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HOME AUTOMATION USING BLUETOOTH APPLICATION

Durga A[1], Revanth Pavan Kumar[2], Seshu Kumar R[3], Naga Mounika V[4]

[2,3,4]BTech students, Dept of Computer Science and Engineering, Lingayas Institute of Management & Technology, Madalavarigudem, Vijayawada, Andhra Pradesh, India

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Abstract - In the era of increasing smartphone utilization, home automation systems offer a convenient solution for managing household appliances remotely. This project presents a cost-effective and accessible approach to home automation utilizing an Arduino Nano microcontroller and HC-05 Bluetooth module. The system is designed to monitor environmental conditions with a DHT11 sensor, detecting temperature and humidity levels. Through a Bluetooth-connected mobile application, users can remotely control various appliances such as fans, water motors, tube lights, and bulbs. Additionally, the system incorporates a relay module to facilitate the switching of appliances requiring 230V power. This implementation not only enhances convenience but also offers practicality for individuals with limited mobility, providing seamless control over household devices from the convenience of a smartphone.

Key Words: Arduino Nano, HC-05 Bluetooth module, DHT11 sensor, relay module, mobile application, home automation, Bluetooth-enabled, convenience, efficiency, temperature monitoring, humidity monitoring, remote control.

1.INTRODUCTION

Nowadays, we have remote controls for our television sets and other electronic systems, which have made our lives real easy. We have come up with a new system called Arduino based home automation using Bluetooth. This system is super-cost effective and can give the user, the ability to control any electronic device without even spending for a remote control. This project helps the user to control all the electronic devices using his/her smartphone. Time is a very valuable thing. Everybody wants to save time as much as they can. New technologies are being introduced to save our time. To save people's time we are introducing Home Automation system using Bluetooth. With the help of this system you can control your home appliances from your mobile phone. you can turn off and on your home appliances within the range of Bluetooth With the advancement of technology, the concept of smart homes has gained momentum, offering convenience, energy efficiency, and enhanced security. Home automation systems allow users to remotely control and monitor household appliances, contributing to a more comfortable and efficient living environment.

The proposed home automation system utilizes Arduino Nano, a compact and versatile microcontroller, as the core component. Arduino Nano is chosen for its ease of use, affordability, and compatibility with various sensors and modules. Additionally, Bluetooth connectivity provided by the HC-05 module enables seamless communication between the Arduino-based system and a mobile application.

2. LITERATURE SURVEY

2.1 Bluetooth based Home Automation System using cell Phones:

ABSTRACT: In Bluetooth based home automation system the home appliances are connected to the Arduino BT board at input output ports using relay. The program of Arduino BT board is based on high level interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only authorized user is allowed to access the appliances. The Bluetooth connection is established between Arduino BT board and phone for wireless communication. In this system the python script is used and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which indicate the status of the device

2.2 Door Automation System for Smart Home Implementation

ABSTRACT: In this paper is presented the design and the prototype implementation of a pneumatic door automation system intended to be used for access control in smart homes. The structure of the developed application is realized around the PIC 16F877A microcontroller which operates together with a pneumatic actuator based on a double acting cylinder controlled through an air distributor with solenoid valve. In the basic mode, the door opening and closing actions can be initiated manually by the user, through password authentication. The main parameters of the system can be configured locally, but an in-depth diagnoses and reconfiguration can be performed only through the serial interface which ensure the communication between the main module of the system and an external PC. Compared with other similar systems, the proposed implementation solution allows a high operation speed and very good reliability due to the pneumatic actuation. In addition, the door automation module can be integrated in a centralized access control system dedicated to the smart homes that has all the appliances and other electricity-based equipment connected into a local network. The door automation module presented in this paper can be integrated in any centralized access control system dedicated to the smart homes.

3.PROBLEM STATAMENT

The increasing reliance on internet connectivity and the proliferation of various electronic devices within households have highlighted the need for efficient control and monitoring systems. Traditional home automation solutions lack integration and accessibility, leading to inefficiencies in device management and energy consumption tracking.

Additionally, there is a lack of real-time visibility into power distribution anomalies, hindering effective troubleshooting and maintenance.

4.OBJECTIVE

The primary objective of this project is to design and implement a smart, lowcost home automation system using Internet of Things (IoT) technology. This system aims to provide seamless control and monitoring of home appliances and electronic devices through a user-friendly website interface. Furthermore, the system seeks to address the challenges associated with traditional metering methods by enabling remote supervision of household energy consumption. By integrating an online billing system, the project also aims to streamline payment processes for consumers and provide dealers with insights into power distribution system anomalies.

5. MATERIALS & METHODS

Operating System	Windows 7 or High
Main Technology	IOT
Programming Language	Embedded C
Tools	Arduino IDE

Table -1: Software requirements

Arduino Type	Nano
Sensor	DHT11
Bluetooth	HC – 05
Module	Relay

Table -2: Hardware requirements

6. ALGORITHMS

The algorithms were involved in this proposed system: • Initialization
• Device Discovery
• User Interface
• Device Pairing
• Data Exchange
• Automation Rules
• Security Measures
• Error Handling
• Testing and Optimization
• Deployment

7. SYSTEM DESIGN

Arduino Nano plays a pivotal role in the prototype of home automation through a Bluetooth- connected mobile application. As the central processing unit, Arduino Nano orchestrates the communication between various components, collects data from sensors, and executes commands sent from the mobile application. At the core of the system lies the Arduino Nano, a compact yet powerful microcontroller board that serves as the brain of the operation. Its small size and versatility make it an ideal choice for projects where space is limited, such as home automation systems. Equipped with a microcontroller unit (MCU), the Arduino Nano can interpret and execute code to perform a wide range of tasks, from reading sensor data to controlling actuators.

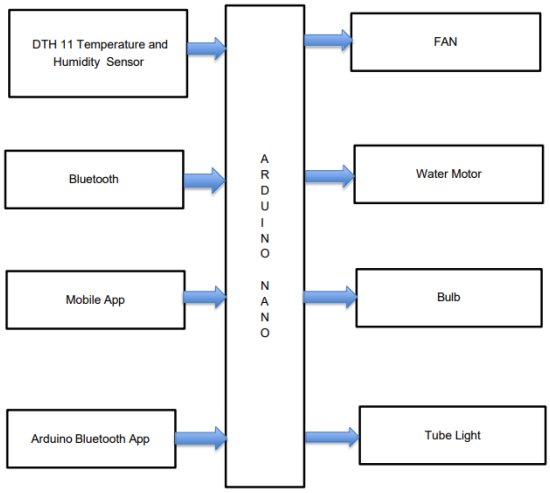

Chart -1: Block Diagram

8. SOFTWARE ENVIRONMENT

Arduino IDE

The Arduino Integrated Development Environment (IDE) serves as a fundamental tool for the development and programming of the rover project. Its primary purpose lies in providing a userfriendly platform where developers can write, compile, and upload code to Arduino-compatible microcontrollers such as the Arduino Nano used in the rover project. The IDE offers a streamlined interface with various features tailored specifically for Arduino programming, including syntax highlighting, code auto-completion, and built-in libraries, making it accessible even to beginners in the field of embedded systems development.

Fig -1: Arduino IDE Software view

9. IMPLEMENTATION & RESULTS

1. Connection to Arduino Nano:

The relay module is connected to the Arduino Nano via digital output pins. Each relay channel is associated with a specific pin on the Arduino, enabling individual control over the connected appliances.

2. Logical Control:

Through the Bluetooth-connected mobile application, users can send commands to the Arduino Nano, which in turn activates the corresponding relay channels based on the user's inputs.

3. Integration with Sensors:

The relay control logic can be augmented with inputs from sensors like the DHT11, which detects temperature and humidity. For instance, the Arduino Nano can be programmed to automatically turn on the fan when the temperature exceeds a certain threshold, providing intelligent and responsive automation.

4. Safety Measures:

Proper insulation and wiring practices should be followed to ensure electrical safety. Additionally, the Arduino Nano should be powered by a stable power source to prevent malfunctions or damage to the microcontroller or connected appliances.

10. CODING

The total coding is in the below hyperlink, kindly check it.

Coding

11. CONCLUSION

In this prototype, we successfully developed a home automation system utilizing an Arduino Nano microcontroller and a HC-05 Bluetooth module. The system enables users to remotely monitor and control various home appliances through a dedicated mobile application. The integration of a DHT11 sensor allows for real-time monitoring of temperature and humidity levels within the home environment. This functionality not only provides users with valuable insights into their living conditions but also enables them to adjust appliance settings accordingly for optimal comfort and energy efficiency. Furthermore, the inclusion of a relay module facilitates the remote control of high-power devices such as fans, water motors, tubelights, and bulbs, all of which operate at 230V. By interfacing the relay module with the Arduino Nano, users can safely toggle the power supply to these appliances via the Bluetooth app, enhancing convenience and accessibility, especially in situations where physical access to switchboards may be limited or inconvenient.

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