Chapter – 5

5. Monitoring and controlling of proposed system

Parameters to be controlled as mentioned are temperature and Humidity [1]. As a parameter nature of temperature is ever-changing. It is exposed to huge array of stimuli from its environment. At the same time humidity depends on presence of water molecule in the environment. Monitoring of stated temperature and humidity is carrying out by using temperature sensor LM35 [2] and humidity sensor LM324DG [3]. Stated sensors will output the sense temperature and humidity in terms of respective voltage which will be input to ADC(Analogue to Digital Converter) and digital output of ADC will be fed into the microcontroller and microcontroller after performing proper calibration display it to the attached LCD and sends to RS232 port. RS232 which itself is connected with computer will display the same in interactive front end of monitor for monitoring and controlling. Two front ends are designed for interactive use one being the front end for intranet(LAN) client other for internet(WEB) client. Requirement of two different front end is due to the technology behind the implementation of both. LAN client is based on simple client server technology where client is considered as a fat client. WEB/Internet client is based on web technology which is considered as a thin client.

5.1 Monitoring and controlling from Intranet client:

The Interactive front end for LAN clients will appear as following screen in the monitor of the user. Stated user interactive front end will enable user to monitor as well as control temperature and humidity values continuously. LAN system is implemented based on Visual Basic with database server in MySQL [4]. Client being fat in nature will send continuous request in regular interval to the server for updated values of temperature and humidity. Server in response to same send the updated values in regular basis and monitor will displayed these values continuously. System will highlight parameter(Temperature/Humidity) name in bold if it is currently displayed. Date and time will be displayed in top for recording of same irrespective database. Status of devices on/off will be displayed in bottom which will run automatically based on controlling limit values of parameter stored in database. It will show the status message regarding values of current
sensing parameter such as (Humidity reaches maximum value as appearing in the screen will be displayed). As soon as parameter will come down to controlled level device will automatically come to switch off mode and message will disappear. Maximum range gives the information of the value currently set for the controlling parameters. Using update button it will enable user to change the limit values in the respective database. Clear Humidity and temperature button will clear the values of parameters from the screen. End program will halt the execution of program though in normal circumstances it will be not required.

**Fig 5.1: Interactive front-end from Intranet displayed in monitor**

Generate report button enable user to generate report based on temperature and humidity of a particular day as chosen by user. These will be retrieved from the database with corresponding date and time of recorded. Selecting Temperature or humidity from the drop-down list of the generate report will display the report for the selected option. Following Figure 5.2 displays a sample report for temperature.
Generate plot button enables the user to generate a graph based on temperature and humidity of a particular day chosen by the user. These will be retrieved from the database with corresponding date and time of record. Selecting temperature or humidity from the dropdown list of the generate graph will display the graph form for the selected option. Suppose we select the Temperature option. On selection, it will open a form containing a list of dates for Temperature. On selecting a date, the scale for the x-axis and scale for the y-axis will be determined, and scale values for ticks and subticks will be displayed. Clicking the Plot data button will generate a Temperature graph as shown in Figure 5.3 below.

**Figure 5.2: Report Form**

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-02-2018</td>
<td>6:00 a.m.</td>
<td>21°</td>
</tr>
<tr>
<td>26-02-2018</td>
<td>10:30 P.M.</td>
<td>23.5°</td>
</tr>
<tr>
<td>26-02-2018</td>
<td>11:45 A.M.</td>
<td>25°</td>
</tr>
<tr>
<td>26-02-2018</td>
<td>3:00 P.M.</td>
<td>23°</td>
</tr>
<tr>
<td>26-02-2018</td>
<td>8:00 P.M.</td>
<td>24°</td>
</tr>
</tbody>
</table>
Figure 5.3: Plotting of Graph for Temperature

5.2 Monitoring and controlling from Web client

Interactive frontend designed for Internet Users enable users to interact with the embedded system from anywhere. User as a web client select a particular date from available list and click on submit button for getting maximum temperature and humidity recorded for that particular date. Refresh date will enable user to refresh date. Clicking on get current values browser will sent request to web server for getting updated data of humidity and temperature. It will display the existing limit values of temperature and humidity in the space provided along with set temperature limit and set humidity limit when user click on show limit button.

To prevent unauthorized users from unwanted updation by setting new values of temperature and humidity system checks the authentication of users. System will allow user to set new control, for which user has to login with valid user-id and password as given in login form below. This is implemented by designing a mail server where database server keeps track of informations with login-id, password and email-id of authorized users in a separate table. Administrator of the system will issue login-id and password to internet users of system authorized to set new values of temperature and humidity. These authorized users can also change the existing password as given in the screen(fig.5.7). If the user forgets his login-id password, he can use forgot password form by clicking on forgot password link of the web
The user is then taken to the forget password web form, where he submits his e-mail id. If the e-mail id is verified correct, then the password will be sent to the same e-mail id. Any machine in the net can be configured as mail server. Mail Transfer Agent (MTA) used for sending mail, Sendmail is used for sending message for mail server. This facility is provided in ASP.NET [5] by Send() method of mail class explain in section 4.9.1. Monitoring and controlling from web is carried out through the following interactive front end.

![Interactive Front-end from Internet](image)

**Figure 5.4 : Interactive front-end from Internet displayed in monitor**

Following form will appear as user try to set new value or click in log in button.

![Login Form](image)

**Figure 5.5 : Login Page**
After entering valid username and password user will be allowed to set new limit values of temperature and humidity. Clicking on Forgot password button following form will appear.

![Forgot Password Form](image)

**Figure 5.6: Forgot Password Page**

Clicking on change password option of figure 5.5 following form will appear. By entering valid entries user will be able to change the existing password to a new password.

![Change Password Form](image)

**Figure 5.7: Change Password Form**
References


[5] Anne Boehm, Joel Murach, “Murach’s ASP.NET 2.0 web programming with C#2005”, SPD New Delhi