in the fingerprint scanner so that the scanning process compares the biometric received through the scanner. The module compares it with already stored data and if it matches then the ignition for the vehicle is allowed else the ignition will be in the off position.
3. The IR sensor is used in the place of the seat belt checker so that if it is low then the buzzer will not on else it sounds indicating that the seat belt is not wearied.
4. The alcoholic sensor is used to check whether the driver had any alcohol, if the user consumed the alcohol more than the permitted levels then the controller will stop the ignition by indicating through the sensor and the reason for the ignition will be displayed in the LCD.

RESULT

The simulation result for the prototype is as shown in the figure below:

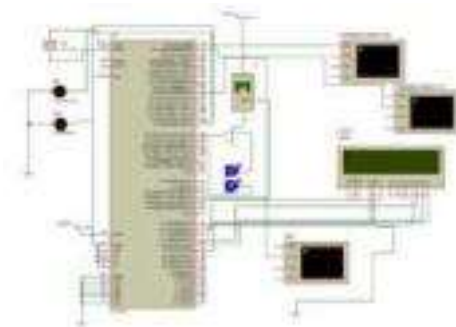


Figure 7 Simulation of the prototype.

The pictorial representation of the system is as shown below:

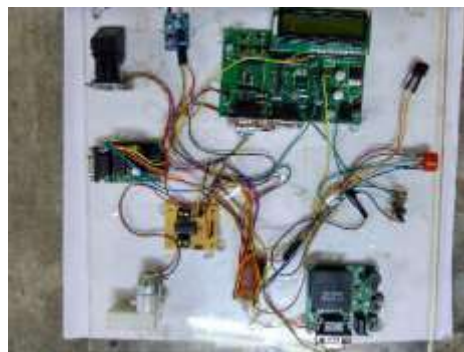


Figure 8 Hardware view of the prototype

Integrating options of all the hardware elements used have developed it. Presence of each module has been reasoned out and placed rigorously so conducive to the most effective operating of the unit.

FUTURESCOPE

The prototype can be implemented by using the CAN protocol. So that all the devices will be communicated fast. Even GPS tracker can be placed so that the path that is travelled by the vehicle will be plotted. The prototype can be implemented additional sensors for automatic monitoring.

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