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**AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)**

**FACULTY OF ENGINEERING**

**MICROPROCESSOR AND EMBEDDED SYSTEMS**

**Fall 2021-2022**

**Section: M**

**Group: B**

**Lab Report No: 05**

## **1.Title**: **Building a weather forecast system using pressure and heat index measurement.**

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## **2. Abstract:**

The MPL115A is an absolute device that can be used to predict and measure the barometric pressure to deduce weather patterns. Weather prediction requires a static location for the sensor and 2-3 hours to analyze a full weather pattern. Typically the pressure changes due to weather are slow, requiring a few hours to determine the sloping of the pressure change. Vertical movement or a significant airflow can interfere with results due to only weather patterns in barometric pressure. The sensor should be kept in a relatively protected area from any strong air flows, and kept at that static location during analysis. Temperature effects can change the results of a normal pressure sensor especially if the measurement is done over several hours in varying temperature. Due to the nature of the calibration and temperature compensation, MPL115A meets these requirements, compensating for temperature swings over a large 0 to 85°C operating range. It will not require auto-zeroing for shifts in offset or span over temperature.

## **3. Objective:**

The objective of this experiment is to get familiarized with Micro-controller-based weather forecast system and heat index measurement. We will learn how to make a weather forecast system using Arduino, MPL115A and DHT22 sensor and we will try to run the system perfect fully.

**4. Results:**

**4.1 Simulation Environment:**

First, we open Proteus 8.12 professional software for this experiment. Then we choose New project from the drop-down menu. After that, we give this project a name and choose a location to save it to. The software then displays two schematic design options. We choose the option to Create a schematic from the selected template. After that, we select Do not develop a PCB layout and click Next. After that, we choose Create a flowchart project, then Next, Finish, and Next. Then we noticed that two windows had been opened. Schematic Capture is one, and Visual Designer is another. We took Import project clip and Arduino one after the other in Schematic Capture. We used the Weather station shield and the Humidity Temperature Brackout board from the Arduino library.

Then we proceeded to the panel labeled Visual Designer. Create a loop system and a setup system, as well as decision, operation, and assignment blocks. And keep the loop system going.

|  |
| --- |
| We have to click next again. |
| **Figure 1** |
|  |
|  |
| After that we have to select create a schematic from the selected template and click next. |
| **Figure 2** |
|  |
|  |

|  |
| --- |
| Then select Do not create a PCB layout and click next. |
|  |
| **Figure 3** |

|  |
| --- |
| From the three option we have select the Create Firmware Project and Family will be ARDUINO and click next. |
|  |
| **Figure 4** |

|  |
| --- |
| Then we have to click Finish. |
|  |
| **Figure 5** |

|  |
| --- |
| Then click the flowchart section. |
|  |
| **Figure 6** |

**4.2 Simulation Result:**

|  |
| --- |
| Connect all components as shown in simulation figure. |
|  |
| **Figure 7: Structure of a weather forecast system with Arduino Library in Proteus.** |
| Implementation of design a flowchart Arduino Uno (R3) in Proteus 8.12 |
|  |
| **Figure 8: Design a flow chart on visual designer** |

|  |
| --- |
| The simulation after running, we can show the current time and temperature on display. |
|  |
| **Figure 9: Display a message current temperature on display** |

|  |
| --- |
| Then, we can show the current time and humidity on display. |
|  |
| **Figure 10: Display a message current humidity on display** |
| Then, we can show the heat index on display. |
|  |
| **Figure 11: Display a message current heat index on display** |

|  |
| --- |
| Then, we can show the current time and pressure on display. |
|  |
| **Figure 12: Display a message current pressure on display** |

|  |
| --- |
| Then, we can show the current time and weather on display. |
|  |
| **Figure 13: Display a message current weather on display** |

**5. Discussion:**

We built a weather forecast system using pressure and heat index measurements in this experiment. We used the proteus 8.12 software in this experiment. We used a Weather Station Shield, a Humidity Temperature Brackout board, and an Arduino Uno microcontroller in this software. Temperature, humidity, altitude, pressure, and weather conditions were all measured.

# **6. Conclusion:**

PROTEUS was familiar from previous. So there was nothing new regarding the software. As the topic was new which was “Building a weather forecast system using pressure and heat index measurement”, lab faculty briefly explained the theory first and after that the software work was started. The components were searched to implement and flow chart was designed with the help of lab manual. Whenever there was any difficulty, lab faculty helped to resolve the problem. After all the process, the system ran successfully. Overall, the lab objective was fulfilled.