EVIDENCE COLLECTION CAR USING ANDROID PHONE APPLICATION

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ABSTRACT

Evidence collection car is a device to record driving history which can be used for car forensics in case of car accident or related crimes. Evidence collection car stores engine temperature readings, obstacle detection and seat belt condition that could be critical clues for investigating car-related accidents or crimes. The images captured can be collected via GSM through android. This demonstration shows the whole process to collect image capture and data's like temperature, obstacle, person is alcoholic are not and seat belt worn. This data is then sent through GSM to concerned authorities.

Keyword: *Renesas Microcontroller, GSM, Smart Phone etc….*

1. INTRODUCTION

Currently traditional method of crash analysis is being used in which cops need to visit accident site and check for signs of accident**.** Then they need to check for evidences like skid marks, degree of damage, collision part, eye witness etc. Often, there is situation of insufficient evidences. Sometimes it may also possible that some clues got missed by police. This is very time consuming and complex process. By using this evidence collection system we could perform analysis of accident cases just from police station.

This reduces manpower, time and complexity over traditional system. Results obtained from analysis may also useful in driver training purpose, safety purpose, insurance issuing process etc. An Event Data Recorder is a device which is installed in vehicles to record information related to vehicle crashes or accidents. In recent times, vehicles like trucks, cars etc. do not have evidence collection system. Evidence collection car can collect the statistically applicable crash or accident information to improve the safety of the vehicles. This collected information is sent to android mobile phone of car owner.

This system satisfies objectives which are, to build such an Evidence collection system which could construct clear picture of an accident, to design an Evidence collection system which will reduce time and complexity in police verification and accident analysis process.

To construct such Evidence Collection system, can help owner to claim vehicle insurance in such cases. Hence this system is not focused on certain objective only. There are many things which can be achieved by this system.

2. LITERATURE SURVEY

In literature, various architectures are proposed for evidence collection of the car where few among them are: [1]. Log your car: The non-invasive vehicle forensics: Preceding in 2016 IEEE (974-982) this device can also help the car owner to claim vehicle insurance from the respective insurance company. Where this assures the fault of

the accident can be investigated and it will be determined. Advantages: Information delivered to the respectively individuals on time Helps in giving accurate position of the incident thereby saving life. Disadvantage: Failure of power will render this device useless. [2]. Evidence Collection from Car Black Boxes using Smartphones: This demonstration shows a process to collect the critical video clips from car black boxes using smart phones. Critical video clips in the black box are hashed to provide data integrity before being transmitted to the police server. Without VANET infrastructure, smart phones are very useful communication media for car black boxes.

Description

Many embedded systems have substantially different designs according to their functions and utilities. In this project design, structured modular design concept is adopted and the system is mainly composed of microcontroller, GSM, DCM, accelerometer, GPS, D.C motor, ultrasonic sensor, temperature sensor, toggle switch and LCD.

The microcontroller located at the centre of the block diagram forms the control unit of the entire project. Embedded within the microcontroller is a program that helps the microcontroller to take action based on the inputs provided by the output of the sensors.

Here accelerometer represents accelerator of a car. An accelerometer generates output voltages against changes in gravitational pull. These output voltages are analogous in nature. Hence the output of accelerometer is given to the ADC unit of the microcontroller. Based on the code embedded within the microcontroller, the D.C motor speed is varied.

The D.C motor in the project demo represents a vehicle. As accelerometer is varied the speed of the D.C motor is varied.

To simulate operation of seat belt, slot sensor is utilized in this demo. When anything is placed in slot sensor, it generates a logic 1 signal which is given to the input pin of the microcontroller.

As seen in the block diagram, a temperature sensor is attached to monitor temperature of the engine. This sensor generates an output voltage which is analogous in nature. This is given to the ADC unit of the microcontroller.

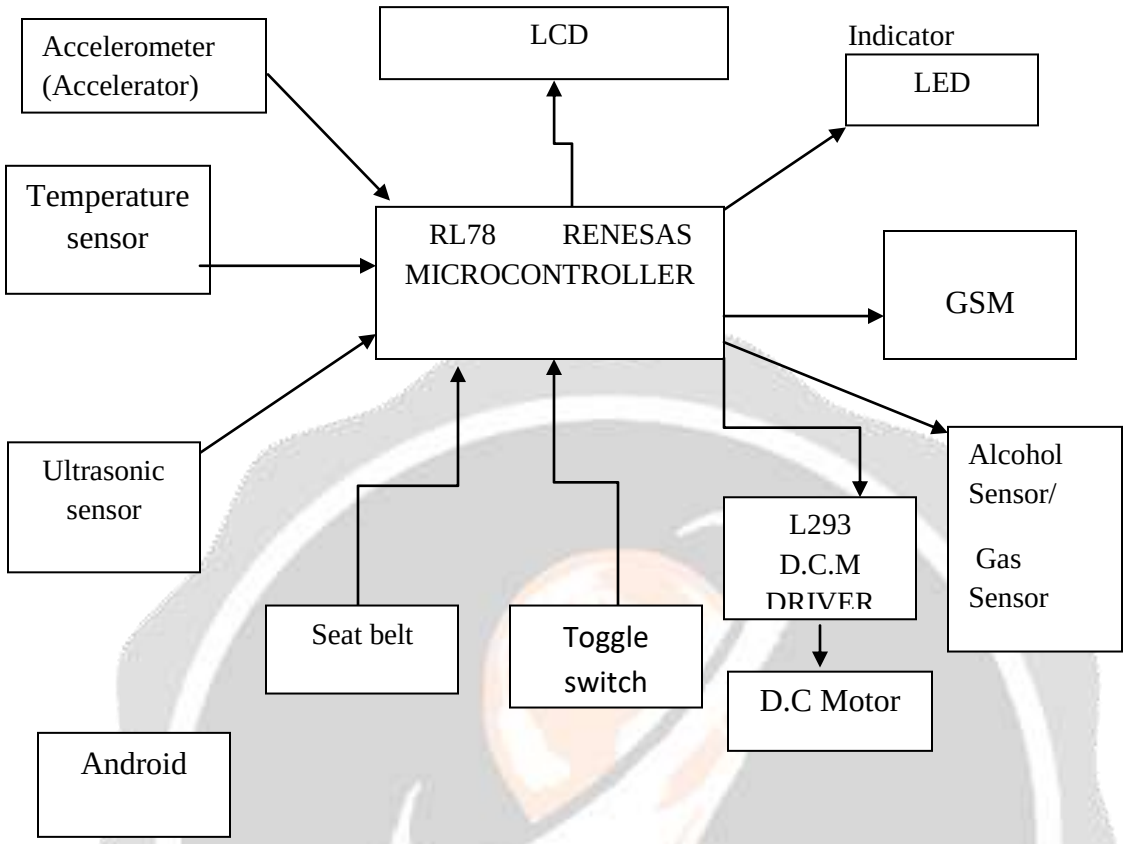
Ultrasonic sensor is placed in front of the vehicle. It constantly monitors the distance of the vehicle ahead of it.

A toggle switch is used to simulate left and right indication switching of vehicle. LED is used to indicate left and right bulb. So when switch slides to left, LED is ON and when slides to right, LED is ON.

All the details from these sensors are sent to Android mobile phone via Bluetooth. In android mobile phone, an application is created for this specific purpose. When vehicle is met with an accident, the camera in the phone captures image of the accident. GPS directly communicates with satellite thereby giving coordinates of the position of accident.

Here LCD is used in the demonstration to display the actions taking place.

3. BLOCK DIAGRAM OF THE PROJECT



Camera image + GPS => send email

Fig-1: Evidence Collection Car Using Android Phone Application

Hardware specification

Renesas

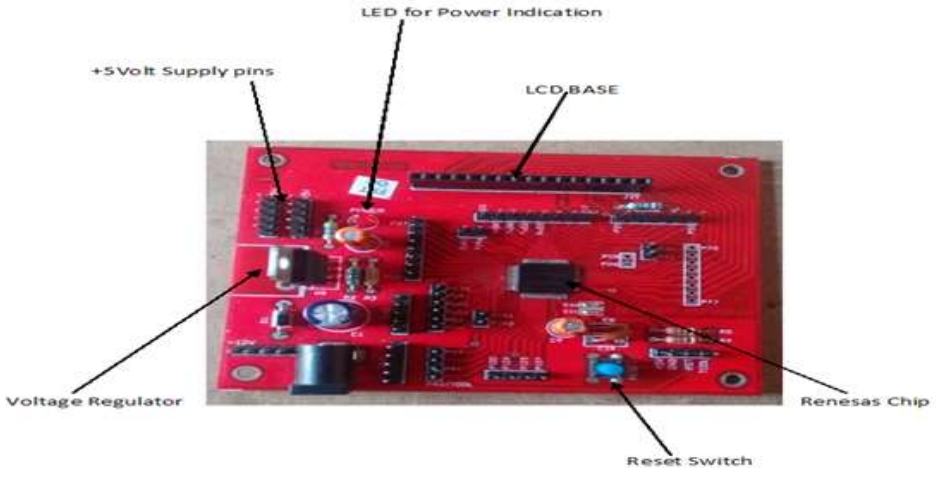


Figure of 64 pin Renesas Microcontroller Board

Fig-2: Renesas

You use general-purpose register of 8 bits × 32 registers (8 bits × 8 registers × 4 banks). ROM: 512 KB, RAM: 32 KB, Data flash memory: 8 KB. On-chip high-speed on-chip oscillator On-chip single-power-supply flash memory (with prohibition of block erase/writing function) On-chip debug function Ports → Total 11 ports with 58 Input / Output Pins

- Port 0 → 0 to 6 → Total 7 pins in port 0
- Port 1 → 0 to 7 → Total 8 pins in port 1
- Port 2 → 0 to 7 → Total 8 pins in port 2
- Port 3 → 0 to 1 → Total 2 pins in port 3
- Port 4 → 0 to 3 → Total 4 pins in port 4
- Port 5 → 0 to 5 → Total 6 pins in port 5
- Port 6 → 0 to 3 → Total 4 pins in port 6
- Port 7 → 0 to 7 → Total 8 pins in port 7
- Port 12 → 0 to 4 → Total 5 pins in port 12
- Port 13 → 0, 7 → Total 2 pins in port 13
- Port 14 → 0, 1, 6, 7 → Total 4 pins in port 14

On-chip power-on-reset (POR) circuit, voltage detector (LVD), On-chip watchdog timer (operable with the dedicated low-speed on-chip oscillator) I/O ports: 16 to 120 (N-ch open drain: 0 to 4) Timer → 16-bit timer: 8 to 16 channels, Watchdog timer: 1 channel Different potential interface: Can connect to a 1.8/2.5/3 V device 8/10-bit resolution A/D converter (VDD = EVDD =1.6 to 5.5 V): 6 to 26 channels.

Power supply voltage: VDD = 1.6 to 5.5 V

LCD

Fig-3:LCD

A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome.[1] LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with the low information, which can be displayed or hidden, such as present words, digits, and 7-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements.

LCDs are used in a wide range of applications including computer monitors, televisions, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens is been used on consumer electronics products such as DVD players, video game devices and clocks. LCD screens have replaced heavy, bulky cathode ray tube (CRT) displays in nearly all applications. LCD screens are available in a

wider range of screen size than CRT and plasma displays, with LCD screens available in sizes ranging from tiny digital watches to huge, big-screen television sets.

Ultra Sonic Sensor

Fig-4: Ultra Sonic Senor

Used to detect the move of human or object. Suitable for indoor and outdoor burglar-proof application, vehicle burglar-proof application, ATM surveillance camera, warehouse surveillance camera, and safety warning application in dangerous site where as voltage and temperature exist.

Product Features:

1. High sensitivity, Reliability and stability.
2. Extreme-temp Resistant, vibration-proof, etc.

Main Technical Specifications:

1. Power Voltage: DC 6-12V
2. Quiescent current: Less than 2mA
3. Output Level: Low 0V
4. Sensing Angle: no greater than 15 degree
5. Sensing Distance: 2mm-3m

GAS/Alcohol Sensor

Fig-5: Alcohol Senor

Structure and configuration of MQ-2 gas sensor is shown as Fig (Configuration A or B), sensor composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless steel net. The heater provides necessary work conditions for works of sensitive components. The enveloped MQ-2 has 6 pin, 4 of them are used to fetch signals, and other 2 are used for

providing heating current. Standard measuring circuit of MQ-2 sensitive components consists of 2 parts. one is heating circuit having time control function (the high voltage and the low voltage work circularly). The second is the signal output circuit; it can accurately respond changes of surface resistance of the sensor

GSM

Fig-6:GSM

SIM900 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM900 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

You can use AT Command to get information in SIM card. The SIM interface supports the functionality of the GSM Phase 1 specification and also supports the functionality of the new GSM Phase 2+ specification for FAST 64 kbps SIM (intended for use with a SIM application Tool-kit).Both 1.8V and 3.0V SIM Cards are supported. The SIM interface is powered from an internal regulator in the module having nominal voltage 2.8V. All pins reset as outputs driving low.

SIM900A provides a RF antenna interface

The "AT" or "at" prefix must be set at the beginning of each command line. To terminate a command line enter <CR>. Commands are usually followed by a response that includes."<CR><LF><response><CR><LF>". In this document, only responses are presented, <CR><LF> are omitted intentionally.
Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM stands for the standardization group which was established in 1982 to establish a common European mobile telephone standard which would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.

L293 Motor Driver

Fig-7: L293 Motor Driver

The L293 is an integrated circuit motor driver that can be used for simultaneous, bidirectional control of two small motors. The L293 is limited to 600mA, but in reality can only handle much small currents unless you have done some serious heat sinking to keep the case temperature down. Unsure about whether the L293 will work with your

motor. Hook up the circuit and run your motor while keeping your finger on the chip. If it gets too hot to touch, you can't use it with the motor.

The L293 comes in a standard 16-pin, dual-in line integrated circuit package. For complete information, consult the Unit rode L293 data sheet (PDF file, 626Kb).The pinout for the L293 in the 16-pin package is shown below in top view. Pin 1 is at the top left when the notch in the package faces up. Note that the names for pin functions may be slightly different than what is shown in the following diagrams. The following schematic shows how to connect the L293 to your motor and the PIC. Each motor takes 2 PIC pins.

Android

Android is a **stack of software for mobile devices** which includes an **Operating System**, **middleware** and some key applications. The application executes within its **own process** and its **own instance of Dalvik Virtual Machine**. **Middleware** is software that **enables two separate programs to interact with each other**. An **example** is software on a Web server that enables the HTTP server to interact with scripting engines like PHP or ASP when processing webpage data.

Advantages of Android

- It is **simple** and **powerful SDK**.
- **Licensing, Distribution or Development fee is not required**.
- **Easy to Import third party Java library**.
- **Supporting platforms** are – **Linux, Mac Os, Windows**.
- Innovative products like the location-aware services, location of a nearby convenience store etc., are some of the additive facilities in Android.
- **Components can be reused and replaced by the application framework**.
- Optimized DVM for mobile devices.
- **SQLite** enables to store the data in a structured manner.
- Supports **GSM telephone** and **Bluetooth, WiFi, 3G** and **EDGE** technologies.
- The development is a combination of a **device emulator**, **debugging tools**, **memory profiling and plug-in for Eclipse IDE.**
- The customer will be benefited from wide range of mobile applications to choose, since the monopoly of wireless carriers like AT&T and Orange will be broken by Google Android.

4. MOTIVATION AND FUTURE SCOPE

You come across so many accidents in our day to day life and it takes so much of difficulties for the police department to investigate on it. So I think this app would be of great help to them by reducing the time consumption and complexities.

For project demo purpose, you have developed a prototype module. In future, this project can be taken to the product level. To make this project as user friendly and durable, you need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system.

Applications

- Evidence collection car helps to determine the cause of car accident.
- Through evidence car collection, the owner of the car can file a lawsuit.
- This device can also help the car owner to claim vehicle insurance from the respective insurance company.

Advantages

- Information delivered to the respectively individuals on time
- Helps in giving accurate position of the incident thereby saving life.
- Easily you can determine the evidence of the accident occur which will reduce the time for investigation.

Disadvantages

- Failure of power will render this device useless.
- Hardware module tampering.

5. REFERENCE

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