

EVIDENCE COLLECTING SYSTEM FROM CAR BLACK BOX

Ms. Kontham Lavanya, Mrs. Y. Roji

Abstract— This demonstration elaborate the collection of the real time data after the detection of collision in an around the vehicle environment and analyze the collected data to have the conclusion regarding the collision while simultaneously transmitting the data over the wireless network. The Evidence Collection System is vehicle based device which collect the data like speed, engine temperature, acceleration, GPS position, wiper movement, and time. This data can be used to investigate the crime, rescue operation and insurance claims. This data then transmitted to the database server so that web application can be able to access this information at different places like Police station, Insurance Company.

In the existing method we can detect the visual information by using sensors and after detecting it rings buzzer to indicate that driver is not paying attention on driving and after buzzer rings driver will come to normal position and he will concentrate on driving. Before driver comes to alert position accident may occur

In the existing method the main disadvantage is we are detecting eyes by using sensors but we are not identifying exactly weather the driver paying attention on driving or not.

Index Terms—GPS, ARM, RISC, GCC, LINUX, GSM, MEMS, EDR, CCTV.

I. INTRODUCTION

Most people associate black boxes with airplanes but they are no longer just the key tool in investigation of airplane accidents. The event data recorder (EDR) as the black box is officially called is slowly gaining an important role in investigation of car accidents as well. Like Black Box of airplane, Car Black Box (known as Event Data Recorder) is used to record information related to accidents. Car black box records driving data, visual data, collision data and position data before and after the accidents so that it can be used to analyse the accident easily and to settle many disputes related to car accident such as crash litigation, insurance settlements. It can be used to not only reconstruct what happened before an accident by Insurance agents and police but also improve vehicle design, roadway design and emergency medical service by automakers, government and hospital.

In addition to the basic function, the car black box equipped with GSM/GPRS communication system can send accident location information to care taker, emergency and disaster server in real-time. Therefore drivers who want help can receive service quickly by rack car, police and hospital ambulance. Car Black Box detects a crash automatically, and

also records the motion of the vehicle and driver's actions during a predefined time period before and after the accident. It consists of data collection devices for collecting the information about car's status and the driver's actions, a non-volatile memory device for recording, a microprocessor for controlling the unit and a wireless modem for communication.

This project shows how effectively collect and manage information obtained from car black boxes in vehicular networks.

The functions of Car Black Box follow as:

1. Real time Data collection

- Visual data: Visual information in front and rear side during driving from camera.
- Collision data: Time, speed from accelerometer.
- Positioning data: The car positions checked in real time by GPS.

This data is saved temporarily in RAM as memory buffer and transfer to the external memory like PEN DRIVE.

2. Report Generation

- Analyze the accident easily and to handle many problems related to car accident like crash litigation, insurance settlements.

3. Wireless communication

- Transmitting the all data via Wireless Network, such as CDMA and GSM/GPRS when accident to main control centre.
- Support rapid service for rescue and treatment of accident.

The car black box contains not only a record of what was happening in the last seconds before the impact but also the record after a collision. So it should take the most recent data values and store them in buffer with a circular sequence (RAM). When the black box senses the accident, buffer refreshing is suspended and the data before and after accident are transfer to external memory automatically.

II. PROPOSED SCHEME

The car black box is a vehicle-based CCTV which records video images, sound, position, speed, and time. However, there are important issues such as user privacy and a data management for a vehicle-based CCTV records. The proposed evidence collection system can reduce driver privacy concerns and communication and management overheads. Our contribution is that we propose a feasible and useful scenario for public safety. By using above technique we are going to use various sensors and video devices in order to capture the various conditions like accidents or crimes, etc.

Camera gets turns on only when MEMS sensor gets activated and starts recording images and stores recorded images in pen drive connected to micro processor as well as it automatically sends alert message to control room through

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GSM/GPRS modem. The captured data can be transmitted and stored in pen drive through USB port from vehicle to Monitoring centre data base. Depends on user requirement (owner) the data can be accessed by security and police departments to analyze the received data. This is very confidential, without permission no one can access the data. The system uses a compact circuitry built around ARM microcontroller and Programs are developed in Embedded C. Flash magic is used for loading programs into Microprocessor.

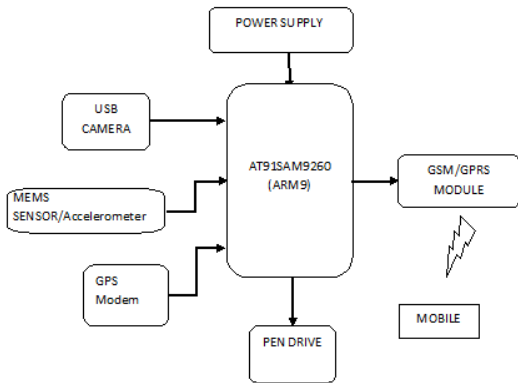


Figure 1: System Block Diagram

III. HARDWARE DESIGN

The system is mainly made with ARM controller unit. The design in this paper applies AT91SAM9260 32-bit ARM microprocessor. This microprocessor has rich resources, including Camera, USB, MEMS Sensor, GPS Modem, GSM/GPRS Module, Power, etc. These modules can help achieve Ethernet services.

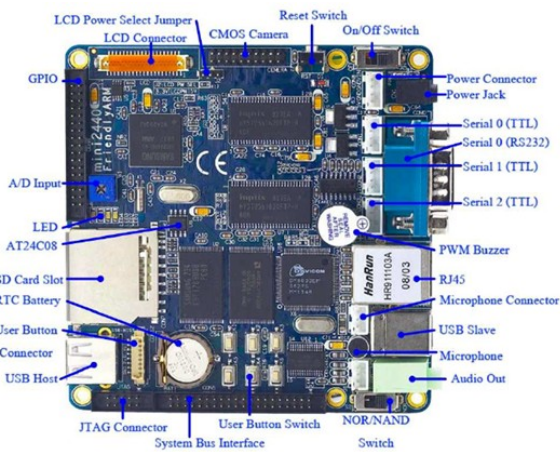


Figure 2: AT91SAM9260

Embedded Linux operating system and boa embedded web server run on the main controller to manage various types of equipments including sensor, USB cameras etc. The sensor mainly used in our system is MEMS sensor; it senses acceleration, tilt and gravity. USB camera monitors all the conditions in and around the car. Communication from sensor board to ARM board is done using UART through RS-232 cable.

IV. SOFTWARE DESIGN

Software development process based OS includes: the establishment of cross-compiler, the creation of root files system, the transplant of Boot loader, the porting of embedded Linux, and the development VOIP media stream. ARM Linux gcc is the cross compiler used. Boot loader vivi is used here.

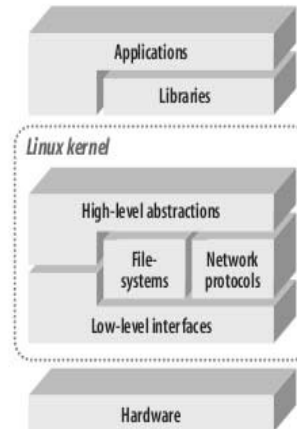


Figure 3: Typical architecture of an Embedded Linux System

The function of Boot loader is to initialize the hardware devices, establish memory mapping tables, thus establish appropriate hardware and software environment, provides interface to send commands to target board and prepare for the final call to the operating system kernel. Linux is used as operating system because Linux system is having a hierarchical structure and completely opens its kernel source. Linux can port to a wide range of hardware platforms, and can run in most of the architecture. Linux has a comprehensive set of editing, debugging and other development tools, graphical interface, a powerful network supporting and rich applications. In addition, the kernel can be reduced by configuring it.

V. FLOW CHART

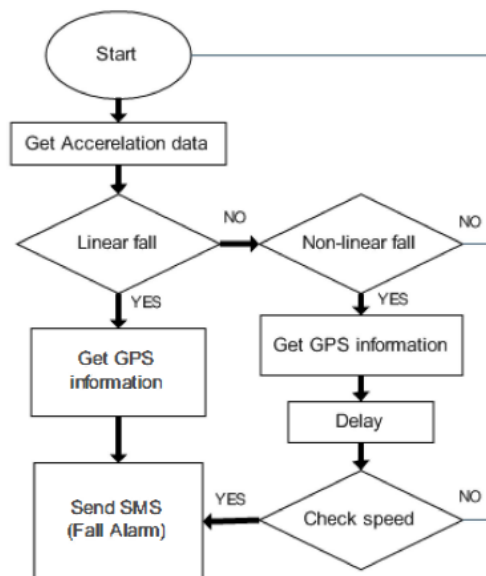


Figure 4: Flowchart of motorcycle fall and accidental alarm system.

VI. EXPERIMENTAL RESULTS

In our demonstration, the evidence collection system uses the MEMS Sensor, AT91SAM9260, USB Camera, GPS Modem and GSM/GPRS module. MEMS sensor detects the collision, USB Camera captures when collision occurs, GPS modem sends longitude and latitude values and GSM/GPRS modem to receive and transmit all the collected evidences which indeed collected at police database server using PIC controller and receiver. Following are the data collected at receiver end. The collected parameters are vehicle id, speed, engine temperature and steering angle respectively from the prototype designed, in this demonstration data collected only when collision is occurred.

The collected data by controller not only transmitted to the server but also saved to the memory at transmitting end which in case of wireless transmission failure will be helpful for data extraction. It is more flexible to watch the generated reports to the person/institution have authority for that like police, insurance company etc.

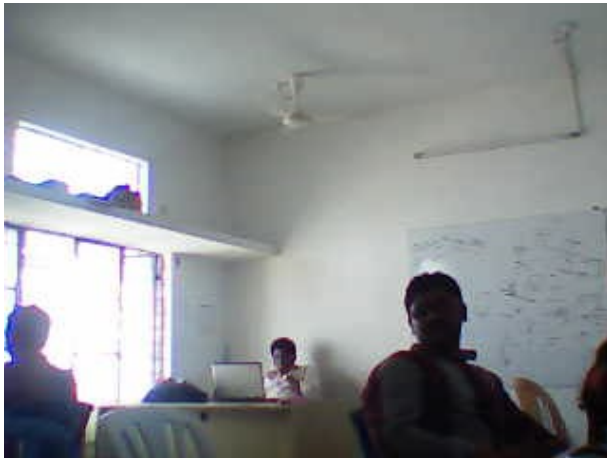


Figure 5: Snapshot of USB camera

Figure 3 shows the snapshot of USB Camera which extracts the collected parameters at receiver end. The specific user can login to the application and can generate accident analysis report.

VII. CONCLUSION

In the Post-PC era, the embedded system technology develops rapidly and the design of embedded and the linux device drivers are important and indispensable components of it. This paper focuses on solving driver privacy concerns and communication and management overheads. Our contribution is that we propose a feasible and useful scenario for public safety. It develops Evidence Collection System from Car Black Box with AT91SAM9260 microprocessor as its main controller and MEMS sensor. With a perfect support of the embedded system technology, we believe that the Evidence Collection System from Car Black Box will have better performance and broader market prospect.

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