Design & Development of Zigbee Based Automatic Drip Irrigation system

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Abstract - It is said that one thing makes human beings different from rest of the world is his thinking and persistence. The history shows the ever raising graph of his outstanding achievements to science and technology. There was a time when man used the language of signs, expression, symbols and gesture for communication. Based on these processes, the project is developed to transfer power within a small range. In this project the pump of water is monitored remotely by mobile phone using dtmf technology i.e. (Dual tone multiple frequency).This project is a mobile based on and off water irrigation pump. This Project is used to control our irrigation pump from anywhere through the mobile phone. The circuit consists of a DTMF tone detector and a powerful 8 bit Microcontroller AT89S52. The microcontroller controls all the system.The Microcontroller senses the DTMF signal through the DTMF decoder IC MT8870 and it switch on/off the corresponding devices according to the user need. The circuit has an inbuilt phone ring sensor circuit and the system will take over the phone control if it was not taken manually. Press the corresponding numbers to turn on/off the devices, for ex: press 4 to start pump ON press 8 to switch OFF pumping motor

Keywords: microcontroller AT89S52, decoder IC MT8870, DTMF tone

I. INTRODUCTION

Remote Controlled Water Pumping System is designed to operate TANK irrigation pump remotely by using dual tone multiple frequency technique which incorporates water pump on /off remotely by using mobile phone that is GSM technology as shown in figure 1. The Microcontroller senses the DTMF signal through the DTMF decoder IC MT8870 and it switch on/off the corresponding devices according to the user need. The circuit has an inbuilt phone ring sensor circuit and the system will take over the phone control if it was not taken manually. Press the corresponding numbers to turn on/off the devices, for ex: press 4 to start pump ON press 8 to switch OFF pumping motor.
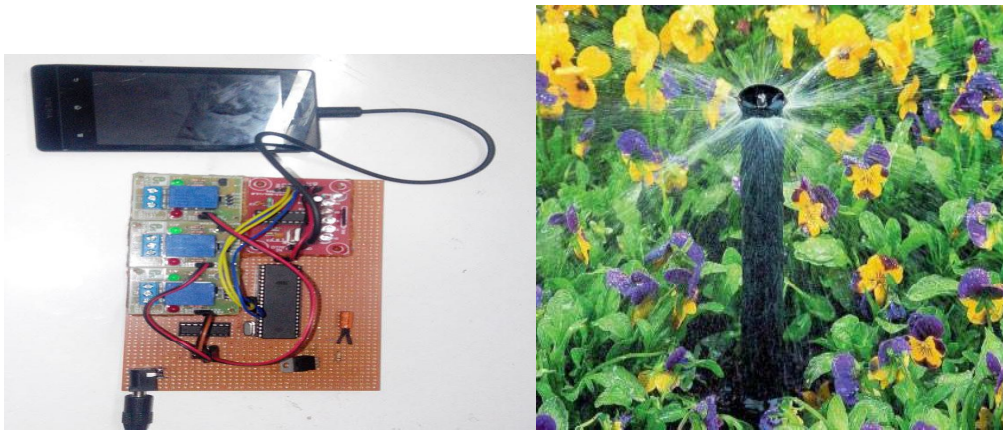
Figure 1: GSM based Remote Controlled Water Pumping System

1.1 WHAT IS D.T.M.F TECHNOLOGY?

DTMF (dual tone multi frequency) is the signal to the phone company that you generate when you press an ordinary telephone's touch keys. In the United States and perhaps elsewhere, it's known as "Touchtone" phone (formerly a registered trademark of AT&T). DTMF has generally replaced loop disconnect ("pulse") dialling. With DTMF, each key you press on your phone generates two tones of specific frequencies. So that a voice can't imitate the tones, one tone is generated from a high-frequency group of tones and the other from a low frequency group. Here are the signals you send when you press your Touchtone phone keys. Figure 2 shows the details of DTMF IC 8870.
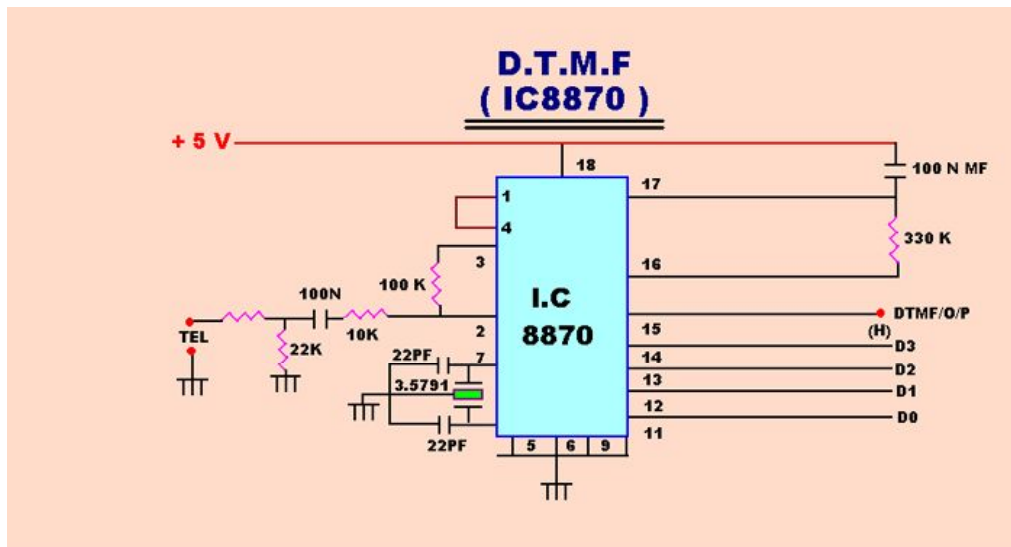

Figure 2: DTMF IC 8870

1.2 WHY IT IS REQUIRED?

One can control home appliances from anywhere. It reduces wastage of electricity when we forgot to switch off the pump and gone outside. It is very low cost compared to other technologies like GSM. It is very much reliable but possesses, low order of security hence used for specialized purpose only.

1.3 BASIC HARDWARE AND SOFTWARE REQUIREMENTS

Power supply ,LED, Transformer , Relay , PCB , Microcontroller ,Pump , at89c51 micro controller, mt 8870 (dtmf decoder ic),7805 three terminal voltage regulator, 230/12V step down transformer ,relay driver circuit, 3 loads +pump motor, cell phone ,one 100 micro farad and one 1000 micro farad electrolytic capacitor ,two 22 pico farad ceramic capacitors, six p-n junction diode, quick switch , one 3.57 megha hertz crystal oscillator , orcad for pcb designing , pic c compiler , tiny boot loader program burn

II.   NEED OF REMOTE CONTROLLING

Now a days there is a Rapid development of autonomous electronics like Laptops, Cellphones, Household robots and all those devices typically relay on chemical energy storage(Battery) As they are becoming daily needs to present generation, Wireless energy transfer would be useful for many applications as above and they need midrange energy. Some examples of wireless energy transfer are shown in figure 3.
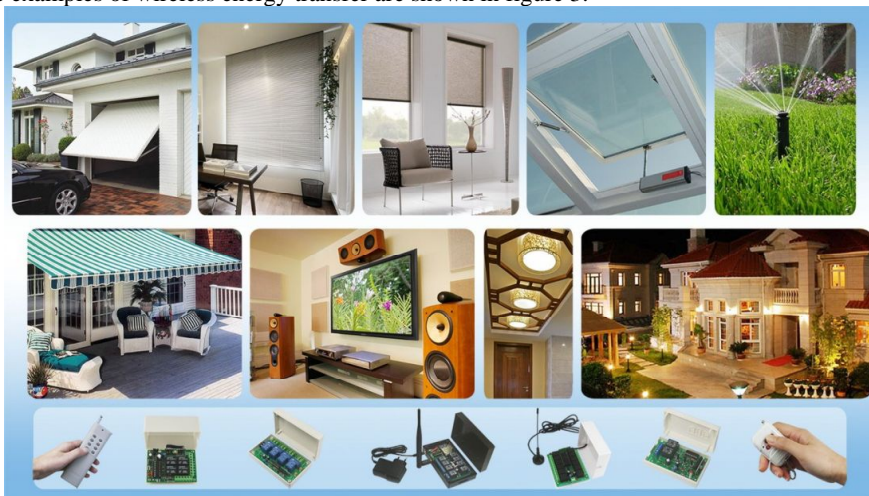

Figure 3: Wireless Energy Transfer

Remote controlling is a wireless technology, which is a 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.

2.1 FEATURES OF REMOTE CONTROLLING
To control any electronic device we require 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 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 circuitry is flexible enough to allow more number of devices to be operated, just by changing the software programming and relay driver IC.
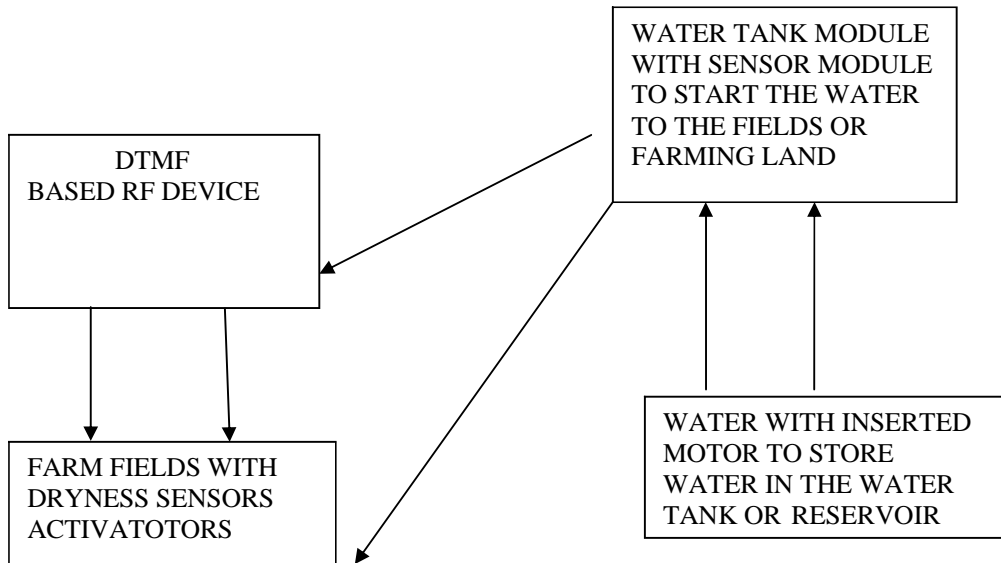
III. CIRCUIT DIAGRAM AND LAYOUT

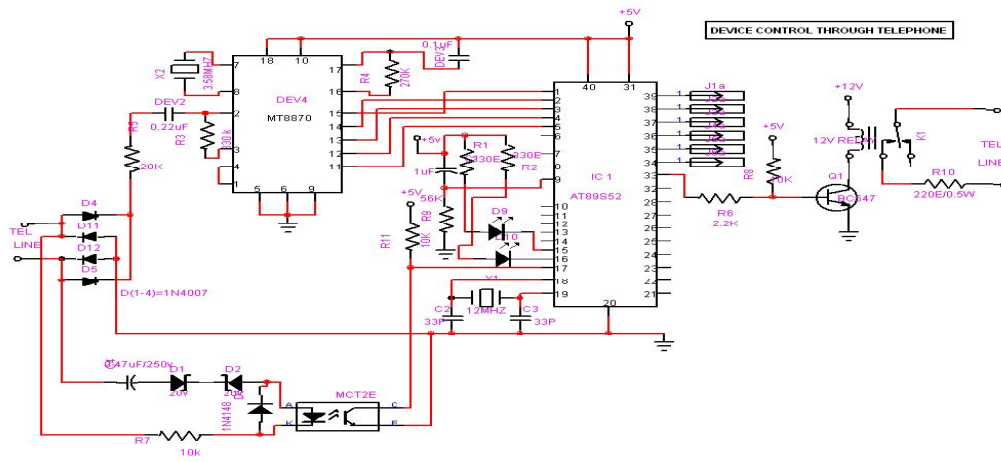Figure 4: Block Diagram of the remote controlled water pumping system

Figure 5: Circuitry of the remote controlled water pumping system

Figure 4 and 5 show the Block Diagram and Circuitry of remote controlled water pumping system. Figure 6 shows the actual designed PCB Set up.

Figure 6: Actual PCB Set up

IV. ADVANTAGES

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.

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 complicate.

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.

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.

V. PERFORMANCE OF DESIGN

- Un affected by the day night cycle, weather or seasons.
- This is an eco friendly.
- It is a boon for the devices which use midrange power.
- More convenient
- No manual recharging or changing batteries.
- Eliminate unsightly, unwieldy and costly power cords
- Never run out of battery power.
- Reduce product failure rates by fixing the weakest link': flexing wiring and mechanical interconnects

VI. RESULT AND CONCLUSION

The cell phone based device controls water pumping in an unique way so as to operate any electronic equipment from miles away by the mobile technology i.e. DTMF and is becoming advanced day by day and this 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.

VII. FUTURE SCOPE

This project is a small implication of our concept in automating and monitoring a system. The practical applications of this project are immense and can have vast level of implementation. This small concept can be used in fields such as weather forecasting, remote sensing, robotics, aeronautics, home automation, and many other related fields where

continuous monitoring and regulation is needed. So this is not the end of the project but rather is a step towards exploring other possibilities that it brings with it.

VIII.   ACKNOWLEDGEMENTS

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