EEE 302: MICROPROCESSORS & INTERFACING

TERM PROJECT

MICROPROCESSOR BASED WATER QUALITY MONITORING SYSTEM FOR BANGLADESH

COURSE INSTRUCTOR: FMA **SPRING 2021**

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1. **Objective:**
   The objective of this project is to address program outcome 4 (PO_4) which is infrequent issues since this sort of complex engineering problem is not faced by an engineer in their career quite frequently.

Course Outcome	Program Outcome	Bloom's taxonomy Level	Knowledge Profile	Complex Engineering Problem Solving	Assessment tools
CO5: Design a Microprocessor-based system that meets specified requirements	PO3: Design PO4: Investigation PO5: Modern tool usage	Create, Knowledge	K5: Design K6: Technology K7: Research	P4: Infrequent Issues	Project Demonstration.

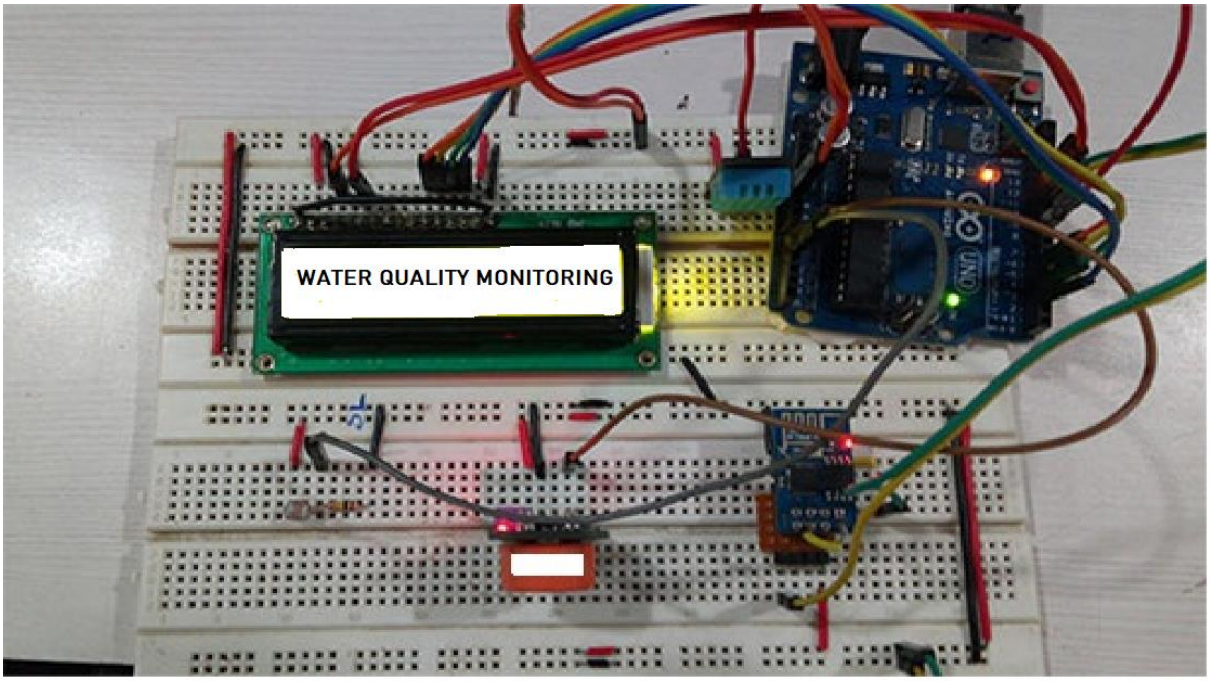
2. **Project tasks:**
   In this project, a water quality monitoring device will be designed that will recognize the quality of the water whether it is drinkable or not, considering environmental factors like temperature, humidity, pH level, and alcohol content. The device will be built on Arduino UNO which is a popular prototyping board.
3. **Brief design process**
   The Arduino UNO is ATmega328 based microcontroller board. It is one of the most popular prototyping boards. The board comes with a built-in Arduino boot loader. It has 14 GPIO pins, 6 PWM pins, 6 Analog inputs, and onboard UART, SPI, and TWI interfaces, an on-board resonator, a reset button, and holes for mounting pin headers. While programming the board, it can be connected to the PC using the USB port and the board can run on USB power. The Arduino UNO has 32 Kb Flash memories, 1 Kb EEPROM, and 2 Kb SRAM. The board can be connected to different Arduino Shields for connectivity with Ethernet, Bluetooth, Wi-Fi, Zigbee, or Cellular network and it can be connected to most of the IoT platforms.

4. **Development of designed solution**

   This Arduino-based IoT device should be installed in a food store. Once it is properly installed and powered on, it should be connected with the internet via a Wi-Fi modem and will start reading data from the interfaced sensors – a temperature and humidity sensor, other sensors.

5. **Investigations to check if the developed system meets requirements**

   The Arduino will collect all the data from all the sensors and will convert the values to the strings. A sensor data will be wrapped as proper strings are passed to the character LCD for display. A Wi-Fi module should be connected to the Arduino which will upload the data in a real-time server. To display and monitor the data; either a digital dashboard or data broker is needed. You need to investigate the developed system with water, formally in front of the course instructor on the following deadlines.



6. **Important Dates:**
   - Students should present their project demonstration on **Saturday, May 10, 2021,** during class time.
   - Each group needs to make a formal video of their project which should not be beyond **2 minutes**.
   - The presentation time fixed for each group is **8 minutes**.
   - A formal report needs to be submitted before the presentation.

Rubrics for the assessment of the design and report

Performance Indicators	Outstanding (10)	Good (8-9)	Satisfactory (6-7)	Unsatisfactory (0-5)
Understanding design requirements focusing on the social impact of Bangladesh.	Fully understands the purpose and function of the system to be designed, fully aware of the constraints.	Reasonably understands the purpose and function of the system to be designed, fully aware of the constraints	Understands to some extent the purpose and function of the system to be designed, fully aware of the constraints	Has a vague or no understanding of the purpose and The function of the system to be designed, fully aware of the constraints
Following sound design procedure considering portability.	The design procedure is very systematic and clear. Design decisions are taken through appropriate analysis and comparison of options	A design procedure is reasonably systematic and clear. Reasonable analysis and comparison of options are done during taking design decisions	The design procedure followed is to some extent systematic and clear. Analysis and comparison of options are done to some extent during taking design decisions	Does not follow any systematic and clear design procedure. Analysis and comparison of options are not done during taking design decisions
Satisfying all the essential parameters requirements	Demonstrates that all design requirements are met	Reasonably demonstrates that all design requirements are met	Demonstrates to some extent that all design requirements are met	Does not demonstrate meeting all design requirements or demonstrate only partially.
Performing economic analysis concerning Bangladesh	Economic analysis is thorough and correct. All cost components are appropriately considered	Economic analysis is reasonable. All cost components are appropriately considered	Performs economic analysis to some extent. Aware of all cost components	Does not perform economic analysis and/or not aware of all major cost components