Hardware Implementation of Voice Controlled Home automation System

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Abstract- Home automation or domotics is building automation for a house, called a smart home or smart house. A home automation system will monitor and/or control home allocate such as lighting, climate, entertainment systems, and appliances. It may also comprise home security such as access control and alarm systems. When connected with the Internet, home devices are an important inherent of the Internet of Things ("IoT").

A home automation system routinely connects controlled devices to a central hub or "gateway". The user alliance for control of the system uses either wall-mounted terminals, tablet or desktop computers, a mobile phone application, or a Web alliance that may also be accessible off-site through the Internet.

While there are many competing salesperson, there are increasing efforts towards open source systems. However, there are issues with the current state of home automation including a lack of standardized certainty measures and deprecation of older devices without backwards affinity.

Home automation has high prospective for sharing data between family members or trusted individuals for personal security and could lead to energy saving estimate with a positive environmental impact in the future.

Index Terms- Automation, Smart Home, IOT, Arduino uno, 2-Channel relay module, Bluetooth module, Sensors, ICT.

1 INTRODUCTION

Automation describes a wide range of technologies that reduce human arbitration in processes. Human arbitration is reduced by predetermining resolution criteria, sub process relationships, and related actions — and embodying those predestines in machines. Automation, take in the use of various control systems for operating equipment such as machinery, procedure in factories, boilers, and heat-treating ovens, switching on telephone networks, steering, and stabilization of ships, aircraft, and other solicitation and vehicles with reduced human intervention.

Automation covers solicitation ranging from a household thermostat controlling a boiler, to a large industrial control system with tens of thousands of input quantification and output control signals. Automation has also found space in the banking sector. In control convolution, it can range from simple on-off control to multi-irregular high-level algorithms. In the uncomplicated type of an automatic control loop, a controller compares a measured value of a process with a desired set value and procedure the resulting error signal to change some input to the process, in such a way that the process stays at its set point despite bother. This closed-loop control is a solicitation of negative feedback to a system. The mathematical basis of control theory was begun in the 18th century and advanced speedily in the 20th. Automation has been pulled off by various means including mechanical, hydraulic, pneumatic, electrical, electronic devices, and computers, routinely in combination. Complicated systems, such as presently factories, airplanes, and ships typically utilize all these combined techniques. The benefit of automation includes labor savings, decreasing waste, savings in electricity costs, savings in material costs, and improvements to quality, accuracy, and precision. The World Bank's World Development Report 2019 appear evidence that the new industries and jobs in the technology sector outweigh the economic effects of workers being displaced by automation.

Idleness and downward mobility blamed on Automation has been cited as one of many factors in the resurgence of nationalist, protectionist and populist politics in the US, UK and France, among other countries since the 2010s.

The word *automation*, inspired by the earlier word *automatic* (coming from *automaton*), was not widely used before 1947, when Ford established an automation department. It was during this time that industry was rapidly adopting feedback controllers, which were introduced in the 1930s.

Those all parts are connected as shown in figure.

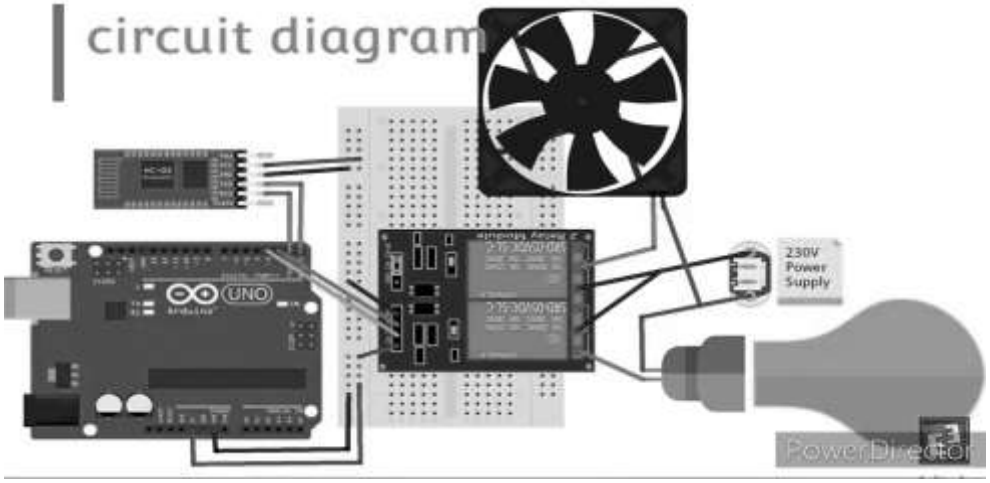

Fig 1:-circuit diagram

2 METHODOLOGY

Home automation narrate a system of networked, controllable device that work together to make your home more comfortable, customized, efficient and secure. In this project there are five main parts Arduino, Bluetooth module, Relay drivers, android application and step down transformer. First of all we provide power to the step down transformer, it step down the input voltage and given to the arduino with VIN pin. The Bluetooth module is also connected attached with arduino to Rx and Tx pin that provides the information to the microcontroller. Microcontroller looks through the information and send to the relay drivers which work as switch. In Arduino Android application (voice controlled robot) are connected to the arduino Bluetooth.

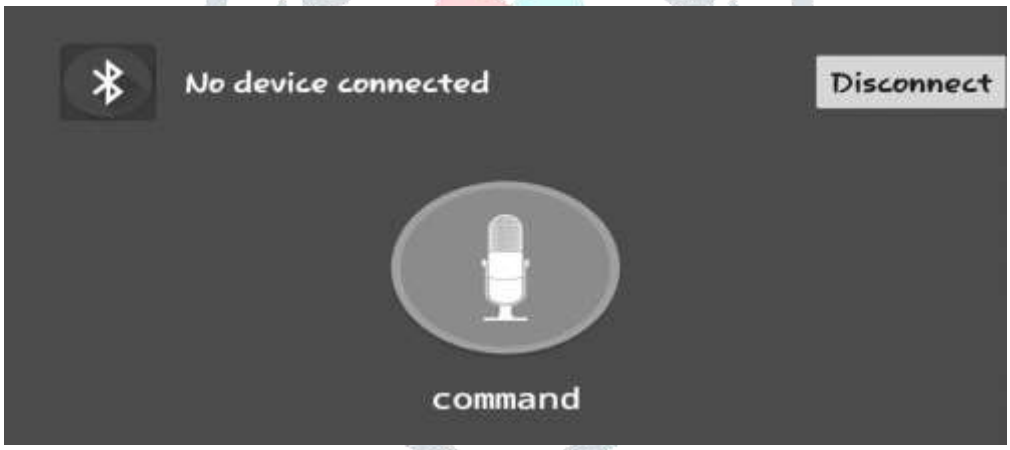

Fig 2:-Android Mobile Application

3 DESCRIPTION OF HARDWARE

Arduino:- The Arduino Uno is an open-source microcontroller board found on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to many expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is compute with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be supply by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is near to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is found on the Arduino website. Layout and production files for some versions of the hardware are also found. The word "uno" means "one" in Italian and was pick to mark the initial release of Software. The Uno board is the first in a series of USB-based Arduino boards; it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now modified to newer releases. The ATmega328 on the board comes preprogrammed with a bootloader that permit uploading new code to it without the use of an external hardware programmer.

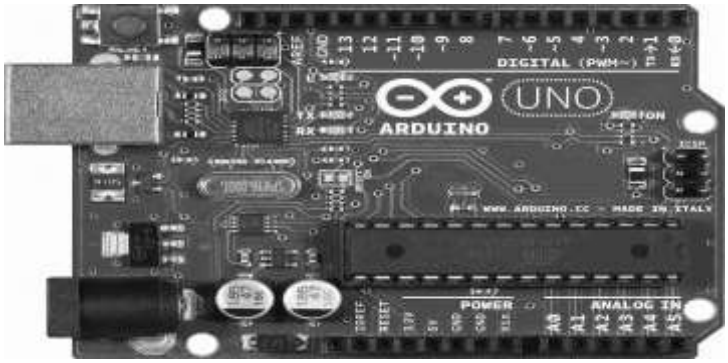

Fig 3:- Arduino UNO

2-Channel Relay Module: - This is a LOW Level 5V 2-channel relay interface board, and each channel required a 15-20mA driver current. It can be used to command various appliances and equipment with large current. It is equipped with high-current relays that work on AC250V 10A or DC30V 10A. It has a caliber interface that can be controlled directly by microcontroller.

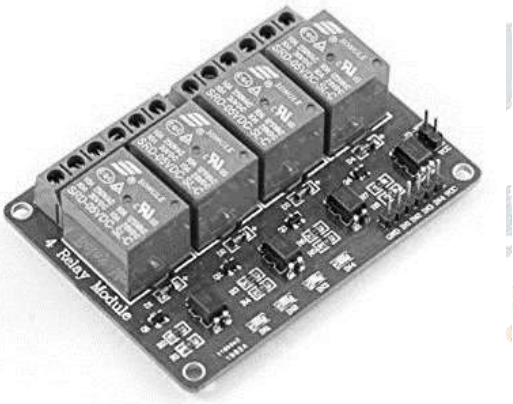

Fig 4:- Relay Module

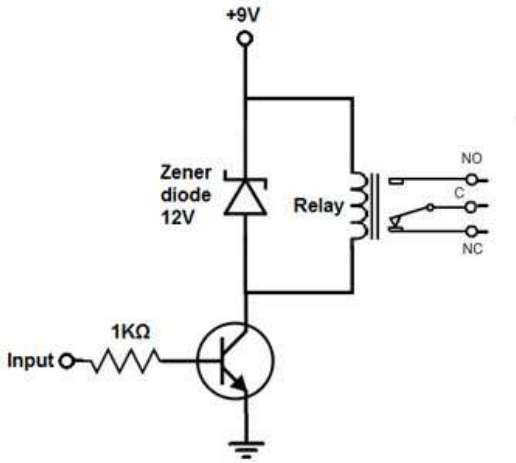

Fig 5:- Relay Circuit Diagram

Bluetooth Module: - Wireless communication is swiftly put back the wired connection when it comes to electronics and communication. Made to replace cable connections HC-05 uses serial communication to communicate with the electronics. Usually, it is used to attach small devices like mobile phones using a short-range wireless connection to exchange files. It make uses the 2.45GHz frequency band. The transfer rate of the data can differ up to 1Mbps and is in range of 10 meters. The HC-05 module can be operated on 4-6V of power supply. It keep up baud rate of 9600, 19200, 38400, 57600, etc. Very importantly it can be operated in Master-Slave mode which means it will neither send nor receive data from external sources.

Fig 6:- Bluetooth Module HC-05

4 ARCHITECTURE

It is constructed on the appliances fault detection unit, kitchen safety unit, grocery monitoring unit. This smart object in Internet of Things (IOT) is able to find their state and share it with other objects across the Internet, thus collaboratively making intelligent decisions on their own.

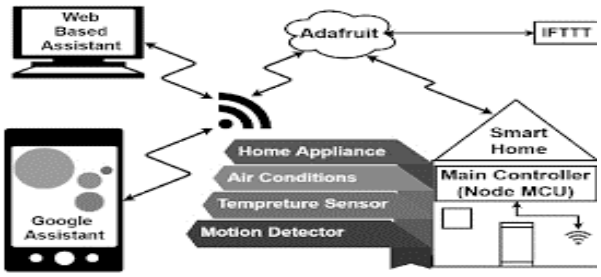

Fig 7:- Architecture of Home Automation

5 RESULTS

A home automation system will monitor and/or control home attributes like lighting, climate, entertainment systems, and appliances. It may also include home security like access control and alarm systems. A home automation system often connects controlled devices to a central hub or "gateway". Utilizing home automation could first to more efficient and intelligent energy saving techniques? By acquiring information and communication technologies (ICT) with renewable energy systems like solar power or wind power, homes can autonomously make decisions about whether to store energy or expend it for a given appliance, leading to overall positive environmental impacts and lower electricity bills for the consumers using the system. In order to do this, researchers bounce using data from sensors regarding consumer activity within the home to anticipate the consumer needs and balance that with energy consumption.

Furthermore, home automation has high potential regarding family safety and security. According to a 2015 survey done by Control, the vital drivers of the demand for smart and connected devices are first "personal and family security", and second "excitement about energy savings". Home automation includes a different variety of smart security systems and surveillance setups. This permit consumers to monitor their homes while away, and to give trusted family members access to that information in case anything bad happens.

6 CONCLUSION

Home automation is prevalent in a variation of different realms, including:

- Heating, ventilation and air conditioning (HVAC): it is possible to have remote control of all home energy monitors over the internet incorporating a simplest and friendly user interface.
- Lighting control system: a "smart" network that blended communication between various lighting system inputs and outputs, using one or more central computing devices.
- Occupancy-aware control system: it is possible to sense the residency of the home using smart meters and environmental sensors like CO_2 sensors, which can be integrated into the building automation system to trigger automatic responses for energy efficiency and building comfort applications.
- Appliance control and integration with the smart grid and a smart meter, taking advantage, for such instance, of high solar panel output in the mid way of the day to run washing machines.
- Home robots and security: a household security system integrated with a home automation system can provide additional services such as remote monitoring of security cameras over the Internet, or access control and central locking of all perimeter doors and windows.
- Pet and baby care, for instance tracking the pets and babies' movements and controlling pet access rights.
- Air purity control (inside and outside). For example, Air Quality Egg is used by people at home to monitor the air quality and pollution level in the city and create a map of the pollution.
- Smart kitchen, with refrigerator inventory, cooking programs, cooking surveillance, etc.
- Voice control devices such as Amazon Alexa or Google Home used to control home appliances or systems.

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