DESIGN A CIRCUIT FOR HUMIDITY PREDICTION USING CMOS TECHNOLOGY AND IMPLEMENTING ANN

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Abstract:

This research paper presents the knowledge about Humidity prediction model based on Arduino Uno, DHT11 Sensor and 16*2 LCD display. The model combines real-time data acquisition with predictive machine learning algorithm to estimate future humidity levels. The microcontroller of Arduino processes from the DHT sensor and shows the predicted and actual humidity data in the LCD display. This system gives a low-cost and user-friendly solution for humidity monitoring in various environments.

Keyword:

Arduino UNO, DHT-11, 16*2 LCD

Introduction:

- Humidity, temperature and pressure are the main and common parameters to measure environmental conditions.
- Humidity Prediction Model designed to forecast atmospheric levels with simplicity and accuracy. Here we will display the real-time data of humidity in LCD display.
- This model offers practical insights into environmental humidity changes. It finds versatile applications in agriculture, climate control, and various industries.

Literature Survey:

A humidity prediction model using Arduino, DHT11, and LCD reveals a growing interest in affordable and accessible solutions for environmental monitoring. The importance of real-time humidity data for diverse applications, ranging from agriculture to indoor climate control. Researchers have explored the integration of Arduino microcontrollers with DHT11 sensors for accurate and cost-effective humidity sensing. The use of LCD displays enhances user interaction and data visualization. While several projects showcase successful implementations, there is a notable gap in the comprehensive literature synthesizing the integration of predictive algorithms with these components. This study aims to address this gap by proposing and evaluating a humidity prediction model that leverages the synergy of Arduino, DHT11, and LCD technologies.

Methodology:

1. Project Plan: Define our project scope, goals, and needs. identify and assign roles and responsibilities in the team. Create a detailed plan that details tasks, dependencies, and timelines. Identify milestones and deliverables for each phase of the project.

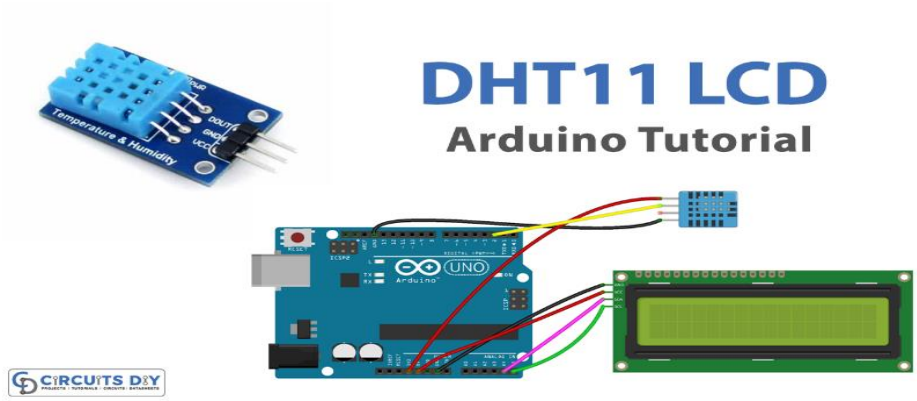

Fig : Circuit Diagram

2. Hardware component description: Research and identify required hardware components, including DHT sensor, Arduino Uno, wireless communication module, and 16x2 LCD display. Purchase your chosen hardware from reputable suppliers. check the product mix.

3. Software development environment: set up the arduino integrated development environment (ide) to program the arduino uno. Install the necessary libraries and dependencies for wireless communication. A development environment that ensures quality work and testing.

4. Arduino programming: Create Arduino Uno firmware for data processing, translation and communication. Test the Arduino program using simulated data to verify functionality. Show off your numbers to be efficient and build confidence.

5. Sensor Integration: Connect and integrate DHT sensors with Arduino Uno. Calibrate sensors to accurately measure temperature and humidity. Rigorous testing is performed to verify the accuracy and reliability of the sensor.

6. Wireless communication: Integrate wireless communication module with Arduino Uno. Use communication protocols for seamless data transfer. Test wireless communications and troubleshoot connectivity issues.

7. LCD screen: Connect and integrate a 16x2 LCD screen with Arduino Uno. Now create the code to display the temperature and humidity on the LCD screen. Check the performance of the job with a successful test.

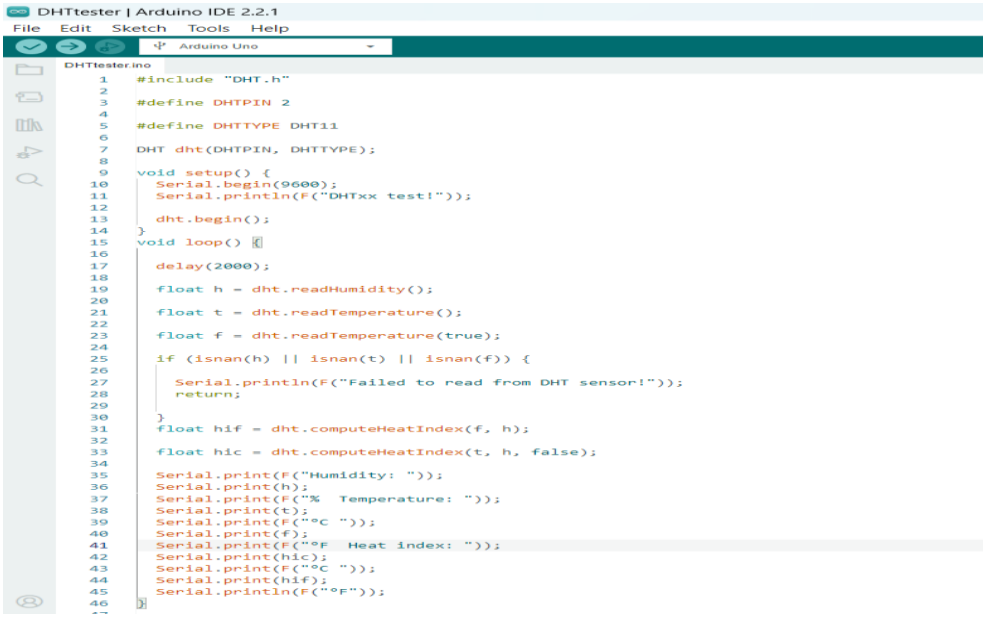

Fig : Arduino Code

8. Integration and testing: Integration of all products to complete the analysis. Perform system testing to ensure interoperability of hardware components. Fix any integration issues and tune the system for better performance.

9. User-interface design and testing: Creating user experience for LCD devices. Then test the user interface for readability and clarity. Gather feedback from potential end customers and make necessary adjustments.

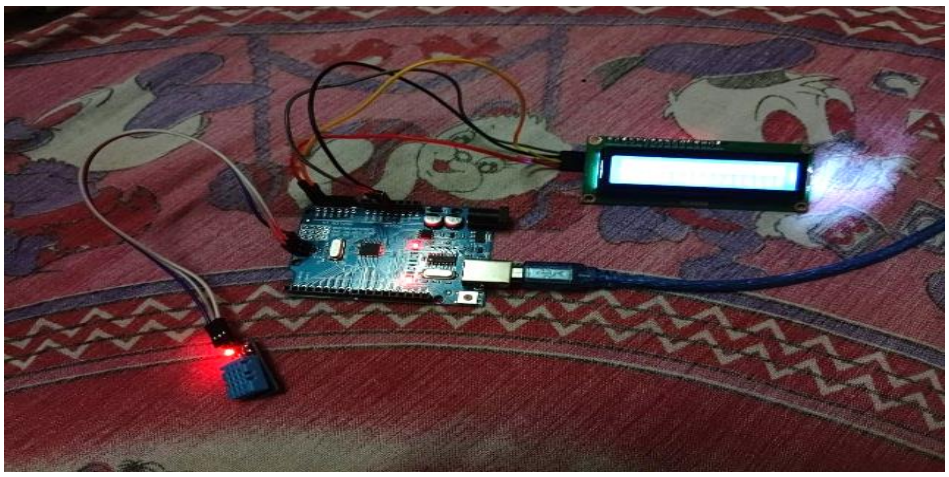

Fig : Circuit Connection

10. Project completion: document all development processes, including hardware schematics, software code and user manuals. Prepare a final report on tasks completed, problems encountered, and solutions. Do a final review to ensure all goals have been met.

11. Presentation: Prepare a comprehensive presentation outlining the aims, methods and results of the project. Provide briefings to stakeholders including teams, coaches and end customers. Plan wireless distribution of temperature and humidity in real scenarios. The above work plan provides a method for completing each project phase. It emphasizes collaboration, innovation, and quality testing to ensure quality and reliable care. Changes are made throughout the work plan to accommodate unforeseen challenges or improvement opportunities that may arise during project completion.

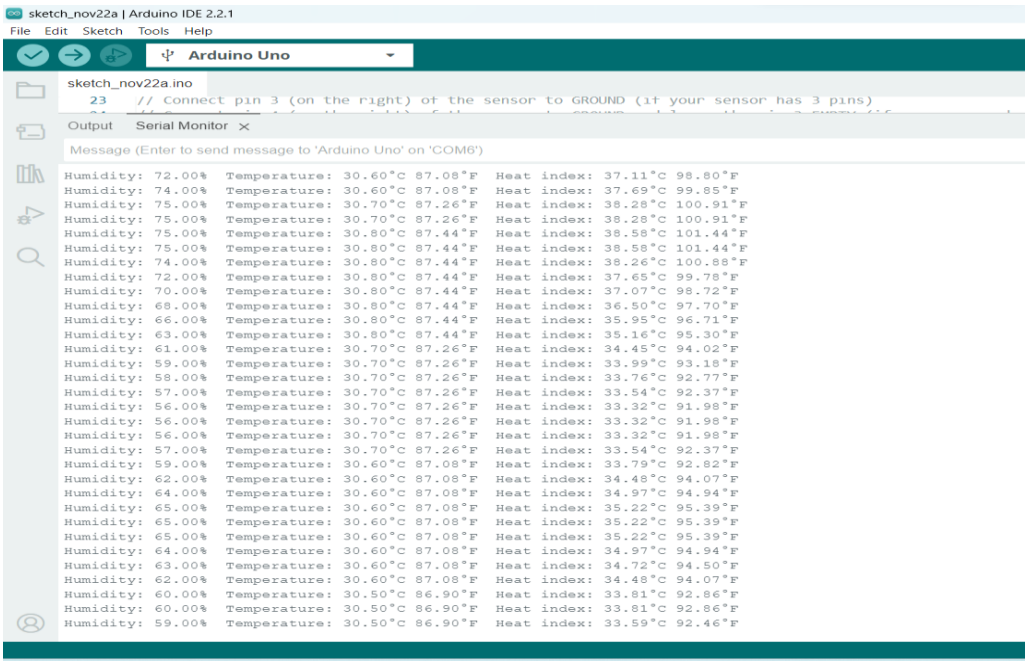

Fig : Output

Future planning for the humidity prediction model..

Machine Learning Integration:

- Explore the integration of machine learning algorithms to enhance prediction accuracy based on historical data.
- Train a model that can adapt to specific environmental conditions and improve over time.

Data Logging and Analysis:

- Integrate data logging capabilities to record humidity values over time.
- Develop algorithms to analyze historical data and identify patterns or trends in humidity changes.

User Interface Improvements:

Enhance the user interface on the LCD display for better user experience.

Expandability:

Design the system with expandability in mind, allowing users to add more sensors or modules for monitoring additional environmental parameters.

Educational and Research Applications:

- Use the project as an educational tool for learning about sensor technologies, microcontroller programming, and data analysis.
- Contribute to environmental research by providing a low-cost and accessible solution for humidity monitoring.

Conclusion :

The humidity prediction model utilizing Arduino, LCD, and DHT11 sensor proves to be an effective and accessible solution for real-time humidity monitoring. The seamless integration of hardware components allows for accurate data collection and presentation on the LCD display. This user-friendly system provides valuable insights into environmental conditions, making it a practical tool for various applications, from home automation to industrial settings. The combination of affordability, simplicity, and reliability makes this model a promising choice for humidity monitoring, contributing to advancements in IoT and sensor technology.

Reference :

- **Dr. Bimal Dutta,Prof. Rupam Sardar, "Prediction of Temperature using Multiple Linear Regression Model in an area of North Twenty-four Parganas , West Bengal**", IJSREM, **June – 2021**
- **Farrukh Hafeez, Usman Ullah Sheikh, Attaullah Khidrani, Muhammad Akram Bhayo, Saleh Masoud Abdallah Altbawi, Touqeer Ahmed Jumani, "Distant temperature and humidity monitoring: prediction and measurement ", Indonesian Journal of Electrical Engineering and Computer Science, December 2021**
- **https://www.instructables.com/How-to-Make-an-Arduino-Weather-Station-With-DHT11-/**