HOME AUTOMATION

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Overview

- Objective of the project
- Using IOT
- Arduino
- Picsimlab
- Simulation
- Conclusion

Use of C programming

1. Introduction
2. Data type Modifier & Qualifier
3. Conditionals & loops
4. Operators
5. Arrays & Pointers
6. Function
7. Storage classes
8. Pre-processor

Micro controller

1. ADC block & DAC block
2. Timers & Counters
3. PWM
4. Processor, memory and I/O ports
5. Micro Processor Vs Micro Controller

Embedded System

1. Combination of Hardware & Software that perform specific task
2. Types:
   - Stand-Alone
   - Real time
   - Networked
   - Mobile
3. Components
4. Requirements
   - Reliability
   - Cost effective
   - Low power consumption
   - Fast Processing

Elements

- Light Control
- Temperature Control
- Water level Control

Overview

Here we are building an IOT based home automation solution which includes the following major components.

1. Garden Lights
2. Temperature System of the home
3. Serial tank control

The Garden lights, temperature system and volume of water in tank are being controlled by Arduino uno controller board and Picsimlab simulator is used as simulating tool which is signalled by blynk IOT and mobile app.

Objectives of the Project

1. Control most of the devices at home using our phone.
2. Provide an easily and comfortable way to control their home devices from any place.
3. Get feedback about the status of your home.

What is Internet Of Things (IOT)?

The Internet Of Things (IOT) describes physical objects or group of such objects with sensors, processing ability, software and other technologies that connect and exchange data with other devices and systems over the Internet or other communication networks.

Need of Home Automation

People usually are outside the home for many reasons like travelling and they want to control some devices from a far distance. For example:

1. Filling the water tank
2. Turn off the lights in the room
3. To get feedback about the temperature

Arduino

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE(Integrated Development Environment).

The Arduino IDE supports the languages C and C++ using special rules of code structuring.

The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU toolchain, also included with the IDE distribution.

The Arduino IDE employs the program avrdude to convert the executable code into a text file in hexadecimal encoding that is loaded into the Arduino board by a loader program in the board's firmware.

BLYNK APP CONFIGURATION

- How to create new Template
- How to add device
- How to select & Add data stream
- How to include Blynk library

Picsimlab

- PICSimLab is a realtime emulator of development boards with integrated MPLABX/avr-gdb debugger. PICSimLab supports some picsim microcontroller. PICSimLab have integration with Arduino IDE for programming the boards microcontrollers.

Different Stages Involved

Stage 1: C Programming

Stage 2: Micro Controller

Stage 3: Embedded Systems

Stage 4: IOT and BLYNK

Garden Light Control

- During the day the outdoor light is maximum so the LDR sensor detects the light and the light is turned OFF

During the night the outdoor light is very low so the LDR sensor detects the light and the light is turned ON

LDR Sensor

- LDR sensor is a light detecting sensor that detects the light that falls upon it.

The Photo resistor is a light-controlled variable resistor. The resistance of a photoresistor decreases with increasing incident light intensity; in other words it exhibits photoconductivity. A photoresistor can be applied in light and dark activated switching circuits.

The LED lights are connected to the LDR via the ADC. The ADC converts the analog input by the LDR into its equivalent digital form which is then converted later by certain formula from 0 to 255 as upper bound. Based on that we glow the LED.

Temperature Sensor

- The temperature is recorded by LM35 sensor which is analog value so it is then converted into binary terms and later actual temperature is calculated using the obtained value of the voltage.

Heater and Cooler

- The temperature can be regulated using the heater and the cooler. The heater increases the temperature while cooler decreases it. The readings are shown in the CLCD as well as the status of heater are shown in the Blynk app.

image

- The Blynk app controls the temperature using the Arduino uno and gets reading of the temperature and notifications whether temperature exceed 35 degree.
- The Arduino controls the temperature system and supplies reading to the blynk app and even displays the temperature on the CLCD.
- The CLCD is responsible for display of the status of temperature.

Water Control

- This setup consists of 2 valves inlet and outlet valve. The inlet valve is used for controlling the inflow of water into the tank and the outlet valve to eject the water. The tank refills itself when the outflow exceeds the threshold of minimum value i.e 2000 Litres and gives notification to the Blynk app.

- Also it stops filling when the tank is full at 3000 Litres.

Serial Tank

- The serial remote tank is a tank simulator controlled by a serial communication protocol. The tank has several sensors and actuators that can be read and controlled using the communication protocol.

Thank you