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VOICE BASED HOME AUTOMATION

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Abstract:

Automation is a trending topic in the 21st century making it play an important role in our daily lives. The main attraction of any automated system is reducing human labour, effort, time and errors due to human negligence. With the development of modern technology, smart phones have become a necessity for every person on this planet. Applications are being developed on android systems that are useful to us in various ways. Another upcoming technology is natural language processing which enables us to command and control things with our voice. Combining all of these, our paper presents a micro controller based voice controlled home automation system using smart phones. Such a system will enable users to have control over every appliance in his/her home with their voice. All that the user needs is an android smartphone, which is present in almost everybody's hand nowadays, and a control circuit. When the first computers came around, achieving the level of sophistication so as to narrate commands using voice to a machine was only realised in science fiction. However with tremendous breakthrough in the field, we are at the precipice of truly using voice to interface with devices.

WORKING

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BLOCK DIAGRAM

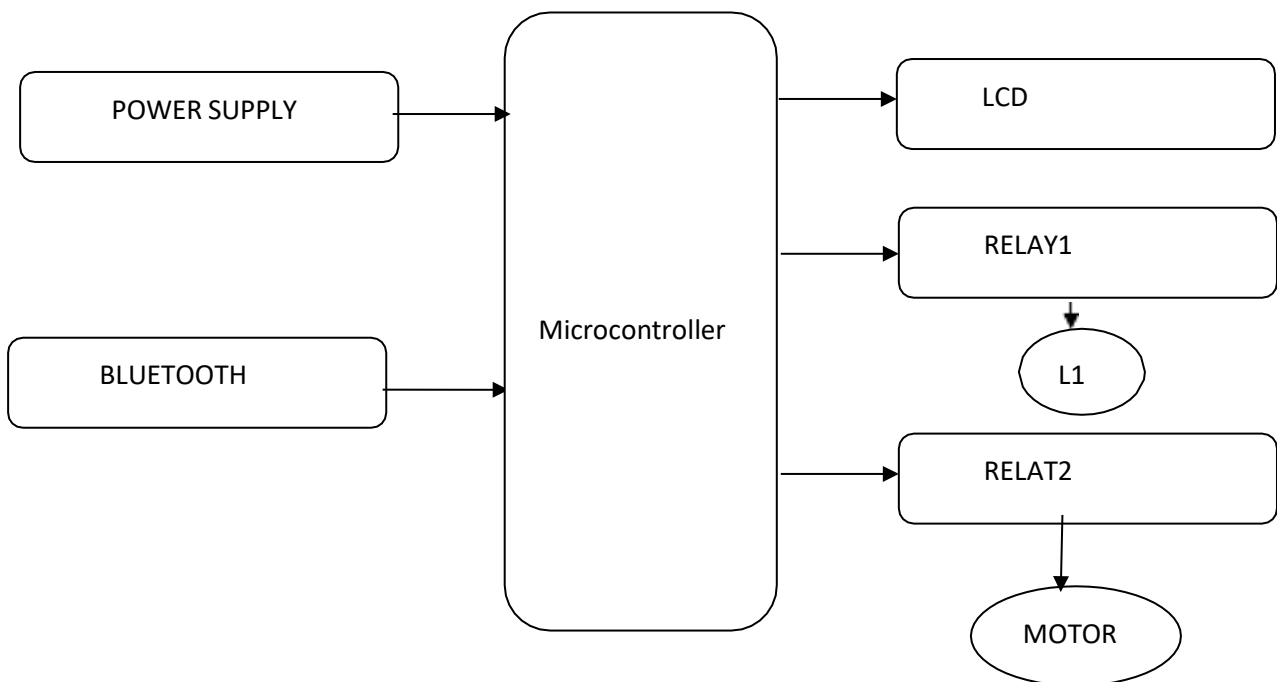


Fig.2.2. Block Diagram of Voice Based Home Automation

POWER SUPPLY

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others

This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12V for various applications.

In this section we have Transformer, Bridge rectifier, are connected serially and voltage regulators for +5V and +12V (7805 and 7812) via a capacitor (1000 μ F) in parallel are connected parallel as shown in the circuit diagram below. Each voltage regulator output is again is connected to the capacitors of values (100 μ F, 10 μ F, 1 μ F, 0.1 μ F) are connected parallel through which the corresponding output (+5V or +12V) are taken into consideration.

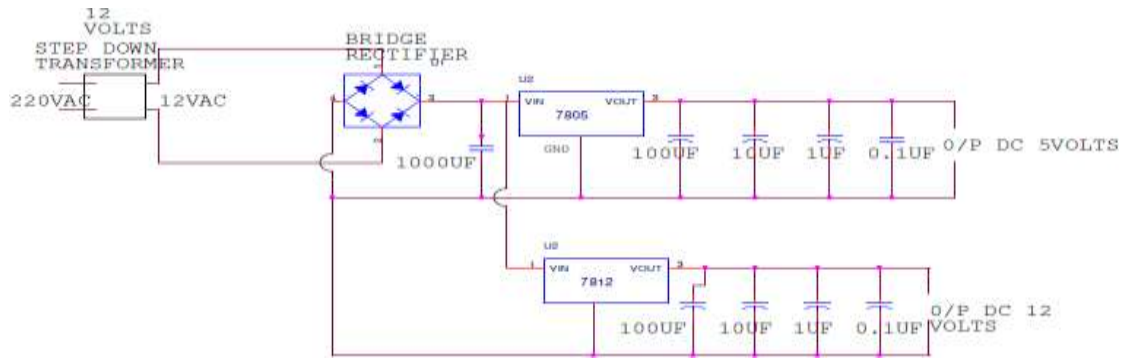


Fig.2.3 Transformer

Frequency Hopping Spread Spectrum

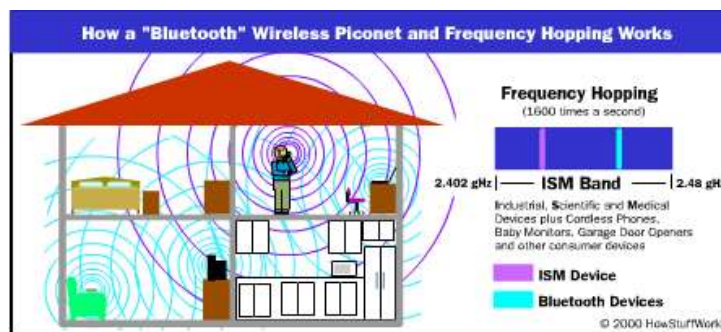


Figure2.13: Frequency hopping spread spectrum

Frequency-Hopping Spread-Spectrum (FHSS) may be a unfold spectrum modulation theme that uses a narrowband carrier that varies frequency during a pseudo random pattern best-known to each transmitter and receiver. To AN unplanned receiver, FHSS seems to be a short-duration impulse noise. Solely transmitters and receivers that are synchronal on identical hop frequency pattern can have access to the transmitted information. The transmitter switches hop frequencies one, 600 times per second to assure a high degree of knowledge security. Additionally compared to DSSS, FHSS is easier to create with higher noise immunity.

TECHNICAL SPECIFICATIONS

SPECIFICATIONS	
Frequency band	2.4 GHz ISM band
Modulation	Gaussian shaped BFSK
Range	10 -100 m

Physical layer	FHSS
Coverage	Omni-directional. Non line of sight transmission
Data rate	1 Mbps/723 Kbps
Hopping rate	1600 hops/sec at 1 hop/packet
Channels	79/23 channels
Channel length	625 microseconds long
Data packet	Up to 2,745 bits in length
Reliable and secure	Good. Link layer authentication and encryption
Cost	\$ 20 aims at \$5 endpoint
Power	0.1 W (Active)
Acceptance	SIG have about 2500 member companies
Data / Voice support	One asynchronous data channel (732.2 kbps and reverse 57.6 kbps) OR three simultaneous synchronous voice channels (64 kbps) OR Simultaneous asynchronous and synchronous channels.
Piconet	1 master and 7 slaves
Scatter net	Up to 10 piconets in a scatter net
Links	SCO and ACL links

are all embedded together on one chip; therefore, the designer

Block Diagram

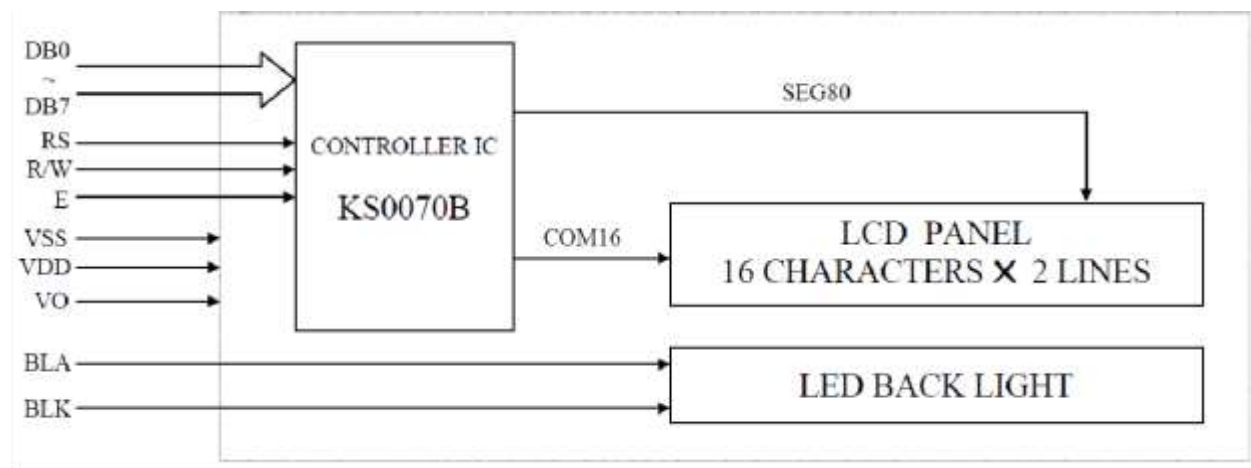


Fig.2.15.16*2 Alphanumeric LCD

Display Data RAM

Display data RAM (DDRAM) stores display data represented in 8-bit character codes. Its extended capacity is 80 X 8 bits, or 80 characters. The area in display data RAM (DDRAM) that is not used for display can be used as general data RAM. So whatever you send on the DDRAM is actually displayed on the LCD. For LCDs like 1x16, only 16 characters are visible, so whatever you write after 16 chars is written in DDRAM but is not visible to the user. Figure below will show you the DDRAM addresses of 2 Line LCD.

00	01	02	03	04	05	06	07	•••••	32	33	34	35	36	37	38	39	← Character position (dec.)
00	01	02	03	04	05	06	07	•••••	20	21	22	23	24	25	26	27	← Row0 DDRAM address (hex)
40	41	42	43	44	45	46	47	•••••	60	61	62	63	64	65	66	67	← Row1 DDRAM address (hex)

DDRAM Address for 2 Line LCD

Character Generator ROM

Now you might be thinking that when you send an ascii value to DDRAM, how the character is displayed on LCD? so the answer is CGROM. The character generator ROM generates 5 x 8 dot or 5 x 10 dot character patterns from 8-bit character codes. It can generate 208 5 x 8 dot character patterns and 32 5 x 10 dot character patterns. Userdefined character patterns are also available by mask-programmed ROM.

RPM

The shaft on a typical shop motor will rotate at either 1725 or 3450 RPM (revolutions per minute).

The speed of the driven machine will be determined by the size of pulleys used, for example a 3450 RPM motor can be replaced by a 1750 RPM motor if the diameter of the pulley on the motor is doubled. The opposite is true as well but if the pulley on the 1750 RPM motor is small it is not always possible to replace it with one half the size. It may be possible to double the pulley size on the driven machine if it uses a standard type of pulley, (not easily done on air compressors for example).

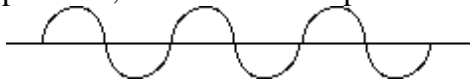
Electronic speed reducers such as the ones sold for routers will not work on induction type motors.

Phase, Voltage & Rotation

Whether or not you can use a motor will likely depend on these factors.

Single Phase

Ordinary household wiring is single phase, alternating current. Each cycle peaks and dips as shown. To run a three-phase motor a phase converter must be used, usually this is not practical, it is often less expensive to change the motor on a machine to a single-phase style.



Three Phase

This is used in industrial shops, rather than peaks and valleys the current supply is more even because of the other two cycles each offset by 120 degrees.



Voltage

Many motors are dual voltage i.e., by simply changing the wiring configuration, they can be run on 110 volts or 220 volts. Motors usually run better on 220 volts, especially if there is any line loss because of having to use a long wire to reach the power supply.

Motors are available for both AC and DC current, our typical home wiring will be AC. There are DC converters available which are used in applications where the speed of the motor is controlled.

Rotation

The direction the shaft rotates can be changed on most motors by switching the right wires. The direction of rotation is usually determined by viewing the motor from the shaft end and is designated as CW (clockwise) or CCW (counter-clockwise).

Inside the Wipers

The wipers combine two mechanical technologies to perform their task

1. A combination electric motor and worm gear reduction provides power to the wipers.
2. A neat linkage converts the rotational output of the motor into the back-and-forth motion of the wipers.

On any gear, the ratio is determined by the distances from the center of the gear to the point of contact. For instance, in a device with two gears, if one gear is twice the diameter of the other, the ratio would be 2:1.

One of the most primitive types of gears we could look at would be a wheel with wooden pegs sticking out of it.

The problem with this type of gear is that the distance from the center of each gear to the point of contact changes as the gears rotate. This means that the gear ratio changes as the gear turns, meaning that the output speed also changes. If you used a gear like this in your car, it would be impossible to maintain a constant speed you would be accelerating and decelerating constantly.

Microcontroller:**Introduction:**

Microcontroller as the name suggest, a small controller. They are like single chip computers that are often embedded into other systems to function as processing/controlling unit. For example, the control you are using probably has microcontrollers inside that do decoding and other controlling functions. They are also used in automobiles, washing machines, microwaves ovens, toys.... etc, where automation is needed.

Arduino Uno Microcontroller:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP 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-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means "One" in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

Results

The main of this paper was two purpose the solution for the problem consider with security purposes in the home automation basically related to software change and that is

related to Arduino IDE software that we use in this project that is necessary for the check for the connected user is recognized one or not enhance the security purposes.



Fig 6.1: Final Connection of the Project

In this paper, the architecture of low cost and flexible home automation system using Arduino microcontroller based on the Bluetooth wireless system is proposed and implemented. We use Arduino because this is easy to understand and its coding is very easy. By implementing this type of system, we can also ensure the energy conservation that is waste everyday in the huge homes and bungalows. By help of this system we can have the complete control over the home appliances from a long distance. This will increase the comfortability of human being and it will reduce the human efforts. The purpose system is analyzed and tested several times within the range of 20m and it achieved 100% accuracy.

Advantages of Home Automation:

Convenience: One of the main advantages of home automation is the convenience it offers. With home automation, you can control various aspects of your home with just a few clicks on your smartphone or voice commands to your virtual assistant. This includes everything from turning off lights to adjusting the thermostat to unlocking doors.

Energy Efficiency: Home automation can also help you save energy and reduce your carbon footprint. For example, you can set your smart thermostat to automatically adjust the temperature based on whether you're at home or away, or to turn off the lights in rooms that are not in use.

Increased Security: Home automation can also enhance your home security. With a smart home security system, you can monitor your home and receive alerts if there is any suspicious activity. You can also control your security cameras and alarm system from your smartphone.

Cost Savings: Finally, home automation can also save you money in the long run. By reducing your energy consumption and automating your home security, you can lower your monthly utility bills and potentially even reduce your insurance premiums.

addition to your home. However, if you have concerns about the potential drawbacks, then it may not be the best choice for you

Applications

- The Voice Activated Home Automation system will help us control different loads (electrical appliances) with simple voice commands.

- This kind of system is very useful for people with disabilities.
- Further, the project can be expanded by adding different sensors (light, smoke, etc.).
- Turning lights down /off at night
- Operating outside lights
- Optimizing use of low cost electricity
- Operating television, hot water heater, kettle etc
- Working with intelligent electrical white goods

CONCLUSION

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FUTURE SCOPE

The proposed system is able to operate and control the appliances within short range only within 20m, for future research work it is recommended to increase the range and interface more sensors and also interface within the google assistance system for enhance the security apart from this project, it should be a user friendly and low cost system, moreover the home automation system can also be interfaced with biomedical signals and it will be beneficial for physically challenged people they will be able to control the appliances using their muscle's movement

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