Pak. J. Biotechnol. Vol. 13 (special issue on Innovations in information Embedded and Communication Systems) Pp. 52 - 54 (2016)

DATA LOGGER FOR A MINIATURE MODEL CAR USING CAN BUS

[1]S.Sreevatsan, [2]Adithya Shankaranarayanan, [3]T. Vishwanthan, [4]L E Aravindraj, [5]E Santhosh Kumar and [6]K P Peeyush

Electronics and Instrumentation Engineering, Amrita school of Engineering, Amrita vishwa vidyapeetham Coimbatore, India

E-mails: [1]s_sreevatsan@yahoo.com, [2]adithyashankar93@gmail.com, [3]vishwanthan93@gmail.com, [4]aravindraj459@gmail.com, [5]santhoshcheran@gmail.com and [6]peeyushkp@gmail.com

ABSTRACT

In this paper we propose an application of data logger. We take data from sensors attached in a model car and store it in an SD card. We are using CAN bus to communicate between microcontroller. We stored the data of accelerometer, brake and crash. The data is stored in the form of .txt file so that it can be used in the future easily. The data is updated for every 1 second.

Index Terms: Data logging in model car.

I. INTRODUCTION

Today most of the vehicles need a proper vehicle diagnostic system. This can achieved with the help of proper data logger. These devices can be used in automobiles to record vehicular sensor data for diagnostic purposes and provide safety .

In automobiles there are various control units like engine control unit, brake control unit e.t.c. To each control unit there are many sensors attached which sense different parameters like engine temperature , engine shaft speed ,rate of fuel flow into engine e.t.c. Similarly there is a crash unit which has sensors which detect crash. All these control units need to communicate with one another to exchange data. This is done by vehicular network protocol like CAN bus.

A Datalogger is one which stores the data from different control units [3] .The control units acquire data from sensors attached to the unit and send through CAN bus into a memory device .This memory device can be a SD card ,Hard disk or any other solid state memory storage element. The memory device is the most important part of datalogger as it stores all the important data. It's a passive element.Data from the sensors are recorded as events.

Some very important data stored are:

- Acceleration of the car
- Braking [2]
- Crash event data
- GPS coordinates
- Speed of the vehicle
- Seatbelt insertion

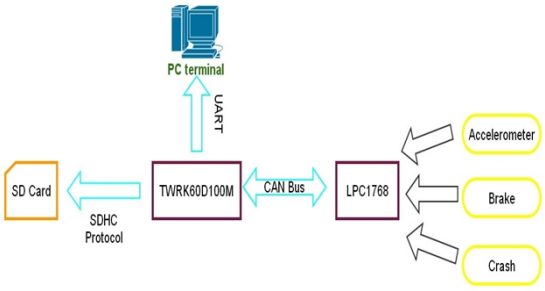

Fig. 1.Datalogger functional block diagram

II. SYSTEM DESCRIPTION

All data loggers consist of the following parts namely

- Sensors
- Micro-controller
- Memory storage device

The data from the sensors like accelerometer, crash and brake are first read by a controller unit and transferred into CAN bus .This take the data to another controller to which SD card is attached .In the SD card these data are stored along with time base .This time value is required to tell when the event occurred.

Sensors

Since we are doing a miniature model car we use sensors that imitate an actual car. We use limit switches in place of the brake sensor and crash sensor. Accelerometer sensor ADXL335 is used to measure acceleration. ADXL335 has a range of ±3g.

Micro-controller

In actual car more than one micro-controller is used to get data from different corners. To imitate that we are using two micro-controller namely,

- K60D 512VMD 10MCU (100MHz ARM® Cortex ™)
- LPC1768

K60D 512VMD10MCU is a part of Freescale Tower Kit TWR-K60D 100M

Memory Device

SD card- The SD card used is 1GB micro SD card. The driver used to communicate with the SD card is an embedded SDHC controller. Secured Digital Host Controller uses 1 bit mode and 4 bit mode to communi cate with the main controller. The storage is little endian by default. The data transfers between the host controller and SDHC is by ADMA transfers i.e., Adva-nced Direct memory access. The SD card uses a FAT16 file system. Above this driver functions File I/O functions are created. Using these file handling functionalities like file open, file write, file append, file close etc. ,storage of data in SD card using embedded systems becomes easier. Text files are created to store data every after 1sec. The data can be stored for 1 day.

Communication Protocol

The micro-controllers will be far apart in actual car. So in order to communicate between micro-controller at high-speed CAN bus protocol is used.

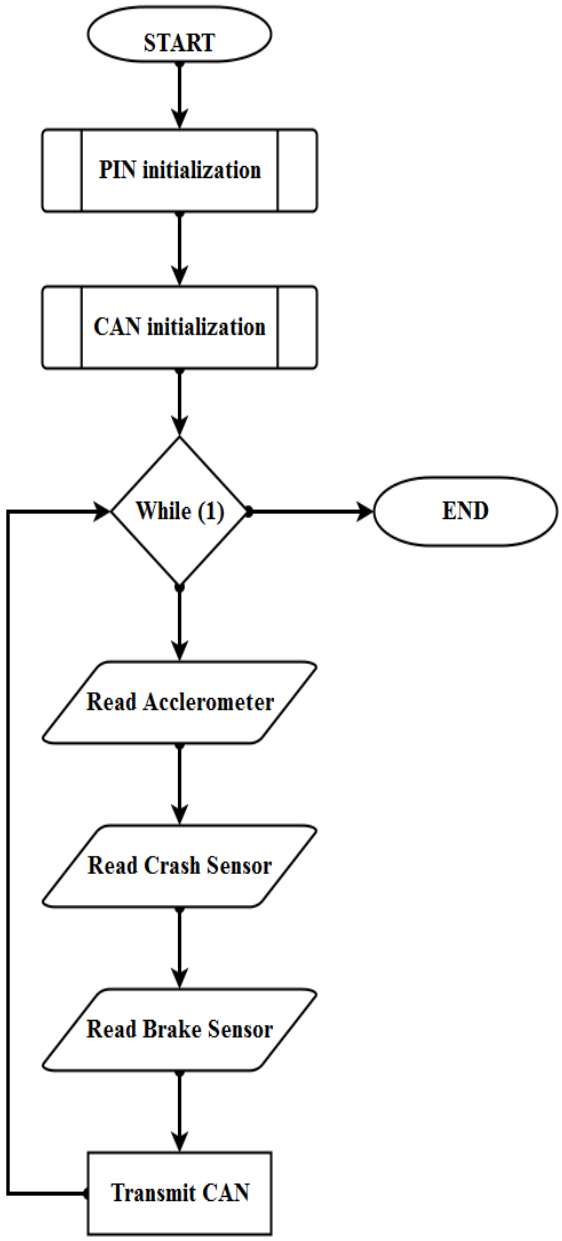

Fig. 2.1 Algorithm of program flow in MBED LPC1768 controller

CONCLUSIONS

Data logger framework using CAN bus was realized by making a small model consisting of two microcontrollers with the provision of CAN bus protocol support [1]. The sensors used to obtain real time data are accelerometer sensor(ADXL335) ,crash sensor and brake sensor (both these sensors are limit switches). These sensors are connected to LPC1768. LPC 1768 is connected to TWR-K60D100M through CAN bus.TWR-K60D100M has a inbuilt SD card slot. The sensors are scanned continuously for data and the data is transmitted from LPC1768 to TWRK60D100M and from TWRK60D100M it is stored in SD card in the form of a text file for every 1 sec interval.

The File is read only file. The file name is configured from the program. This text file can be converted to other formats like excel to view the data in spread sheet format and perform further analysis.

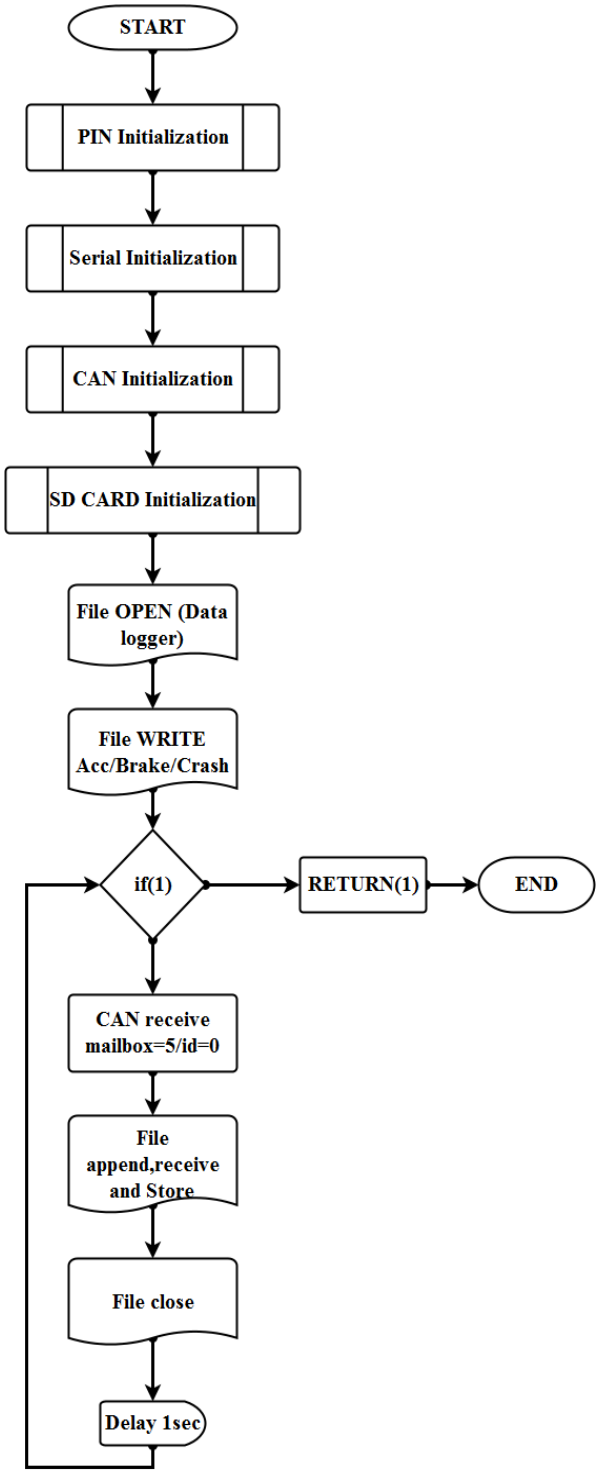

Fig. 2.2 Algorithm of the program flow in TWR-K60D100M MCU tower kit

ACKNOWLEDGMENT

I wish to express my sincere respect and gratitude to the Department of Electronics and Communication Engineering, for providing me an opportunity to improve upon our subjective knowledge through a practical project .

I am very much grateful to Mr. Peeyush K P for having been our guiding force behind the project and helping me to progress to a great extent to achieve ultimate objective of the project.

REFERENCES

[1] Fu Liang, Li Wei, The Development and Design on CAN-bus Controller: in SJAlOOO [J]. Modem Transportation Technology (2007).

[2] Joshua, R. Henderson, James M. Conrad and Craig Pavlichy, Using a CAN Bus for Control of an All-Terrain Vehicle. IEEE Southeastcon Conference Pp. 1-5 (2014)

[3] Purwadi, A., Y. Haroen, F. Y. Ali, N. Heryana, D. Nurafiat and A. Assegaf, Prototype development of a Low Cost data logger for PV based LED Street Lighting System: in Electrical Engineering and Informatics (ICEEI), International Conference Pp. 1-5 (2011).

[4] Corrigan, S., Introduction to the control area network (CAN), (2008).

[5] Kuanming, W.U., The Theory and Design of Application System of CAN Bus: in Beijing University of Aeronautics and Astronautics Press Pp. 18-34 (2001).

[6] Zhou Chunjie, Song Mingquan, Wang Yongji, Oneway and realization of CAN network communication: in Control Engineering No.1, 50-93 (2005).