

Missile Health Monitoring System (Temperature, Humidity and Acceleration)

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Abstract—The main abstract of this paper is to design a Health Monitoring System for an optimum solution to detect the temperature, humidity and acceleration in 3-axis direction. Usually, missile is transported or stored until usage. In this course, environmental changes such as changes in temperature and humidity directly affect the components of it. Secondly, it might also be subjected to shock and vibrations either due to natural or man-made disturbances e.g. during transportation. It incorporates a microcontroller, sensors (Temperature/Humidity and Accelerometer), MMC card, connectors and devices to display the results. Here DHT11 sensor is used for temperature and humidity, ADXL335 is used to detect acceleration in 3-axis direction. Integral part of the system is the code that is dumped into the PIC18F4550 controller and is solely responsible for monitoring and storing. The state data is stored in the MMC card for estimating the performance and the future analysis of the missile health monitoring system.

Keywords—DHT11, ADXL335, PIC18F4550, MMC card etc.

I. INTRODUCTION

Monitoring systems are widespread in today's world. They are being extensively employed to monitor various parameters of a system or an entity. To name a few, we come across monitoring system to read the health of a patient; monitoring systems to control the data and voice communications and in many other fields. Monitoring systems are devices that automatically monitor measurements, collect the state data and store them for future purposes. The state data is collected at periodic intervals or at times when a certain parameter exceeds a limit which is unique to each parameter. Now-a-days, every nation is investing

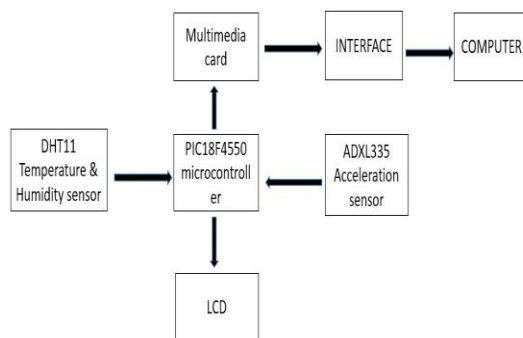
a large percentage of the national income in the defence research and development projects. In particular, development and testing of missile is of great interest. The more number of successful projects depicts the nation's power. The specimens are usually used at a later stage i.e. not immediately after the development. In this due course, they experience a variety of disturbances either natural or man-made which affect the performance of the missile. This project aims to develop a simple Health Monitoring System to monitor and store the timely state data regarding the disturbances experienced by it. As already stated, the missile will be used at a later stage. Usually, missile is transported or stored until usage. In this course, environmental changes such as changes in temperature and humidity directly affect the components of it. Secondly, it might also be subjected to shock and vibrations either due to natural or man-made disturbances e.g. during transportation. Every missile has a certain limit to withstand the intrusions beyond which the specimen malfunctions. Based on the intensity of the intrusions and the values of the parameters above threshold, the performance is estimated. So, to determine the performance of the missile what could be the possible solution?

II. PROPOSED SYSTEM

The main aim of this project is to design a Health Monitoring System that could cater for an optimum solution to detect the temperature, humidity and acceleration in 3-axis direction. It incorporates a microcontroller, sensors (Temperature/Humidity and Accelerometer), MMC card, connectors and devices to display the results. Here DHT11 sensor is used for temperature and humidity, ADXL335 is used to detect acceleration in 3-axis direction. Integral part of the system is the code that is dumped into the controller and is solely responsible for monitoring and storing. The state data is stored in the MMC card for estimating the performance and the future analysis of the health monitoring system. Primarily, the document

gives a detailed description about the PIC microcontroller especially PIC18F4550 which the most imperative device of the system to be designed. It then focuses on the components used in the designing and responsible for obtaining the desired result. Next, it throws light on the software tools used to develop the code, design the system and simulate the system in a virtual environment. Then, a detailed description and working of the circuit is presented with the aid of the code developed.

III. BLOCK DIAGRAM EXPLANATION



Missile health monitoring system

DESCRIPTION

As shown above, the block diagram consists of PIC 18F4550 microcontroller and sensors to sense the different changes in the environment. The DHT100 senses the changes in the temperature and humidity. The ADXL345 senses the shock and vibrations experienced by the specimen. The sensors are connected to the PIC microcontroller in which a code is embedded. The code processes the necessary functions. It facilitates to store the information regarding the intrusions in the MMC Card. It is also responsible for displaying the information in the LCD. The information can be stored in the MMC card for a long period of time before the specimen is used. Before using the specimen, we can read the values of the disturbances experienced by it by interfacing the MMC card to the computer. By examining the values, we can estimate the performance of the specimen and decide whether it is ideal to employ in the real time situation.

A. PIC18F4550

PIC18F4550 belongs to pic18f family of microcontrollers. PIC18F4550 is one of the

advanced microcontrollers from microchip technology which is used at present generation. This microcontroller is very famous in between amateur and learners due to its functionalities and features such as ADC and USB integration. Large amount of RAM memory is used for buffering and Enhanced Flash program memory to make it ideal for embedded control and monitoring applications that require periodic connection with a PC via USB for data upload or download or for updates.

B. ADXL335:

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures the acceleration with a minimum full-scale range of 3 g. It can measure the static acceleration of gravity in sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

The bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins.

The ADXL335 is available in a small, low profile, 4 mm × 4 mm × 1.45 mm, 16-lead, plastic lead frame chip scale packages.

C. DHT11

DHT11 output calibrated digital signal. It uses technique of digital signal collection and humidity sensing technology to assuring its reliability and stability. Its sensing elements is connected with 8-bit single-chip in computer.

Every sensor in it is compensated temperature and calibrated in accurate calibration chamber and the calibration-coefficient is saved in memory.

Small size & low consumption & long transmission distance of which is about 20m ,DHT11 to be suited in all kinds of harsh application occasions.

D. Liquid Crystal Display(LCD)

LCD is used to display the temperature and humidity and acceleration output results in Liquid Crystal Display.

E. Multi Media Card (MMC)

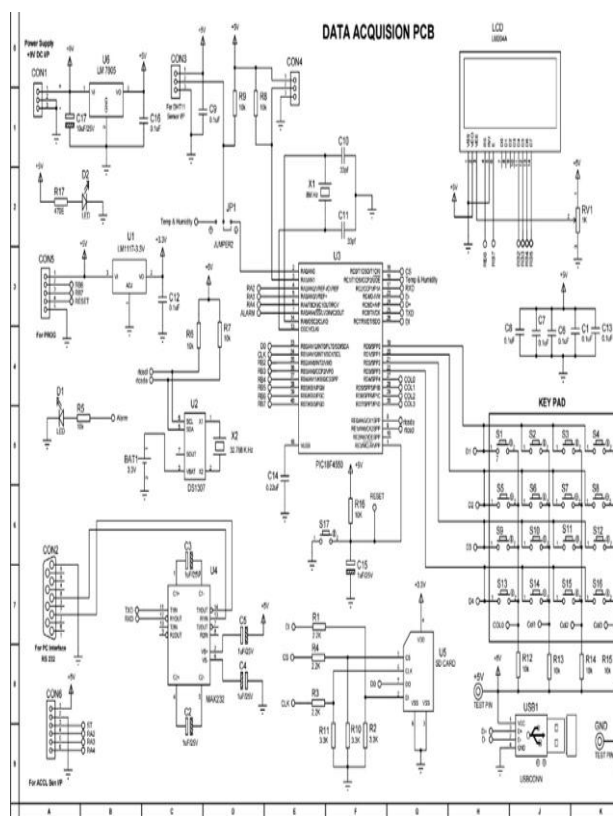
MMC is used monitoring data to store in it .It is used for analysis the data and future use

IV.HARDWARE EXPLAINATION

The following layout design diagram explain that the voltage needed for working system is 5v.and MMC need 3.3v. and a regulator LM7805 is used.DHT11 is consist of 3 pin one is join with vcc and second pin given to ground and third pin is link with pic18f4550 microcontroller. Here the system will give real time clock. The main operations of the system is SPI and I2C.

Here keypad is used to type or to write the data.when the clock is given in keypad the outputs are shown in LCD.

And the data will be stored in MMC card. USB port is used for connecting of compiling the c programs and for dumping the files to microcontroller .

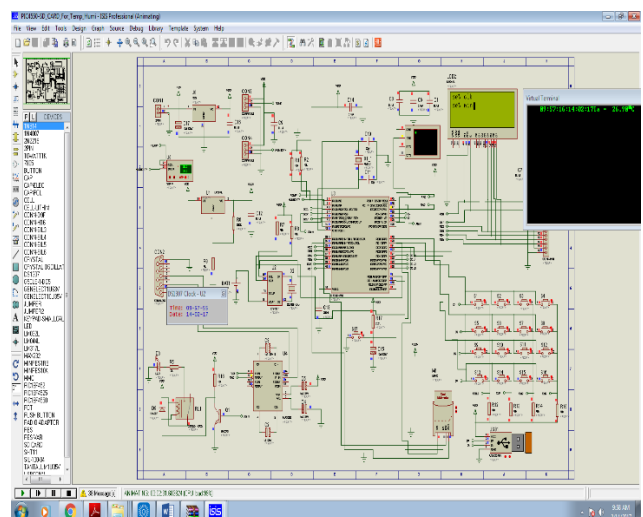


ADXL335 is consists of 6 pins i.e ; ST, Ground, RA2, RA3, RA4 which are connect to ground and microcontroller.

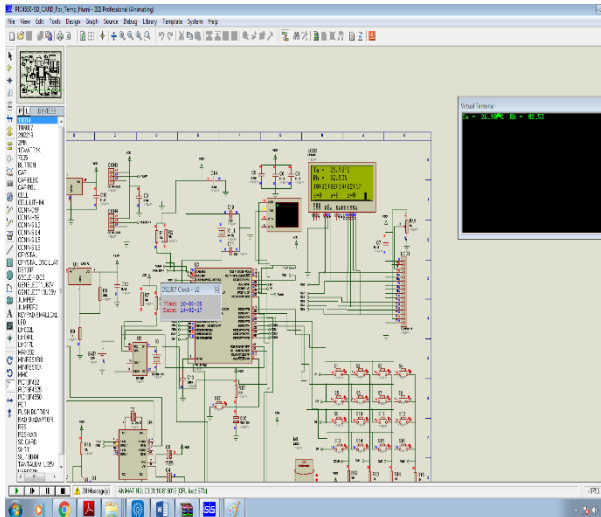
V. CONCLUSION

The “MISSILE HEALTH MONITORING SYSTEM ” has been successfully designed and tested by integrating features of all the software components used to develop it. Presence of every module has been reasoned out and placed carefully thus contributing to the best simulation of the output. And the shock and vibrations are controlled.Secondly, using highly advanced and modern PIC microcontroller and with the help of growing technology the project has been successfully implemented.

VI. OUTPUTS



(a)



(b)

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