Abstract

In every Industry sensors are required for processes, manufacturing, automation, and other large-scale systems and for these sensors there will be necessity to check the health of sensor. For those sensors if we provide Hundreds of computers and embedded systems that are used to synchronize signals then that controlling process will goes more complex. Also operator has to visit at every station to collect data from each sensor as well as every time has to check the health of sensor by complex calculation. These problems can be solved by using Data logger which reduces the number of computer and embedded system. Also ability, health of sensor can be evaluated by using Data Historians in small scale industries, companies and institutes.

1. Introduction

To simplify controlling and analyzing process in Industries we can use Data logger which get all information received by sensors on single Control Processing Unit (CPU). Sensor data is conditioned or filtered and further stored continuously for every time instant in memory of data logger. By analyzing stored data in memory we can find Accuracy, Repeatability and Linearity of sensors. Also by using Data Historians we can find the Health of sensors.
2. Background To The Present Work
While studying the IEEE paper, we got the knowledge about the DATA HISTORIANS, from “Assessing health of sensors using data historians”. In this, we studied, how the health of sensors is assessed by using data historians. In this paper, data historian collects the data from different sensors and analyses them for different conditions to find life/health of sensor [1].
“After studying this paper, we got to know about the use of data logger from “Embedded web server based on DAC system using ARM”. From this paper, we studied that, Data logger is used to communicate with sensors and other users. In this, continuous logging is efficient and time consuming is less [2].
After studying “Embedded web server based automation”. In this we studied that, it collects the data from different places and store them in the offline embedded web server, this part can be used as backup unit for our system, where we can store the data [3].
We also got to know about the wireless communication from “A Review on Various Data Security Techniques in Wireless Communication System”. In this we studied that; we can transfer data through wireless communication to pc by using RF module [4]

3. Objectives of Project
i. Logging the data from different sensors.
ii. Saves Data from different sensor.
iii. Multiple authorized user can access the Data.
iv. Automatically find out Health/Life Of Sensor.

4. Proposed Project
4.1 Description
Power supply: It is a circuit which accepts 230V AC mains supply as its input and gives output voltage and current after converting it into proper format that can be acceptable for further circuitry.
Sensors: The sensor senses different physical quantities. Six sensors are used in our projects that are Smoke sensor, Temperature sensor, Speed sensor, Humidity Sensor, Vibration sensor and level sensor. Out of these, five sensors are connected to ADC port, as they produces analog signal, whereas the speed sensor produces digital signal. Speed sensor required conditioning circuit as it has led and phototransistor producing very small voltage.

![Detailed Block Diagram](image-url)
4.2 sensors used in our project are described as follows

- **Smoke Sensor (MQ7):** This sensor is used to sense smoke. The temperature range for this sensor is from -55 to 150°C. Its measure capabilities are from 300 to 10,000 ppm and hence its accuracy is high.

- **Temp Sensor (LM35):** This sensor is used to sense the temperature. The temperature range for this sensor is from -55 to 150°C. Its operating range is from 4 to 30V.

- **Speed Sensor (IR):** This is an infra-red sensor used to measure the speed. This infrared sensor used in project to detect black and white color that create on pulley or drive shaft of the motor the change of the motor. The changes of both color produce different voltage that will compare using comparator.

- **Humidity Sensor (SY-HS-220):** This sensor is used to sense the moisture contain in air. The accuracy for this sensor is ±3% of RH.

- **Vibration Sensor (Adxl335):** This sensor is used to sense the vibration. The sensitivity for this sensor is 270 to 330 mV/g.

- **Level Sensor:** This is the type of resistance sensor. The level of resistance changes according to the liquid level.

- **Arm Controller:** If either of the sensors is not active or damaged then Controller displays the sensor name which is not in active condition on LCD. Controller further process on data, convert all sensor information into SI Unit, and stored in to the PC, which work as external storage (Back up) unit. Converted data is forwarded for further procedure to the CPU.

- **RF Module:** This interface is provided so that the controller can communicate with the PC available at master side. This will help in sending/receiving the data to/from PC. It converts TTL logic to machine level.

- **PC interfacing and software console:** Software console resides on the PC. It consists of software designed in Visual Basic. The role of this software is to take the required Sensor data with time and date and display its historian graph or make modification in historian graph.

### 4.3 Working Procedure

![Flow Chart](image)

<table>
<thead>
<tr>
<th>Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initialize all ports of arm controller, LCD, Sensors located at different plane, CPU</td>
</tr>
<tr>
<td>Question received?</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Identify Working sensor</td>
</tr>
<tr>
<td>Send data to the CPU</td>
</tr>
<tr>
<td>Log all received information with time along with data</td>
</tr>
<tr>
<td>CPU Display</td>
</tr>
<tr>
<td>Display</td>
</tr>
<tr>
<td>Forward historian graph of sensor data</td>
</tr>
</tbody>
</table>

**Figure 4.3.1: Flow Chart**
We first initialize the sensors as they are speed sensor, Humidity sensor, Gas sensor, level sensor, vibration sensor and temperature sensor. From these sensors, speed sensor has frequency as output which is connected to the counter port of the controller. Controller converts the sensor output which is in voltage form (speed sensor has output in frequency which converted in to the RPM) into the actual quantity. That quantity is stored into the PC and the same quantity is transferred to the PC via RF module. PC has the VB Application software which analyses that data from controller and logged. The flowchart for the project can be seen in the above figure which shows the working principle of our project.

4.4 Specifications of Project
i. Project work on 7 to 10V DC supply.
ii. Maximum 16 analog or 16 digital sensors can be connected
iii. Power consumption 100mW.

5. System Design
As this system is consist of power supply, sensors, Arm controller, RF module, PC interfacing and software console. Six sensors are used as temperature sensor, smoke sensor, speed sensor, humidity sensor, level sensor and Vibration sensor. Controller checks that data with date and time in text file format and also displays that data on the screen. Same data is arrange and used to design the historian graph and shown on the screen and for each sensor this procedure is repeated until the sensor is turned off.

Figure 5.1 (a) Hardware Of Project & (b) Output on Display
The working sensor is displayed on LCD screen which takes reading from the sensors and saves the data in the external storage, PC used as a backup unit. Converted data is forwarded for further procedure to the CPU. RF module is used to interface the controller with PC. It converts the TTL logic to simple machine logic. As the sensor data is transmitted to the PC through the RF modules and the data is logged into the PC for further operation and it is saved in the text file format. That format and data is used by the data historian to plot the historian graph.

6. Result
We interface different sensors with controller and collect their data at single point and display it on a LCD. Same data we save in PC as well as its forwarded and which logs that data and shows historian graph of each sensor. The output for four sensors can be seen in following figure with the help of data logger.

![Figure 6.1: output of data logger](image)

7. Conclusion
Our Project reduces human work, increases accuracy and efficiency also by observing historian graph we can simply detect the faulty sensor and every logged data has backup at PC. It checks the complete health of all the sensors with the help of ARM 7 processor and transfers the data to the computer with the help of RF module. We can save the data i.e output of the sensors in the form of text and graph which can be easily viewed with the help of data logger and data historian. So that data loss problem is solved all of this came at very low cost which is industries first requirement.

References