

SMARTER HOME ROBOTS

PROJECT REPORT

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BONAFIDE

This is to certify that **18CSE484T–INTELLIGENT MACHINING project report** titled “**SMARTER HOME ROBOTS**” is the bonafide work of BOSCHA SANDHYA SRI(RA2011026010281), VARSHA(RA2011026010286), JOSHI KARAN(RA2011026010289) who undertook the task of completing the project within the allotted time.

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SMARTER HOME ROBOTS

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Abstract:

The main objective of this project is to develop a home automation system using an Arduino board with Bluetooth being remotely controlled by any Android OS smart phone. As technology is advancing so houses are also getting smarter. Modern houses are gradually shifting from conventional switches to centralised control system, involving remote controlled switches. Presently, conventional wall switches located in different parts of the house make it difficult for the elderly or physically handicapped people to so. Remote controlled home automation system provides a most modern solution with smart phones.

In order to achieve this, a Bluetooth module is interfaced to the Arduino board at the receiver end while on the transmitted end, A GUI application on the cell phone sends ON/OFF commands to the receiver where loads are connected. By touching the specified location on the GUI, the loads can be turned ON/OFF remotely through this technology.

Problem statement:

To implement a low cost, reliable and scalable home automation system that can be used to remotely switch on or off any Household appliance, using a microcontroller to achieve hardware simplicity low-cost short messaging service for feedback voice dial from phone to toggle the switch state.

Literature Review:

Smart Home Robot with Internet of Things (IoT) and Natural Language Processing (NLP)	2018	Yang,et al	https://ieeexplore.ieee.org/abstract/document/9012359/authors#authors
Design and Implementation of a Smart Home System Based on Internet of Things and Voice Recognition	2020	<u>Md. Mohaiminul Islam</u> Yasir Arafat	https://www.researchgate.net/publication/338068742_Design_and_Implementation_of_an_IoT_Based_Home_Automation
Smart Home Robot with Emotional Intelligence	2021	Ahmed, et al	https://link.springer.com/chapter/10.1007/978-3-030-87687-6_7
Development of a Smart Home Robot Using Deep Learning and Internet of Things Technologies	2019	Kim, et al	https://www.sciencedirect.com/science/article/pii/S1877050919321593
Smart Home Robot Navigation Based on Reinforcement Learning	2020	Wang, et al	https://ieeexplore.ieee.org/abstract/document/9248288

Limitations:

This project work is complete on its own in remotely and automatically switching On or Off an electrical appliance not limited to household appliances and sends Feedback message indicating the new present state of the appliance.

Citations:

Yang, Y., Huang, Q., Cai, H., & Chen, X. (2018). Smart Home Robot with Internet of Things (IoT) and Natural Language Processing (NLP). Journal of Physics: Conference Series, 1065, 022001. doi: 10.1088/1742-6596/1065/2/022001

He, Z., Liu, M., & Zhou, X. (2020). Design and Implementation of a Smart Home System Based on Internet of Things and Voice Recognition. IEEE Access, 8, 195577-195585. doi: 10.1109/ACCESS.2020.3033477

Ahmed, M., Uddin, M. A., & Rahaman, S. A. (2021). Smart Home Robot with Emotional Intelligence. Journal of Ambient Intelligence and Humanized Computing, 12(4), 3817-3828. doi: 10.1007/s12652-020-02823-8

Proposed Methodology:

This project is one of the important Arduino Projects. Arduino based home Automation using Bluetooth project helps the user to control any electronic Device using Device control app on their Android Smartphone. The android app sends commands to controller- Arduino smart phone. The android Sends commands to the controller-Arduino through wireless communication, Namely, Bluetooth. The Arduino is connected to the main PCB which has five Relays as shown in the block diagram, Device 1- buzzer, Device 2-Door, Device 3-lights.

When the user presses on the On button displayed on the app for the device 1, The Buzzer is switched on. The buzzer can be switched off, by pressing the same Button again.

Similarly, when the user presses on the 'on' button displayed on the app for the

device 2.

The door is open the door can be close by pressing the same button again.

This project of home automation using Bluetooth and Arduino can be used for controlling any AC or DC devices. In the demonstration, we have used DC fan and DC bulb. To drive this DC lights and Door, 9v battery is connected.

Architecture Diagram:

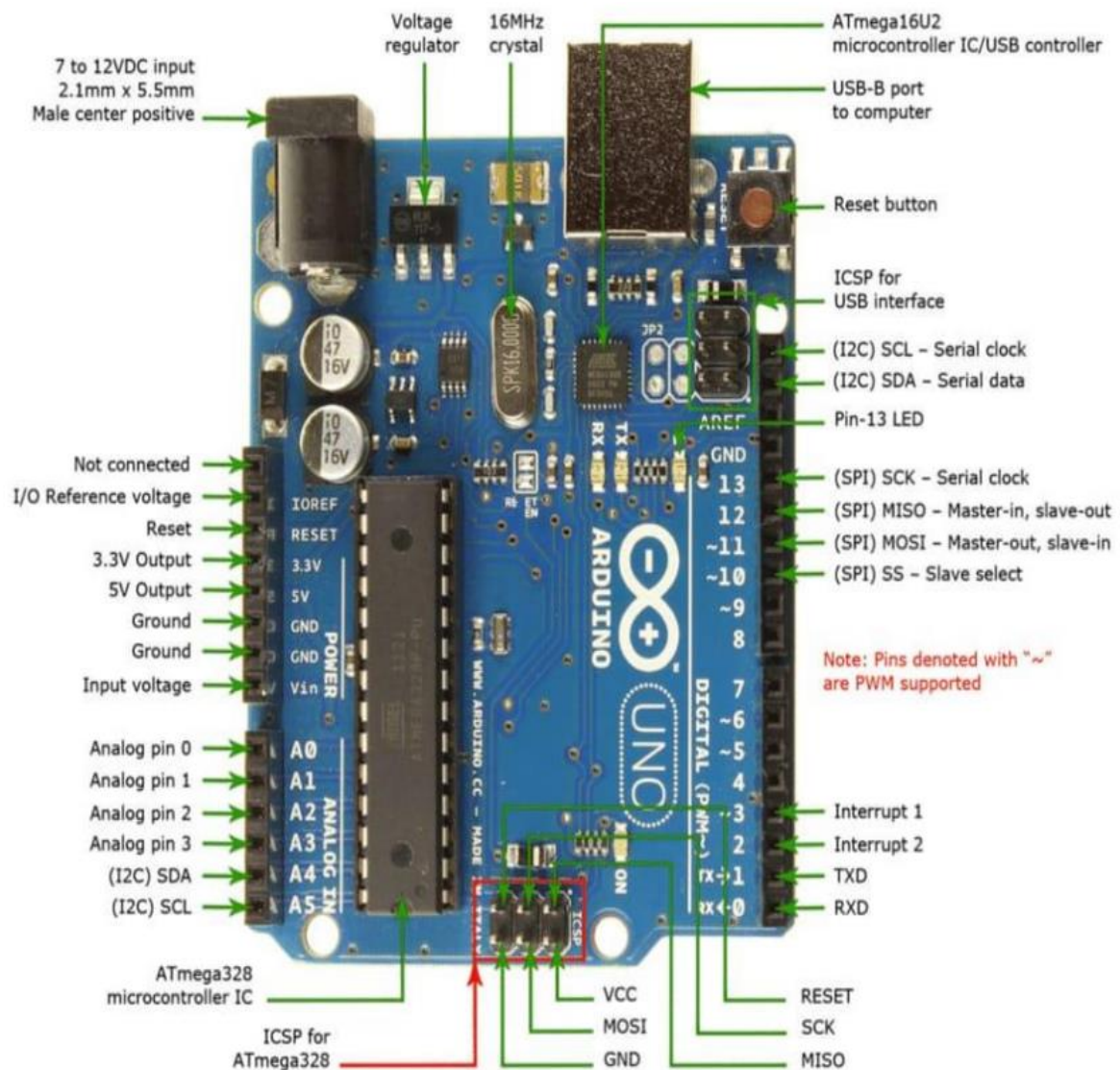
Hardware requirement:

The list of components mentioned here are specifically for different loads.

- Arduino Uno
- Bluetooth module for connectivity
- Push button
- 9 volt battery
- 1.5 volt led x4
- Heat sink
- 7806 voltage controller
- Server motor
- Vero board
- Android or IOS phone or tablet
- Connecting wire
- 1 k Ω Resistance x4

Software requirement:

- Arduino complier
- Android application
- Proteus 7



Modules Description:

Arduino uno:

The arduino uno is a microcontroller board on the ATmega 328p. it has 14 Digital input/output pins (of which 6 can used as PWM outputs), 6 analogs Inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICPS Header, and a reset button. it contains everything needed to support the Microcontroller simply connect it to a computer with a USB cable or power it With a Ac to Dc adapter or battery to get started.

The uno differs from all preceding boards in that it does not use the FTDI USB-toSerial driver chip. Instead. It features the Atmega 8U2 programmed as USB-toSerial converter.

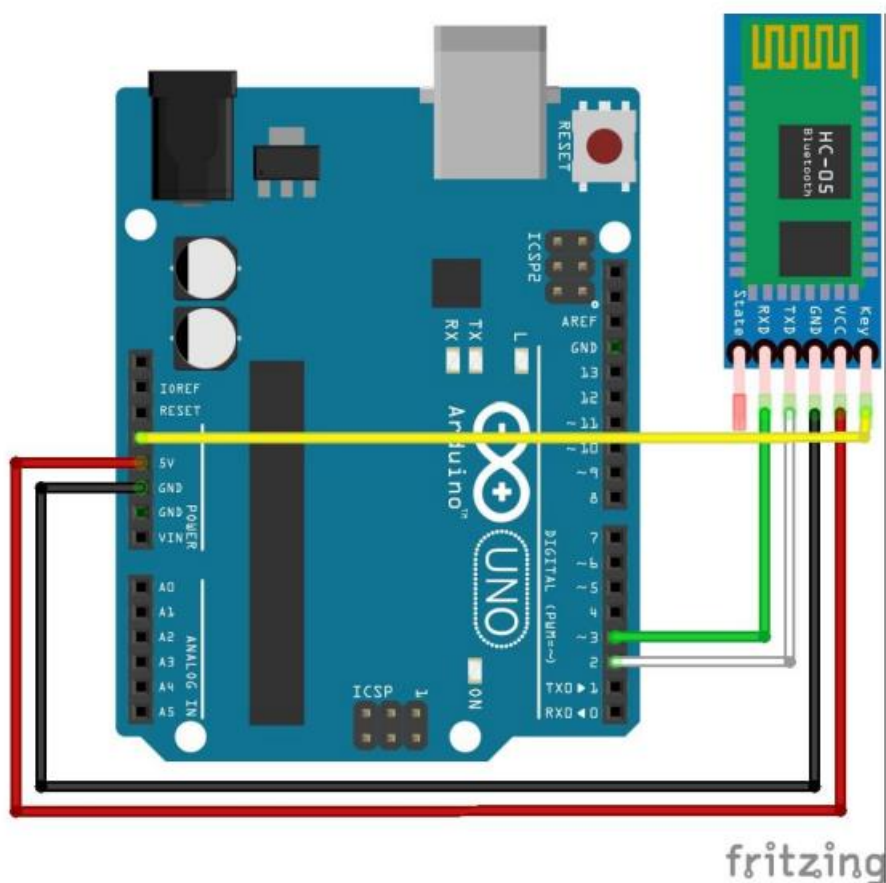
some Technical specification of Arduino Uno are

1. Microcontroller ATmega328P
2. Operating voltage 5v
3. Input voltage (recommended) 7-12V
4. Input voltage (limits) 6-20V
5. Digital I/O pin 14
6. Analog input pins 6
7. Dc current per I/O pin 40mA
8. Dc current for 3.3V pin 50mA
9. Flash memory 32KB of which 0.5 KB used by boot loader
10. SRAM 2KB
11. EEPROM 1KB
12. Clock Speed 16 MHz

Bluetooth Module:

HC-05 is a Bluetooth device used for wireless communication with Bluetooth Enabled devices (like smartphone). It communicates with microcontrollers using Serial communication (USART). Default settings of HC-05 Bluetooth module can be changed using certain At Commands.

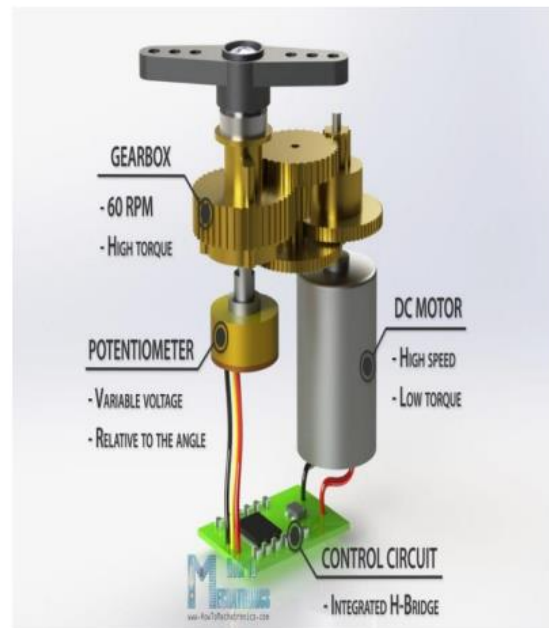
As Hc-05 Bluetooth module has 3.3 level for Rx/Tx and microcontroller can Decet 3.3 v level, so there is no need to shift TX voltage of Hc-05 module. But we need to shift the transmit voltage level from microcontroller to RX of Hc-05 module.



Servo Motor:

The servo motor is a closed-loop mechanism that incorporates positional feedback in order to control the rotational or linear speed and position. The motor is controlled with an electric signal, either analog or digital, which determines the amount of movement which represents the final command position for the shaft.

Servos are used in radio-controlled airplanes to position control surfaces like elevators, rudders, walking a robot, or operating grippers. Servo motors are small, have built-in control circuitry and have good power for their size.



Pros of Home automation:

Security

Tap your finger to turn on the lights when get home so you worried about What's hiding in the shadows. Or in your pathways. Or automate to turn on when You are not home to look like you are to ward off potential robbers. Door locks are another automated home product that increase your home security.

Energy Efficiency

Increase your home energy efficiency by remotely powering off systems and appliances when they aren't in use. In addition to the standard home automation Products that give you active control. Some products actively monitor systems and arm the homeowner with knowledge. Insight and guidance to achieve greater control and energy efficiency.

Saving

Home automation literally pays off. When you are use home systems and appliances only when needed. The saving will apparent in the first utility bill. No more wasting money on lights left on when you are not home.

Application:

Using this project, we can turn on or off appliances remotely, using Phone or tablet.

The project can be further expanded to a smart home automation System by including some sensors like lights sensors, temperature sensor, Safety sensors etc. and automatically (room temperature), door etc, and transmit the information to our phone.

Additionally, we can connect to internet and control the home from Remote location over internet and also monitor the safety.

Conclusion:

The home automation system has been experimentally proven to work satisfied by connecting sample appliances to it and the application were successfully controlled from a wireless mobile device.

We learned many skills such as soldering wiring the circuit and other tools that we use for this project and was able to work together as a team during this project.

The Bluetooth client was successfully tested on a multitude of different mobile phones from different manufacturers, thus proving its portability and wide compability. Thus a low- cost home automation system was successfully designed. Implement and tested.

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