

NOVEL SMART HOME SOLUTION

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ABSTRACT

The market is flooded with smart home appliances. You can control them remotely through the internet. They make your life easy and convenient. People are throwing their supposedly dumb appliances into garbage to replace them with smart appliances. This is detrimental to the environment and your savings. Due to above reasons we plan to make our existing home appliances smart. We plan to do this by developing a device which would be able to control home appliances remotely. The device would be able to do that through IR (Infrared). The device would include a microcontroller such as Arduino, a Wi-Fi module, and an IR diode. The device would be connected to the internet and will be placed in the line of site of the home appliance to control such as AC, TV, Music System, etc. Through the phone app a person could control the home appliances remotely, through time triggers (such as at 6am, switching on the music system), or through location triggers (such as within 2km range of the house, turning on the AC), etc. This will help save costs and extend the life of current devices and thus help protect the environment as well.

Keywords: IOT, ESP2866 Wifi Module, Arduino, Home Automation, IFTT

1. INTRODUCTION

The basic idea of our project is to convert old existing devices to smart devices. The market is flooded with smart home appliances. You can control them remotely through the internet. They make your life easy and convenient. People are throwing their supposedly dumb appliances into garbage to replace them with smart appliances. This is detrimental to the environment and your savings. Due to above reasons we plan to make our existing home appliances smart.

We plan to do this by developing a device which would be able to control home appliances remotely. The device would be able to do that through IR (Infrared). The device would include a microcontroller such as Arduino, a Wi-Fi module, and an IR diode. The device would be connected to the internet and will be placed in the line of site of the home appliance to control such as AC, TV, Music System, etc. Through the phone app a person could control the home appliances remotely, through time triggers (such as at 6am, switching on the music system), or through location triggers (such as within 2km range of the house, turning on the AC), etc. This will help save costs and extend the life of current devices and thus help protect the environment as well.



Fig- 1:ESP2866 Node MCU

2. OBJECTIVE

The purpose of this project was to create a Wi-Fi enabled IR blaster that could be controlled with Amazon Alexa. This was designed with the NodeMCU board but should be compatible with multiple ESP8266 variants. Includes a functional web portal for code capture, output monitoring, and device state tracking. Device gives real time LED feedback, can handle complex code sequences for multi-device home theatre control, and full integration with Amazon Alexa via the smart home entertainment devices API and the IR Controller Alexa skill.

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Fig- 2: Reuse

3. SYSTEM SPECIFICATION

Software requirements:-

- a. Operating system :- windows, ios
- b. Arduino IDE
- c. Node MCU firmware
- d. libraries : ESP8266WebServer, ESP8266Wifi, Arduino Json, WiFi Manager, Easy NTP Client, IRremoteESP8266.
- e. Miscellaneous basic:- internet, MS – PowerPoint, MS-office to make presentation and report

Hardware requirements:-

- f. Processor:- Core i 3
- g. RAM:- 4gb
- h. Hard disk:- 500 gb
- i. ESP8266 module
- j. Node MCU development kit
- k. General purpose NPN transistors
- l. IR LED, IR receiver
- m. Resistance (1k Ohms and 100 Ohms)
- n. Breadboard

i. Basic:-

The hardware is based on the NodeMCU ESP8266 board and uses an infrared LED combined with the 2N2222 transistor for increased current and range. Values of the resistors seen in the schematic are variable and will depend on the specifications of your LED. If you're using the LED recommended below then a 1000 ohm resistor to the 2N2222 transistor and a 10 ohm resistor to the LED itself are appropriate values, otherwise please use an LED resistance calculator. In total the parts come in around \$10 so building a controller for each IR enabled device in your home is very feasible, and most components are cheaper in bulk

ii. Arduino IDE installation:-

As of the ESP8266 Arduino Core 2.4.0 lwIP version 2.0 is default. This causes problems and crashing and it is recommended you use lwIP 1.4. Go to Tools > lwIP Variant > lwIP 1.4 (Prebuilt)

- Install [Arduino IDE](#)
- Install [ESP8266 Arduino Core](#)
- Install the following libraries from the Arduino IDE [Library Manager](#): ESP8266WebServer, ESP8266WiFi, ArduinoJs on WiFiManager, Easy NTPClient, IRremoteESP8266 as well as [Cryptosuite](#) which is not on the IDE
- Load the IRController.ino blueprint from this repository
- Upload blueprint to your ESP8266 (the .ino file). Monitor via serial at 115200 baud rate
- Device will boot into WiFi access point mode initially with SSID IRBlaster Configuration, IP address 192.168.4.1. Connect to this and configure your access point settings using WiFi Manager. If your router supports mDNS/Bonjour you can now access your device on your local network via the hostname you specified (http://hostname.local:port/), otherwise via its local IP address (this IP address is displayed on the serial output).
- Forward whichever port your ESP8266 web server is running on so that it can be accessed from outside your local network, this is critical since Alexa commands come from Amazon's servers, not locally
- Download the IR Controller Alexa skill and start creating your devices. Each IR command will require a URL which can be saved. Choose whichever functionality you desire. Information on creating the URLs can be found below

iii. Alexa Setup :-

- Download the IR Controller skill from the Alexa skill store
- Login with your Amazon account
- Go to <https://tehsyc.pythonanywhere.com/>
- Login with the same Amazon account you used for the skill login
- Create a new device by specifying the friendlyName, endpointId, and description
- Add whichever functionality you want your device to have by scrolling through the options on the page
- Save your new device
- Run device discovery on your echo device by saying "Alexa, discover devices" or via <https://alexa.amazon.com/>
- Verify that your new device was discovered online or in the Alexa app and enjoy!

iv. Drivers

Install the NodeMCU drivers for your respective operating system if they are not autodetected

<https://www.silabs.com/products/mcu/Pages/USBtoUARTBridgeVCPDrivers.aspx>

v. IFTT :-

If you are unable to use the Alexa skill for whatever reason, or you are using a competing voice control product or some other implementation, then IFTTT can also be used to execute commands using the Maker channel HTTP commands. Simply generate your URLs and save them in the Maker channel

4. EXISTING

- The market is flooded with smart home appliances.
- You can control them remotely through the internet. They make your life easy and convenient.
- People are throwing their supposedly dumb appliances into garbage to replace them with smart appliances.
- This is detrimental to the environment and your savings.

4.1 WORKING:-

- a. Commands are sent to the address of the device using POST method :
<http://xxx.xxx.xxx.xxx:port/msg?code=A90:SONY:12&pass=yourpass>
- b. The commands supported are:
 - Pass : password required to execute commands
 - Code: IR code such as A90:SONY:12
 - Repeat: Number of times to repeat the signal
- c. Rdelay: delay between each delay

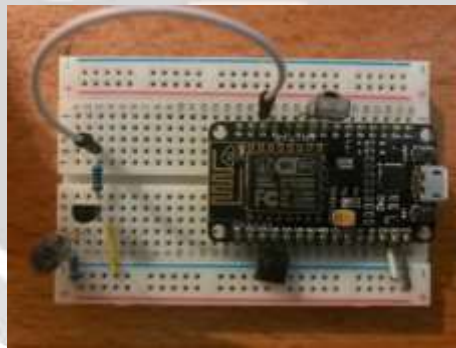
5. SYSTEM ARCHITECTURE:-

Fig- 3: Assembled ESP2866 On Bread Board

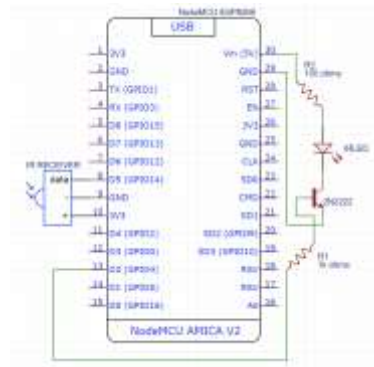


Fig- 4: Circuit Diagram

6. CONCLUSION

The plan was successfully followed and a prototype has been created. The architecture of the full model has been successfully studied and the software design is developed, some of the basic diagram are used through visual paradigm and now prototype model is ready for implementation

7. REFERENCES

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