Development of a Mobile Based Device Remote Control with Voice Acknowledgment

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ABSTRACT
It is said that "the only thing which make human beings stand different from rest of the world is his brain". The history of man gives the ever raising graph of his outstanding dedication to science and technology. There was a time when man used the language of signs, expression, and symbol for communication. And at present we are waiting deliberately for 4G mobile. Mobile communication has proved to be few of glorious inventions made by man-kind. But as science has no limitations, let us make the use of mobile communication not just to have a talk, but to operate remote appliances on walk. The cell phone-based device control with voice acknowledgement is an excellent device to operate any electronic equipment from miles away. Being a student of Electronics & Telecommunication we have tried to implement our knowledge in the field of automation. From the vast area of Electronics & Telecommunication we are using the knowledge of microcontroller in embedded system along with the mobile communication part. The microcontroller is an exciting, challenges and growing field. It will pervade industry for decades to come. To meet the challenges of this growing technology, we will have to be conversant with the programmable aspect of the microcontroller. Programming is a process of problem solving and communicating in a strange language of mnemonics. The projects could be developed significantly faster and much easily using a microcontroller. The purpose of this project is to implement the various concepts of embedded designing environment and mobile communication for the technological support in automation. Our project "Cell-phone based device control with voice acknowledgment" fully utilizes microcontroller features, embedded technology concepts and mobile communication system to reduce the time consumption and increase the quality of operating the devices.

1. INTRODUCTION
Present era is 24x7 running era. With its huge technological advancement in today's competing world people have to pay attention to lot of work in very limited duration of time. Thus it becomes difficult for us to operate the devices at various sites like home, offices and farms, etc simultaneously. For example if a person has switched on motor at his home and if he needs to go out at the same time prior switching it off. Then there would have been problematic situation for him, but this device can help him greatly in such situation as he can get the idea of present status of motor and can take action accordingly. Office automation can also be done with this project. This idea would be helpful in agriculture sector also. As in many parts of India there is shortage of electricity, hence peoples have to face the frequent electricity cut off problem. Generally farmers have their homes and farms at different places. Hence whether the electricity at farm is present or not can't be predicted from home. This affects most the agriculture sector which thus needs to be automated significantly.

This project is an example of embedded system and mobile communication as all its operations are controlled by intelligent software inside the microcontroller and communication takes place using a cell-phone. Here is a circuit that lets you operate the home appliances like lights and water pump from the office or any other remote place. So if anyone forgets to switch off the lights or other appliances while going out, it help him to turn off the appliance with his cell-phone. The cell-phone works as a remote control for the home appliances or any other devices which we want to operate. We can control the desired appliance by pressing the corresponding key and through this circuit we can operate 6 devices at a time. This system also gives you voice acknowledgement of the appliance status. This means it gives us the information about that particular appliance, weather it is switched on or off. The user can use any type of cell-phone. This way it overcomes the limited range of infrared and radio remote controls.

2. LITERATURE RIVIEW
In the paper [1] a system with abilities of remote monitor and remote control based on BREWTM, a wireless application platform, is designed for an autonomous mobile robot (ROBO-E). The construction of network environment, real-time image transfer and autonomous and manual control program of the autonomous mobile robot of the remote wireless monitor and control system are presented by using Internet and cell phone network. It is realized to monitor and operate the ROBO-E remotely and wirelessly by using a developed application through Internet.

This paper [2] describes the development of an ultra low cost cell phone based remote control application for induction motor-pump based irrigation in agriculture. Rural areas in many states of India are plagued by frequent power cuts and abnormal voltage conditions. The developed system ensures that water is distributed to field whenever normal conditions exist based on task specified. The task is initially specified through keyboard / SMS. A novel concept of number of miscalls in specified duration has been used to reduce the operational cost of the system to bare minimum. Information is exchanged in form of messages / miscalls between the system and the user cell phones. The system is based on AVR ATMega32 micro-controller and includes protection against single phasing, over-current, dry running and other desirable features. RTC DS1307 and DS18S20 are used for time and temperature measurement respectively.

This work [3] describes the development of innovative low cost cell phone based remote control application for induction motor-pump based irrigation in agriculture. The developed system ensures that water is distributed to field whenever normal conditions exist based on task specified. A novel concept of miscall for specified duration has been used to

reduce the operational cost of the system and for the convenience of farmers facing difficulty in typing messages. Information is exchanged in form of miscalls / message between the system and the user cell phones. The system is based on AVR ATMega32 micro-controller and includes protection against single phasing, over-current, dry running and other desirable features. DS1307 and DS18S20 are used for time and temperature measurement respectively. It is expected that system will relieve hardships of farmers relating water distribution to a great extent.

Stepper motor is found in a lot of applications so it is necessary to control the stepper motor from remote places. This paper [4] describes a remote angular position control system of stepper motor using DTMF Technology as an alternative means of communication using Radio Frequency (RF) with advantages of simplicity and audibility. DTMF Technology has been used here to implement acoustic communication for controlling the angular position of the stepper motor remotely anywhere in the world through mobile phone network. The desired value of angular position signals, in terms of DTMF tones have been generated by using a mobile phone. The microcontroller has been used to implement the control algorithm after receiving the DTMF tone. Since no extra transmitting and receiving device is needed except mobile phone, the system is very much simple, rugged, and cost effective. The experimental results indicate that the system has high resolution, repeatability and error is also within tolerable limit.

3. DRAWBACK OF EARLIER SYSTEMS

The device control through SMS is already existing system. But that has number of drawbacks. In that system there are certain specifications for the use of mobile handset. If any mobile has been programmed for the controlling and receiving purpose, then it cannot be replaced. Only GSM mobiles are compatible with this system. There are certain protocols like AT command set used for the communication between two handsets. This increases the complexity of the installation process. The main drawback is that, the illiterate people cannot operate this system as it includes controlling through SMS.

4. SOLUTION: PROPOSED SYSTEM

To overcome the above said drawbacks we are here proposing the then solution by which we can achieve our goal. The block diagram of our proposed system is shown below in figure 1 which is based on embedded system and mobile technology. Flow chart showing how mobile based device remote control with voice acknowledgment works. After getting the input from decoder conditional block will check the option, if it is true then get the numeric input for that option and according it will perform the operation and if input is wrong, system will get another input option.

4.1 Embedded Technology

The technology used here is embedded system with mobile technology which is future of today's modern electronics. Microcontroller is used here for centralized operation and digital processing. A microcontroller can be considered a self-contained system with a processor, memory and peripherals and can be used as an embedded system. Microcontrollers are used in automatically controlled products and devices, such as automobile engine control systems, implantable medical devices, remote controls, office machines, appliances, power tools, and toys. By reducing the size and cost compared to a design that uses a separate microprocessor, memory, and input/output devices, microcontrollers make it economical to digitally control even more devices and processes. We have also incorporated a special feature of voice acknowledgment with the help of APR9600. The APR9600 device offers true single-chip voice recording, non-volatile storage, and playback capability for 40 to 60 seconds. Thus the project has become more users friendly and also efficient. The care has been taken while developing its hardware and software part that it should be compatible with any kind of mobile handset.

4.2 Why to use Mobile technology?

Mobile technology is a wireless technology, which is the major reason to make it handy and user friendly. The wide spread mobile technology now-a-days help to work even in remote areas. It is very much economical to get service of this technology, as every service provider is in race of giving best service in least charge of money. Even in the developing country like India, near about 60-70% of population is familiar to mobile technology and actually using it. This proportion is supposed to increase very drastically. In this particular project, there is no any specification on the type and the owner company of your mobile handset. This increases the flexibility of project.

4.3 Features

The following are the prominent features of our project

- To control any electronic device with the help this circuit, there is a need of pressing just a key of cell phone. This eliminates the drawbacks which would have to be faced with device controlling through SMS.
- The circuit is very much user friendly, as it gives voice acknowledgement.
- The instructions which are to be preloaded in the voice recognition IC, can be given in any language whish user understands.
- The use of advance microcontroller reduces size of the hardware to a greater extent.
- There are no specifications for the kind of mobile used.
- The complete circuitry is proved to be very much economical.
- The set of instructions is very much simplified. This eliminates the requirement of expert user. An introductory knowledge of mobile phone is more than sufficient.
- The numbers of devices that will be controlled through this circuitry are not limited to one or two. But total 6 devices can be controlled with ON/OFF facility of each.
- The circuitry is flexible enough to allow more number of devices to be operated, just by changing the software programming and relay driver IC.

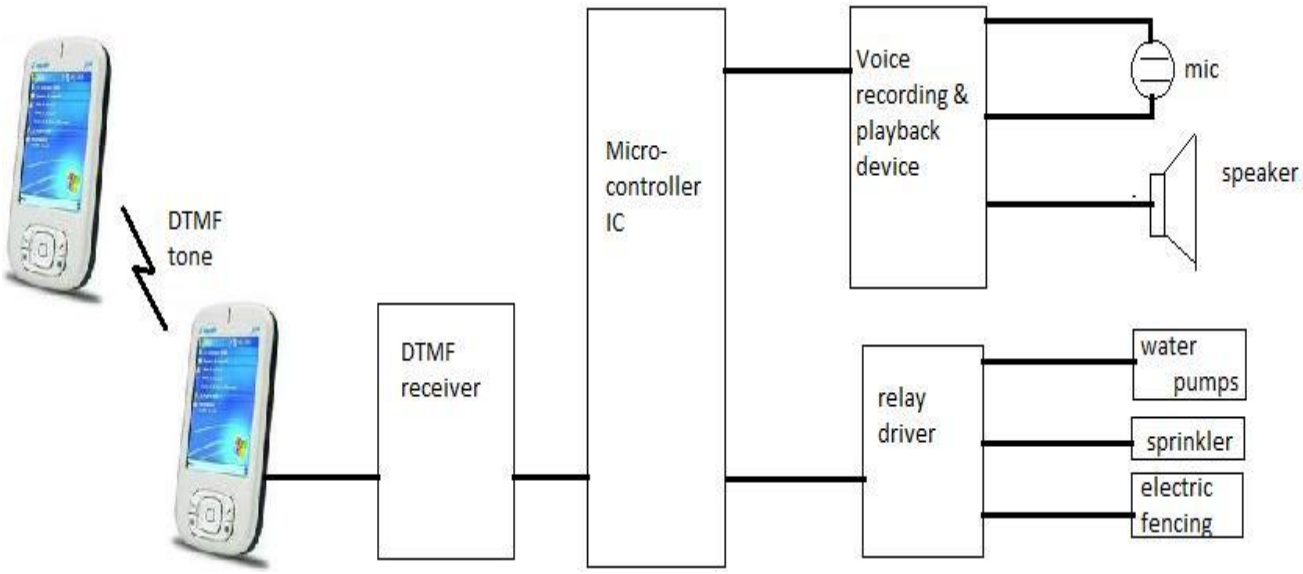

Fig 1: Block Diagram of Mobile Based Device Remote Control with Voice Acknowledgment.

5. FLOW-CHART

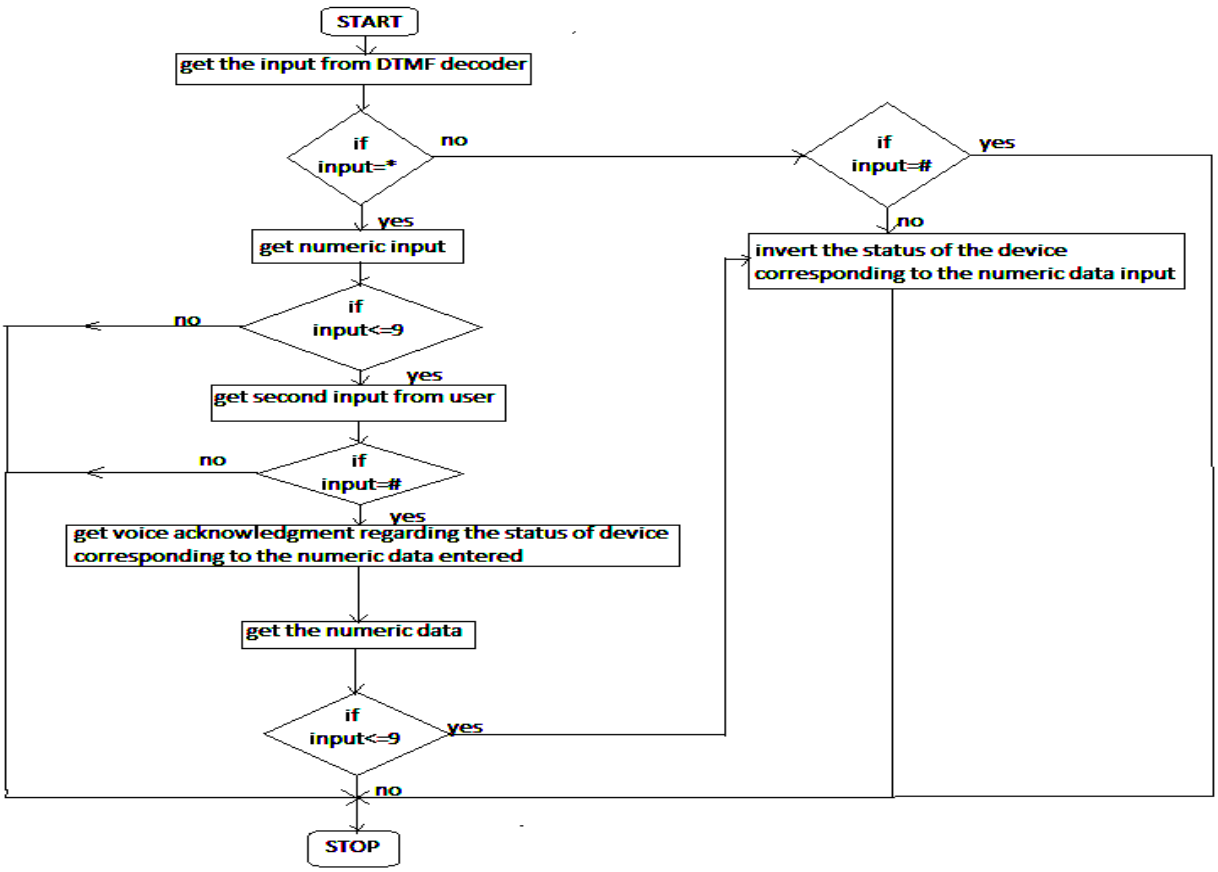

Fig 2: Flow chart showing how Mobile Based Device Remote Control with Voice Acknowledgment works

6. ADVANTAGES

6.1 Cost Effective

Power saving in offices, home, industry, hotels, school, colleges, and agriculture .Due to this there will be cost saving. It is a low cost device. It is easily available to everyone. Due to huge publicity of mobiles and widely spread network it is easily available in market.

6.2 User friendly

It is easy to operate. Even a villager who is less educated or a farmer can operate this device. Its operation is not much complicated.

6.3 Time Effective

It is time saving device. Businessman, office going people is so much busy. So this circuit will save their valuable time. Also a famer at night can save his time by operating pumps from home. The network is available for 24 hours. Due to this even at midnight we can control devices.

6.4 Security

Increased security is another advantage. We can control our main switch to on/off by this. Due to this no stranger will be able to turn on devices. Smart home and home security concepts are used here.

6.5 Voice Acknowledgment

Acknowledgement about execution of command from system to user. So there is no problem of uncertainty about execution of command. Alerts user on occurrence of any abnormal conditions like power failure, parameters exceeding prescribed limits, etc.

7. APPLICATIONS

7.1 Office Automation

If lights or fans or any other electronic device in office remain on by mistake at night. With just a call any authorized person in office can check for device status or can switch it off from a remote place. Also he will get a voice reply after the operation is over. Due to this electricity, cost, time, efforts of person will be minimized. Also a person by sitting on his chair can control operation of electronic doors, curtains, A.C., lights, fans in his room. The device will control at a time six devices like pcs, fans, lights, printers, fax machines in office. It's very easy to implement in office. Also if there is any other electronic device in office it can be controlled with mobile as remote control. It's just like a robot operating as per our instructions. Also in some emergency or a case where manual operation is impossible we can operate devices with a call and prevent them from damage.

7.2 Home Automation

This system enables the user to control home appliances remotely and the security alert subsystem provides the remote security monitoring. The system is also capable of instructing user via voice command from a specific cell number to change the condition of the home appliance according to the user's wish. It also provides security against intrusion by generating an alert voice to the owner.

Home automation designates an emerging practice of increased automation of household appliances and features in residential dwellings, particularly through electronic means that allow for things impracticable, overly expensive or simply not possible in recent past decades.

If a person forgot to switch off appliances in home and he is in office away from home, he can control it with just a voice call. He will get a reply in the form of voice after operation is over. At a time he can control six devices in home. The devices are T.V.s, fans, lights, PCs, washing machine, refrigerator can be operated. Also if he wants to on the motor pump or sprinkler in garden he can operate it with our device. It will save his time, efforts and also electricity. Remote controls are a great addition to automatic underground sprinkler systems. They are an easy way to troubleshoot problems without running into the house to turn the water on and off. Remote control sprinkler systems are great for large yards.

In our home we can control our garage also our car security system by sitting anywhere else. This will save our time and give us comfort. Curtains in our home also doors can be operated using this device.

7.3 Industrial automation

Automation is the use of control systems and information technologies reducing the need for human intervention. In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist them with the muscular requirements of work, automation greatly reduces the need.

In small scale industry many machines almost every machine is electronic. User can control these machines, fans, lights in industrial area. Also in case of emergency when it is impossible for user to reach at destination and switch off devices he will just call and give voice command? Automatically that device will be off and in case of fire it will save devices from damage.

In HVAC that is high voltage a.c. current system also remote operation is possible. If some day there is less number of workers in factory and it's impossible to control every operation our device will prove to be very useful one. Factories can use more number of circuits of our device. One circuit will control six devices at a time. Indirectly it will increase production of industry.

7.4 Boon to blind people

Our device can prove to be great boon to blind /less educated persons due to its capability for remote control through speech commands. Through mobile it will be possible for them to operate any device remotely and also it will give them a reply back through voice. It will save their effort and time. Senior citizens or physically handicapped people find if difficult to do work by their own. For these people it will be really very much helpful.

8. CONCLUSION

The cell phone-based device control with voice acknowledgement is an excellent device to operate any electronic equipment from miles away as the mobile technology is becoming advanced day by day; it is used for much other application as device control. As mobile service is used by everyone these days, this system will be very much useful in rural areas as well the device control can be applied in every field like agriculture, home, factories etc. The use of mobile communication in device control has been thoroughly justified and the previous drawbacks and problems have been overcome.

9. FUTURE SCOPE

Video Calling: In future we can add video facility to our circuit. It will be an advanced way like video conferencing. Along with the reply as a voice we will get the visual status of condition of the devices. Also if anybody is misusing our device we can immediately make it off. Means for security purpose also we can use it. It will be applicable in home, offices, industry, and our vehicle parking system, agriculture also. Alarm Facility: Alerts user on occurrence of any abnormal conditions like power failure, parameters exceeding prescribed limits, Voice Operated System: A system is developed for remote monitoring and control of devices using mobile through spoken command. Use of Robots: In this the static circuitry will be replaced by the Robots which will be controlled through commands given remotely by mobile. This will be major step in automation and will have tremendous future scope of development and applications.

10. REFERENCES

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