

HOME AUTOMATION BASED ON DTMF

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ABSTRACT

Traditionally electrical appliances in a home are controlled via switches that regulate the electricity to these devices. As the world gets more and more technologically advanced, we find new technology coming in deeper and deeper into our personal lives even at home. Home automation is becoming more and more popular around the world and is becoming a common practice. The process of home automation works by making everything in the house automatically controlled using technology to control and do the jobs that we would normally do manually. Home automation takes care of a lot of different activities in the house.

Keywords: Diode, Crystal Oscillator ,Push Button ,Leds ,Voltage Regulator ,MT 8870 DTMF IC ,IC8051 IC ,2 Line Lcd Display ,Resister ,Capacitor ,Relays.

I. INTRODUCTION

The aim of the proposed system is to develop a cost effective solution that will provide controlling of home appliances remotely and enable home security against intrusion in the absence of homeowner. The system provides availability due to development of a low cost system. The home appliances control system with an affordable cost was thought to be built that should be mobile providing remote access to the appliances and allowing home security. Though devices connected as home and office appliances consume electrical power. These devices should be controlled as well as turn on/off if required. Most of the times it was done manually. Now it is a necessity to control devices more effectively and efficiently at anytime from anywhere.

II. MICROCONTROLLER AT89S52

The AT89S52 is a low-power, high-perform CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller, which provides a highly flexible and cost-effective solution to many, embedded control applications. The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator, and clock circuitry.

III. POWER SUPPLY

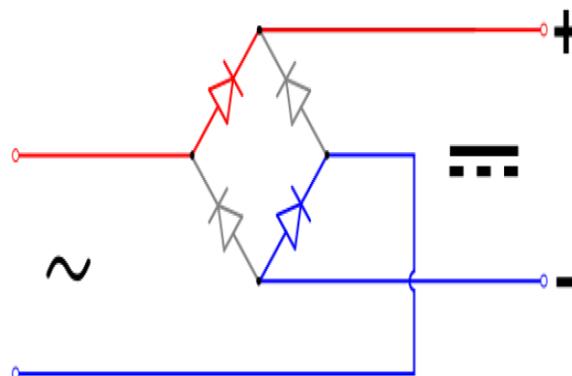
Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a **power supply unit** or **PSU**. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. Here in our application we need a 5v DC power supply for all electronics involved in the project. This requires step down transformer, rectifier, voltage regulator, and filter circuit for generation of 5v DC power. Here a brief description of all the components are given as follows:

IV. TRANSFORMER

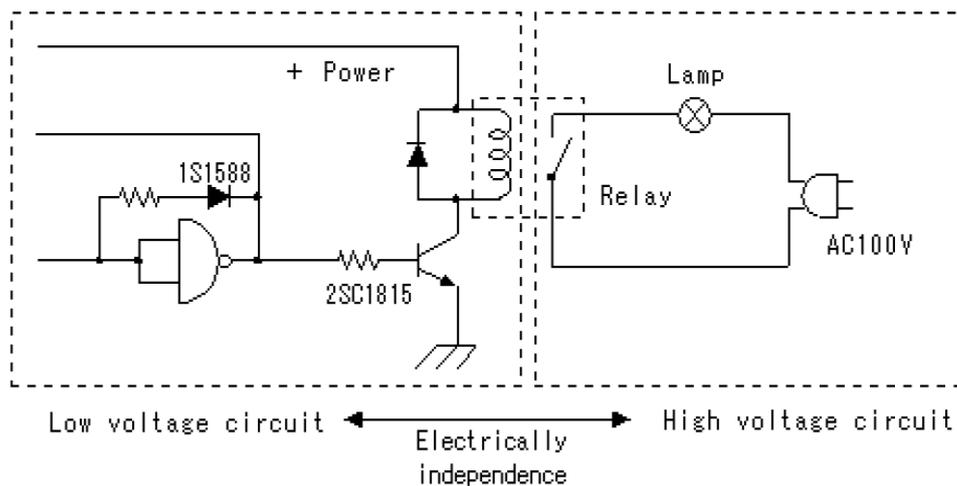
Transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors — the transformer's coils or "windings". Except for air-core transformers, the conductors are commonly wound around a single iron-rich core, or around separate but magnetically coupled cores. A varying current in the first or "primary" winding creates a varying magnetic field in the core (or cores) of the transformer.

V. BRIDGE RECTIFIER

A bridge rectifier makes use of four diodes in a bridge arrangement to achieve full-wave rectification. This is a widely used configuration, both with individual diodes wired as shown and with single component bridges where the diode bridge is wired internally.



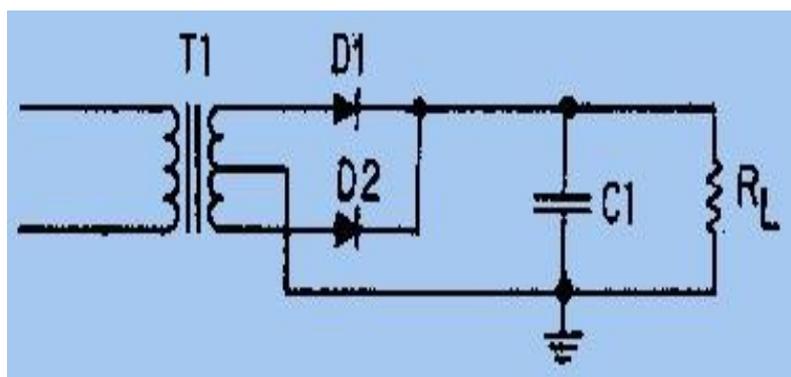
RELAY: The relay takes advantage of the fact that when electricity flows through a coil, it becomes an electromagnet. The electromagnetic coil attracts a steel plate, which is attached to a switch. So the switch's motion (ON and OFF) is controlled by the current flowing to the coil, or not, respectively. A very useful feature of a relay is that it can be used to electrically isolate different parts of a circuit. It will allow a low voltage circuit (e.g. 5VDC) to switch the power in a high voltage circuit (e.g. 100 VAC or more).



REGULATOR IC (78XX): It is a three pin IC used as a voltage regulator. It converts unregulated DC current into regulated DC current



The Capacitor Filter: The simple capacitor filter is the most basic type of power supply filter. The application of the simple capacitor filter is very limited. It is sometimes used on extremely high-voltage, low-current power supplies for cathode-ray and similar electron tubes, which require very little load current from the supply. The capacitor filter is also used where the power-supply ripple frequency is not critical; this frequency can be relatively high. The capacitor (C1) shown in figure 4-15 is a simple filter connected across the output of the rectifier in parallel with the load.



DTMF DECODER: Today, most telephone equipment use a DTMF receiver IC. One common DTMF receiver IC is the Motorola MT8870 that is widely used in electronic communications circuits. The MT8870 is an 18-pin IC. It is used in telephones and a variety of other applications

To test the DTMF IC 8870/KT3170, proceed as follows:

- Connect local telephone and the circuit in parallel to the same telephone line.
- Switch on S1. (Switch on auxiliary switch S2 only if keys A, B, C, and D are to be used.)
- Now push key ‘*’ to generate DTMF tone.
- Push any decimal key from the telephone keypad.
- Observe the equivalent binary as shown in the table.
- If the binary number implied by glowing of LED1 to LED4 is equivalent to the pressed key number (decimal/A, B, C, or D), the DTMF IC 8870 is correct.

Burner Software:



PRO51 BURNER provides you with software burning tools for 8051 based Microcontrollers in there Flash memory. The 51 BURNER tools, you can burn AT89SXXXX series of ATMEL microcontrollers.

PROG51 User Interface: Prog51 is used for programming the 89C1051, 89C2051 and 89C4051 Microcontrollers. User interface includes:

- Load Hex/Binary file in Buffer
- Save Buffer as Binary File
- Display / Specify Target Device to be Programmed.
- Com Port Selection.
- Identify Target Device with the device specified by you in the designated area.

VI. WORKING OF PROJECT

Our project uses M-8870 DTMF decoder IC which decodes tone generated by the keypad of cell phone. When you press any key on your mobile phone while call is in progress, the other person will hear some tones corresponding to the keys pressed. These tones are based on the DTMF (Dual Tone Multi Frequency) technology.

Data is transmitted as pairs of tones. The receiver detects the valid frequency pair and gives the appropriate BCD code as the output of the DTMF decoder IC.

DTMF signal can be tapped directly from the microphone pin of cell phone device.

See the figure below. Cut the microphone wire and you will be able to see 4 wires..

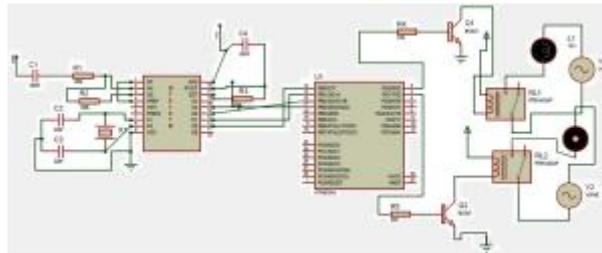
Select the right wire and connect it as the DTMF input to the decoder circuit. Ground should be connected to common ground of our circuit.

The signals from the microphone wire are processed by the DTMF decoder IC which generates the equivalent binary sequence as a parallel output of Q1, Q2, Q3, and Q4. The output Q4 from the DTMF decoder IC is fed to the clock input of IC 7474 D flip flop which acts as a buffer to the output from M8870 DTMF decoder IC.

IC7474 is configured as Toggling mode that is if it gets a clock pulse the output of this IC (Pin 5) sets to high and further clock pulse resets back the IC. (The outputs toggle whenever a key is pressed).

When we press and release any of the keys among 1, 3, 5, 7, 9 and *, the DTMF decoder IC generates a high pulse which acts as a clock to our flip flop and sets the output flip flop to high.

The output of flip flop is connected to the relay driver circuit via 100Ω resistor; this output energizes the relay coil through BC547 transistor and turns ON the bulb that is connected at the normally open terminal of relay circuit.



VII. PRECAUTIONS

SOLDERING PRECAUTIONS : The construction was carried out with care. The precautions taken during the soldering were:

- The tip of soldering iron was kept clean with the help of a file from time to time.
- Take solder wire was of smaller thickness.
- Extra solder was not used in order to avoid a cause of short circuit in the conductive path.
- The overheating of components was avoided to prevent component damage as a result of excessive heat on the components due to the heat from the soldering iron.
- The leads of the components were kept clean before soldering, with the use of sand paper.

VIII. COMPONENTS PRECAUTION

- IR sensor used should be sensitive. Before using in the circuit it should be tested with a multi-meter.
- I.C should not be heated much while soldering; too much heat can destroy the I.C. For safety and ease of replacement, the use of I.C socket is suggested.
- While placing the I.C pin no 1 should be made sure at right hole.
- Opposite polarity of battery can destroy I.C so please check the polarity before switching ON the circuit. One should use diode in series with switch for safety since diode allows flowing current in one direction only.
- Each component was soldered neatly and clean.
- We should use insulated wire.

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