ENVIRONMENTAL MONITORING BASED ON INTERNET OF THINGS

TEAM

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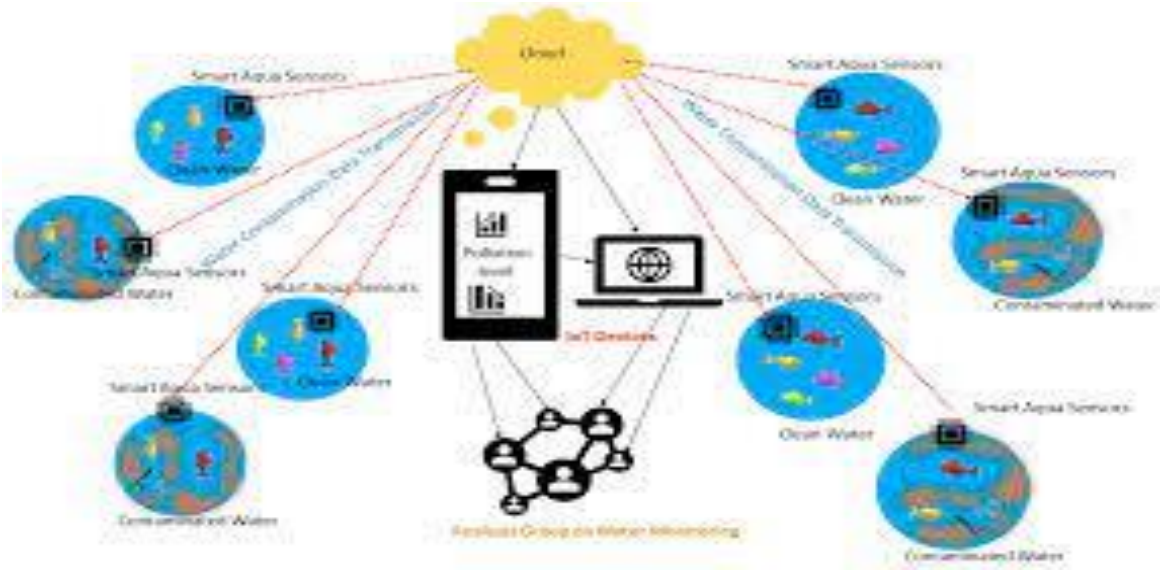
Phase 2 Document Submission

Project Title: Environmental Monitoring



INTRODUCTION:

In a world increasingly affected by climate change and urbanization, monitoring environmental conditions such as temperature and humidity is paramount for sustainable living and efficient resource management. Changes in these parameters can influence ecosystems, agriculture, human health, and infrastructure. Therefore, the development of an innovative Environmental Humidity and Temperature Monitoring System is crucial to understand and respond to these changes effectively.

The project aims to design and implement a state-of-the-art monitoring system that provides real-time and historical data on temperature and humidity levels across various geographical locations. This system will leverage cutting-edge sensor technologies, wireless communication, cloud computing, and data analytics to deliver accurate, reliable, and accessible environmental information.

Hardware implementation:

The components employed in this work include the microcontroller, different types of sensors, and motors. One of the main parts of the system is the programmable chip that controls the work.

The microcontroller (arduino):

Arduino Uno is a microcontroller board. Arduino has many inputs pins which are basically fed from a variety of switches or sensors and controls a wide range of outputs such as lights, recorders etc. The Arduino board can be assembled manually or purchased pre-assembled; the open-source IDE (Integrated Development Envi- ronment) can be downloaded free of charge from the website. The Arduino UNO is based on the ATmega328P microcontroller. The board is programmed with Arduino IDE and provided with 14 input/output (I/O) pins. The board supply voltage is provided through a USB cable or by an external dc supply in a range of 7- 20 volts

Fig:Arduino uno microcontroller

Specification of Arduino uno microcontroller:

Microcontroller	ATmega328
Clock Speed	16MHz
Operating Voltage	5V
Maximum supply Voltage (not recommended)	20V
Supply Voltage (recommended)	7-12V
Analog Input Pins	6
Digital Input/Output Pins	14
DC Current per Input/Output Pin	40mA
DC Current in 3.3V Pin	50mA
EEPROM	1kB
SRAM	2kB
Flash Memory	32kB of which 0.5kB used by boot loader

III. PROPOSED CIRCUIT AND ITS OPERATION

DHT22 unit:

The DHT22 is the low-cost digital humidity and temperature sensor. It utilizes a capacitor based humidity sensor combined with a temperature sensor component to measure the surrounding air. The output of the sensor is a digital signal that is to be transferred to appropriate data pin. This sensor is perfect and accurate with working in a broad range of humidity and temperature.

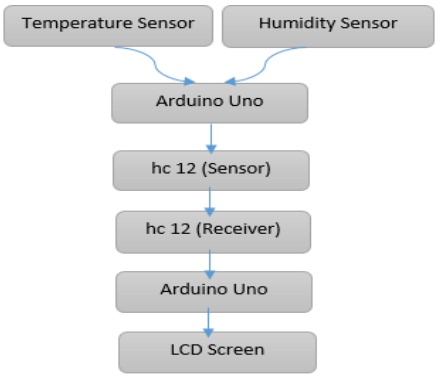
Fig:DHT22 sensor

Specification of DHT22 Sensor:

Technical Specification:

Model	DHT22
Power supply	3.3-6V DC
Output signal	digital signal via single-bus
Sensing element	Polymer capacitor
Operating range	humidity 0-100%RH; temperature -40~80Celsius
Accuracy	humidity +-2%RH(Max +-5%RH); temperature <+-0.5Celsius
Resolution or sensitivity	humidity 0.1%RH; temperature 0.1Celsius
Repeatability	humidity +-1%RH; temperature +-0.2Celsius
Humidity hysteresis	+-0.3%RH
Long-term Stability	+-0.5%RH/year
Sensing period	Average: 2s
Interchangeability	fully interchangeable
Dimensions	small size 14*18*5.5mm; big size 22*28*5mm

Flow chart:



Software implementation:

An open source software for Arduino boards is used to write and upload codes on the Arduino boards without any complicates. It runs on different platforms including Windows. It provides extra options to monitor and communicate with Arduino boards.

RESULT:

The transmitter part consists of Arduino, the board connected with, sensor, and resistor 10K for reducing the voltage difference and protecting the sensor from the high current, and sending piece hc12.

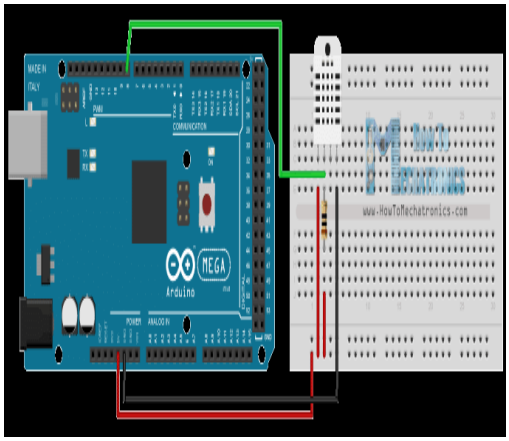


FIG 1: Diagram of the DHT22 Temperature and Humidity Sensor Combined with Arduino Uno Microcontroller.

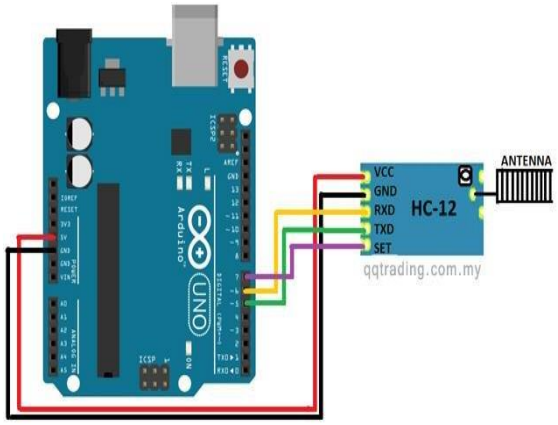


FIG 2:The RF 433 Hc12 Combined with Arduino Uno Microcontroller.

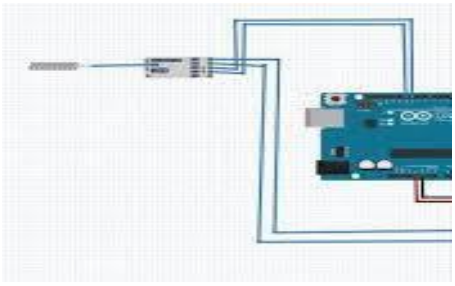


FIG3: : Diagram of the System Connected to LCD Screen.

CONCLUSION:

The word ‘humidity and temperature change” has begun to draw more attention of many scientists and researchers. Basically, it refers to a continuous process that has an alerting and perhaps dangerous consequences. Monitoring the humidity and temperature is a fabulous technique to record and track any changes in order to enable the decision makers to prepare or follow the proper procedure to prevent any environmental disasters that could lead to jeopardising the natural resources such as water, air, soil…. etc. The huge developments in the field of Information and communication technology in the climate change, mitigation, adoption and monitoring have added significant improvements to the traditional techniques in terms of accuracy, reliability, and faster data transfer. Consequently, these updated techniques reduce the overall system cost; provide real time observation, low power consumption, lively tracking, real time data processing and analysis. At the end of the day, having such improved national humidity and temperature monitoring system will positively affect people’s livelihoods.