### American International University- Bangladesh

### Department of Electrical and Electronic Engineering

**EEE4103: Microprocessor and Embedded Systems Laboratory**

***Guidelines for students: Students can design an embedded system by verifying the program for their experiment using a relevant software development tool and then implementing their experiment on the breadboard as hardware to observe their results. The time duration for this whole lab experiment will be 90 minutes per group. This overall lab experiment will be done group-wise including 5 or 7 members per group. All the groupmates will be responsible to complete the lab report. The lab report (one report in each group) must be submitted on the lab exam week (hardcopy) before starting the class. Late submission will be accounted for heavy penalty. If a student or group is found to not follow the guidelines, then deductions can be made or zero can be expected. In total, 15 marks are allocated for the lab report and student’s individual performance within the group.***

***For report submissions, the following topics must be included:***

***Title:*** Students will provide an appropriate title for a microcontroller-based self-designed laboratory experiment based on ideas and knowledge they acquired from their previous laboratory experiments.

***Objective:*** Students will be implementing this experiment based on one or more objective/objectives.

***Theory and Methodology:*** Students will be explaining their experiment methodology in this section which will be brief. They may produce a circuit diagram and block diagram to explain the overall system of their designed experiment and label the circuit diagram appropriately.

***Apparatus:*** The students can select apparatus from the below table but are not limited to create their experiment according to their requirements. However, they must purchase or collect it before the experiment, if any particular components, sensors, or display devices are not available in the lab.

|  |  |  |
| --- | --- | --- |
| * Arduino UNO * Arduino Mega * STM32 board | * Breadboard * LEDs * Tilt sensor * Push button switch | * Jumper wires * Potentiometer * Resistors * Tilde Switch |

***Experimental Setup:*** Students will be adding pictures of their implemented hardware circuit connection with possible outcomes in this section.

***Codes of the Program:*** Students will be adding the program they wrote for hardware implementation in this section with proper explanation.

***Software Simulation:*** Students will be adding the program they wrote for software implementation in this section with proper explanation of the simulation methodology.

***Discussions:*** Students will be writing reasonable conclusions here related to their experiment.

***Individual’s Contribution:* Include in a tabular form.**

***Course Outcome Mapping with the OEL:***

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO/**  **CLO Number** | | **CO/CLO Statement** | | **K** | **P** | **A** | **Assessed Program Outcome Indicator** | **BNQF Indicator** | | **Teaching-Learning Strategy** | | **Assessment Strategy** | |
| **1** | | Simulate laboratory experiments using microcontrollers, sensors, actuators switches, display devices, etc., and a suitable simulator related to the fields of electrical and electronic engineering. | |  | P1,  P4,  P5 |  | P.e.2.P4 | FS.6 | | Practical Demonstration | | Report | |
| **Assessment Rubrics [include this page as cover page]** | | | | | | | | |  | |  | |
| **Course Name:** | | | Microprocessor and Embedded Systems Lab | | | | | | **Course Code:** | |  | |
| **Semester:** | | |  | | | | | | **Sec:** | |  | |
| **Faculty Name:** | | | Md Sajid Hossain | | | | | | | | | |
|  | | |  | | | | | |  | |  | |
| **Title:** | | |  | | | | | | | | | |
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|  | **Student ID #** | | **Student Name** | | | | | | **Obtained Marks** | | | |
| **1.** |  | |  | | | | | |  | | | |
| **2.** |  | |  | | | | | |  | | | |
| **3.** |  | |  | | | | | |  | | | |
| **4.** |  | |  | | | | | |  | | | |
| **5.** |  | |  | | | | | |  | | | |
| **6.** |  | |  | | | | | |  | | | |
| **7.** |  | |  | | | | | |  | | | |
| **8.** |  | |  | | | | | |  | | | |

**Assessment Materials and Marks Allocation:**

|  |  |  |  |
| --- | --- | --- | --- |
| **COs** | **Assessment Materials** | **POIs** | **Marks** |
| CO1 | Performance Test | P.e.2.P4 | 15 |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| COs-POIs | Excellent  [5] | Proficient  [4] | Good  [3] | Acceptable  [2] | Unacceptable  [1] | No Response  [0] | Secured Marks |
| **CO1**  **P.e.2.P4** | The lab developed as a process for complex engineering problems considering microcontrollers, sensors, switches, display devices, etc. The simulation and implementation processes are clearly demonstrated combining all input patterns with several outcomes. | The lab developed as a process for complex engineering problems considering microcontrollers, sensors, switches, display devices, etc. The simulation and implementation processes are clearly demonstrated with some outcomes and limited input patterns. | The lab developed as a process for complex engineering problems considering microcontrollers, sensors, switches, display devices, etc. The simulation and implementation processes are not clearly demonstrated with some outcomes and input patterns. | The lab developed as a process for complex engineering problems considering microcontrollers, sensors, switches, display devices, etc. The simulation and implementation processes are not clearly demonstrated with a few outcomes for a few patterns. | The lab developed as a process for complex engineering problems considering microcontrollers, sensors, switches, display devices, etc. are not appropriate. The simulation and implementation processes are not demonstrated with any outcomes and not for any pattern. | No responses at all |  |
| **Comments** |  | | | | **Total marks (15)** |  | |

*How K/Ps are addressed through this task?*

In this POI, there is no need to think about knowledge profile (K) as per AIUB OBE Manual V21.

P1: This task requires knowledge of electrical circuits, electronic circuits, and digital electronics (K3), design knowledge (K5) of circuit design and simulation and hardware tools as well as test and measurement tools (K6). So, it satisfies the requirements of depth and breadth of knowledge as per P1 (depth of knowledge at one or more levels of K3-K6 or K8). Practicing knowledge in electrical and electronic engineering discipline as per POI statement (P.e.2.P4), which is mapped to this course outcome, CO1.

P4: The circuit was designed where there is no knowledge on it. So, this full-fills the requirements of the involvement of the infrequently encountered issues.

P5: To design the circuit, the outside problems encompassed by standards and codes of practice for professional engineering are required. Without this working knowledge, no can design the system using microcontrollers.