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DESIGN OF MICRO-CONTROLLER BASED ANDROID APPLIANCES SYSTEM FOR A REMOTE ACCESS

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ABSTRACT
This paper presents the planning and construction of android appliances control. It takes the advantage of the long distance communication capability of the android phone and its ability to interface with micro controller to implement a switch system. The completion of this design ends up in a switching system which will be controlled from any place using SMS. The design was achieved by connecting a programmed GSM Module using attention (AT) command with a programmable device that is being programmed in programming language. Instruction was sent from any phone or android to a remote phone connected to the programmable system. If the password is correct, the instruction is carried out and also the appliances connected to the system is switched on or off. The strategy used is that of the principle of wireless communication incorporated with embedded system.

Keywords: Assembly Language, GSM Module, Instruction, Micro controller and Switching

1. INTRODUCTION
This design introduced an application among the rising applications of the GSM technology. We tend to introduce the design of a complete encompassing system with ability to manage and control home gadget regionally using inbuilt input and output supplementary. Remotely, through the android phone, the house owner can watch and manage the house gadget set by causation commands within the type of SMS messages and receive the gadget standing as well. There

are two parts in this system, namely; hardware and software. The hardware design contain a stand-alone encompassing system that's supported eight-bit micro controller, an interface and a driver circuit to attach the devices to the micro controller and a GSM modem. SMS messages are the means provided by the GSM modem to the house owner and the system to communicate. The system software driver is developed using communicative assembly language programming platform (Boylestad & Nashelsky, 2017). This design could be a way to execute the concept of wireless interaction of android and a micro controller.

The scope of this SMS operated device is vast in areas of managing devices at home like microwaves, air conditioners and lighting points and so forth. The device uses AT89S52 microcontroller being created by atmel corporation as the system control unit. The relay driver and the microcontroller has the aptitude of dominant up to eight (8) appliances, however this design will limit its scope to regulate one appliance. Every of the appliances works severally to every other counting on which one is being activated or deactivated by the user.

The design aim to offer an effective result that may provide controlling of home gadget remotely in the absence of house owner no matter the space separating the user and the device using android. The target embodies;

1. To style the ability supply
2. To program the GSM module to receive message with the android and the other software package
3. To design the voltage level device unit
4. To design the programmable circuit
5. To program the microprocessor

2. REVIEW OF RELATED WORKS

A control system is one that undertakes some function, checks its success and takes additional action till the objective is achieved (Holt, 2018 & Boylestad, 2017). This extension may include improvement in performance of system and inflated flexibility, since microcontrollers are often programmed to carry out completely different tasks such as data analysis, and control of physical, electrical or mechanical quantities. The control system enforced in this design uses the android phone to control a group of electrical appliances. It also takes the advantage of the android phone long distance communication skills to implement a control theme from anywhere and with any android phone.

Some folks in the field of embedded systems has done several related work based on this SMS home appliances system based on the most problem they are

facing is the controllability of the device. They will only use one specific phone to control the system but in this new design, any phone can be used no matter the manufacturer and any GSM operator may also be used. The most factors the user has to know is to induce the user manual to understand the working rule of the projected system (Edward, 2014 & Bernard, 2012).

Another difference between the new system and the previous system is that the previous system that has been done to date uses a network router as their GSM modem which is not readily found all over but the new system uses an android phone as the GSM modem connected to the system which is quickly found everywhere and is cheaper than the old system (Gupta et al, 2003). In the old system, once the router connected to the modem is switched off, the complete system will finish off and any appliances connected to the system will stop working but in this new system; it is freelance on the modem connected to it. Once the modem is off, the devices will still maintain their stand and no need to reprogram the modem anymore, within the previous work that has being done so far, it is not password secured; anybody can just send message to simply power the appliances but in this new design, the system will be secured using password that has already being programmed into the system.

3. METHODOLOGY

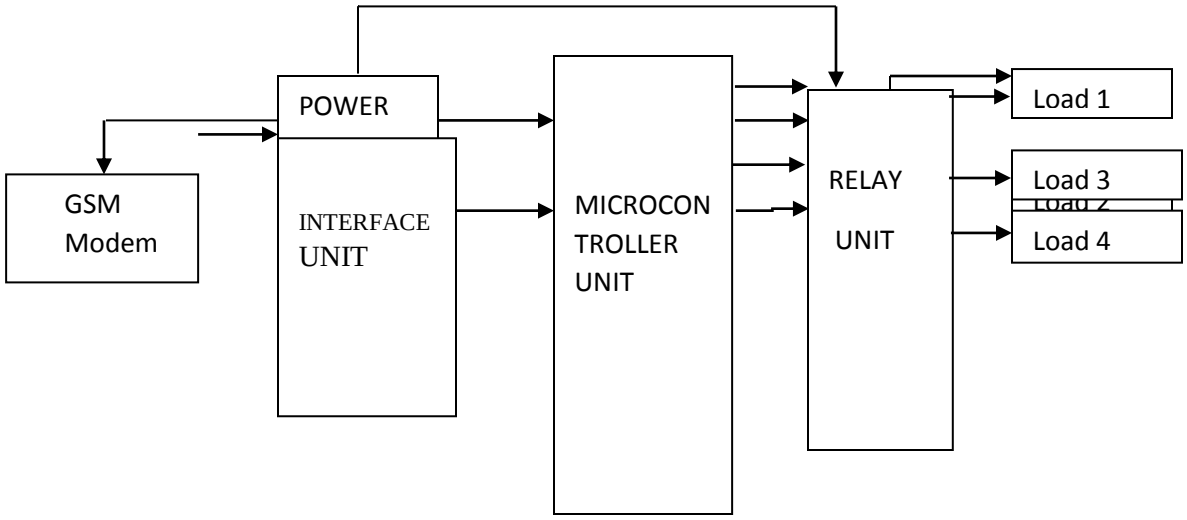


Fig 1: Block Diagram of a SMS Operated switch. (Source: designed with proteus)

3.2 Design of the Microcontroller unit.

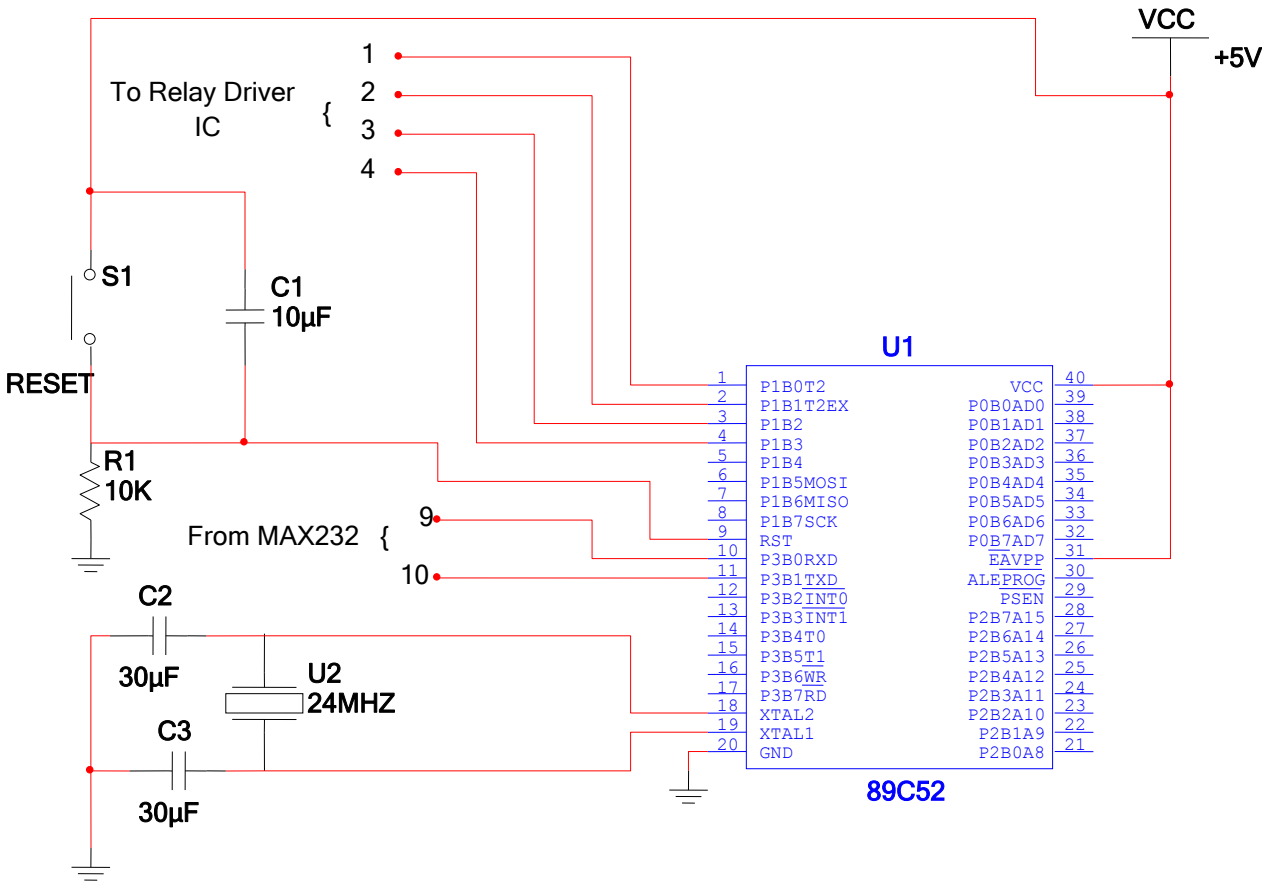


Fig 2: Circuit Diagram of the microcontroller unit

3.3 Design of the Interface unit

3.3.1 The GSM Modem

To interface the GSM modem with the microcontroller, hands-free is used to hold the signal from android phone to transmit to the micro controller. The operating voltage of the GSM modem is 3.3 V and provides 3.7 volt at logic 1 and 0 v at

logic 0. Max 232 IC is utilizing to have the amount equal to micro controller. It can sense input voltage not up to 2V.

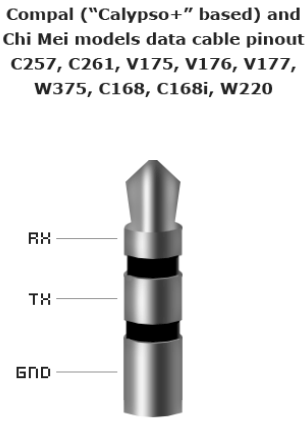
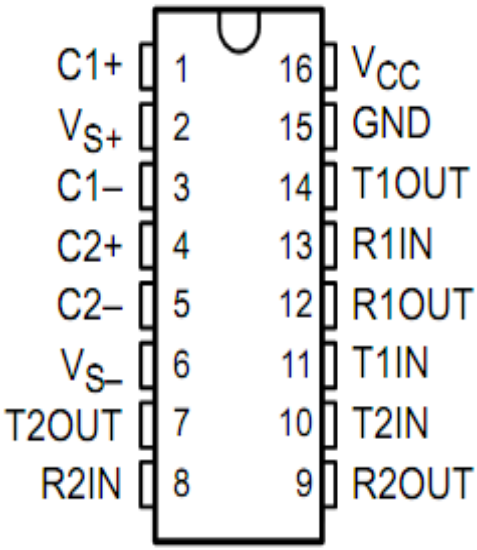


Fig 3: Hands Free Connector

3.3.2 Description of MAX232 IC

It is a twin driver or receiver that has an electrical phenomenon voltage generator to produce EIA-232 voltage levels from one 5-V supply. EIA-232 inputs can be changed to 5-V TTL/CMOS levels by each receiver. The receivers also have a regular threshold of 1.3 V and a regular physical phenomenon of 0.5 V, and might settle for ±30-V inputs. TTL/CMOS input levels is changed to EIA-232 levels by each driver.



Function Tables

EACH DRIVER

INPUT TIN	OUTPUT TOUT
L	H
H	L

H = high level, L = low level

EACH RECEIVER

INPUT RIN	OUTPUT ROUT
L	H
H	L

H = high level, L = low level

Fig 4: Pin Diagram of MAX232

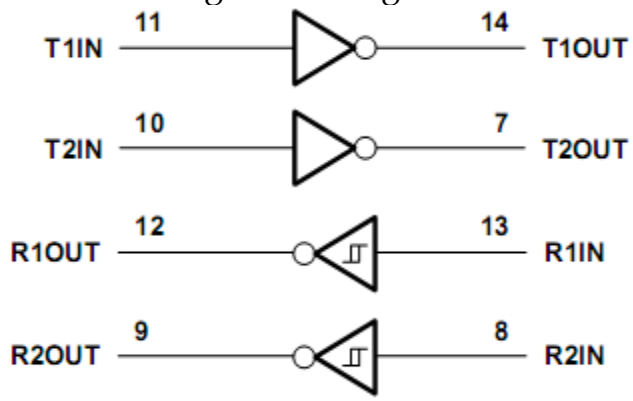


Fig 5: logic diagram (positive logic)

The figure below is the complete circuit diagram of the Interface of the android phone with the microcontroller by MAX232

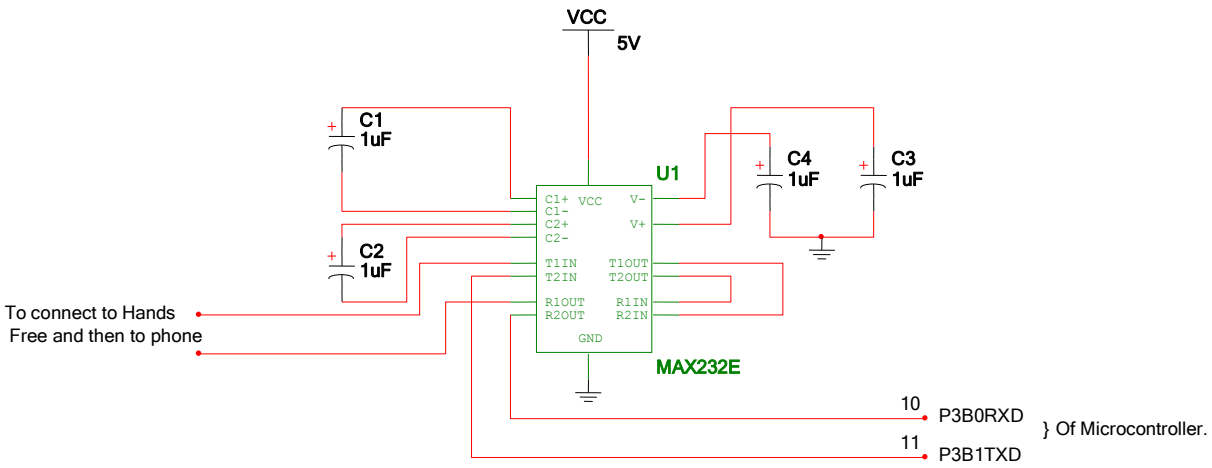


Fig 6: Circuit Diagram of the interface unit

Putting a diode throughout the coil such as in the diagram above can subdue harmful action. Throughout the "ON" state of the semiconductor, the diode is back-biased; it sets as an electric circuit and doesn't have an effect on anything. However, when the diode forward-bias, it means the transistor is turns OFF and the voltage throughout the coil is reverse, hence it places the diode in its "ON" state. The present through the electrical device established during the "ON" state of the transistor can then still flow through the diode eliminating the severe modification in current level.

The below figure is the circuit diagram of the relay unit.

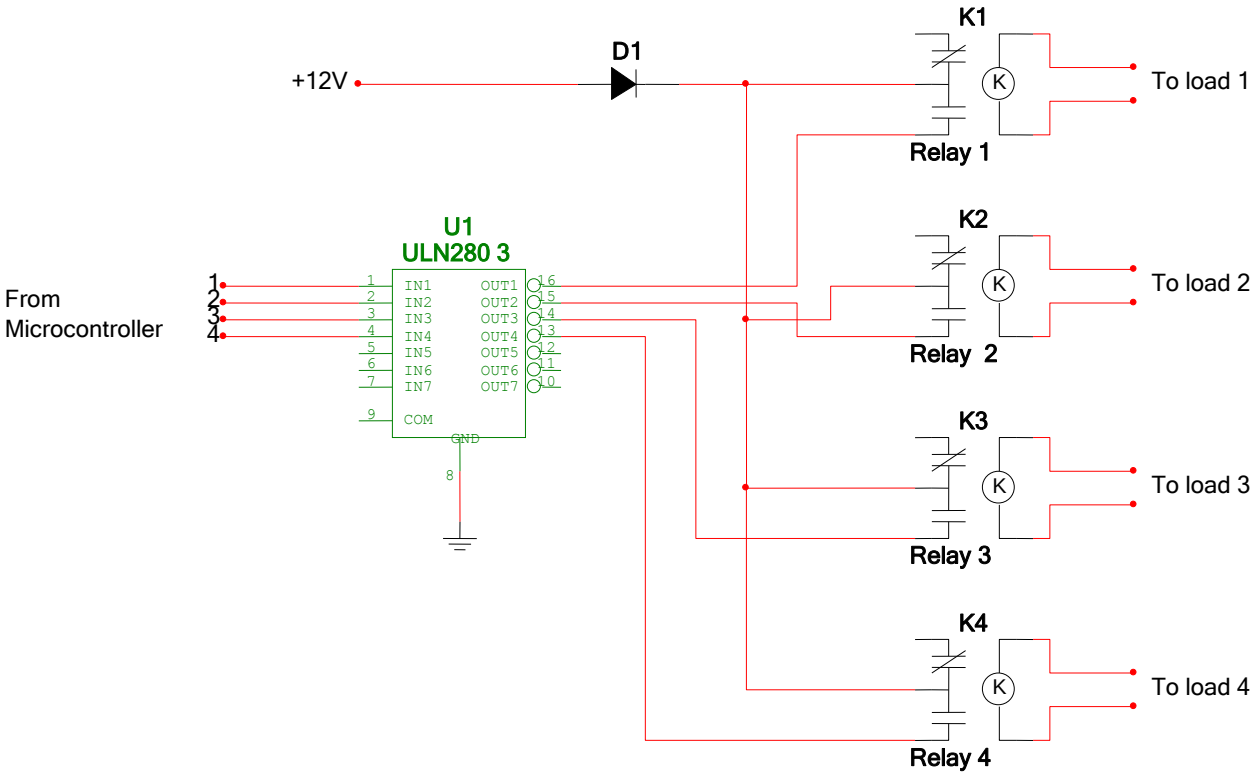


Fig 7: Circuit Diagram of the Relay Unit

3.8 Complete Circuit Diagram

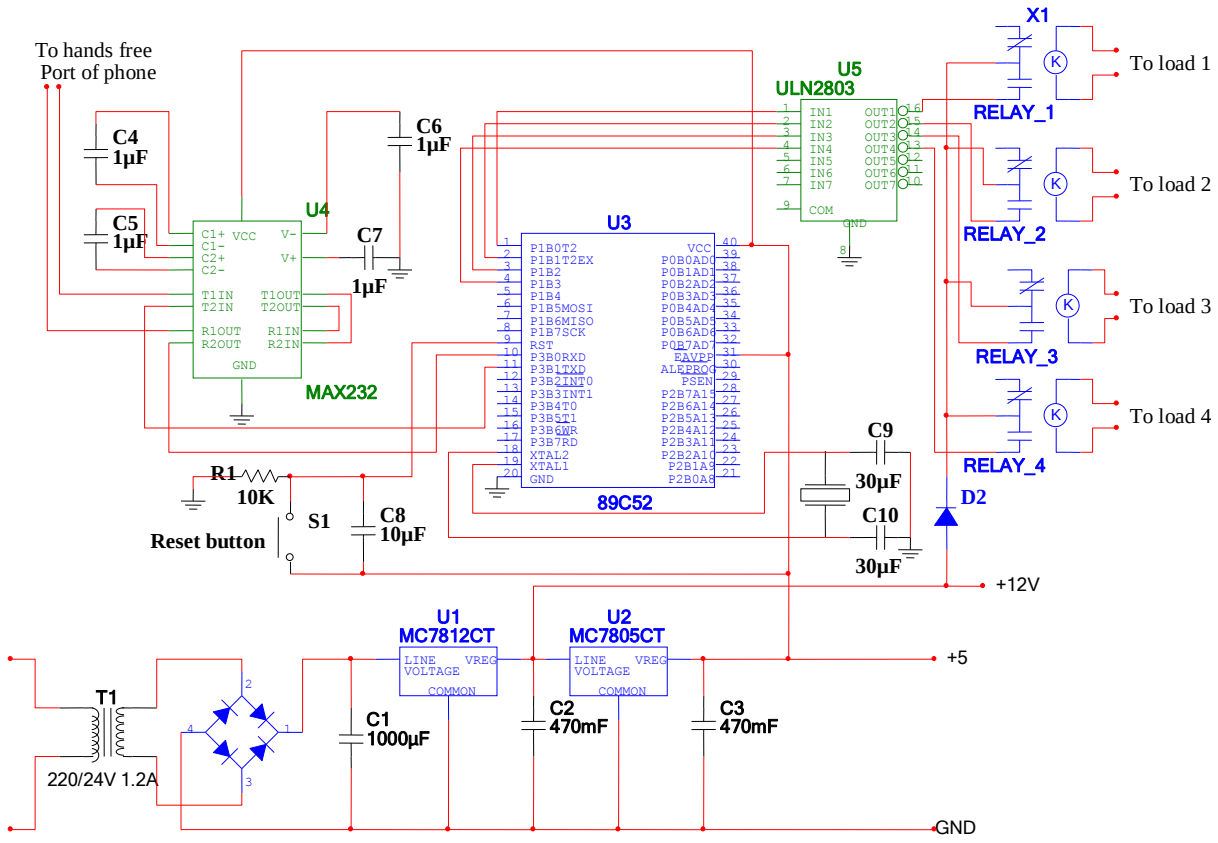


Fig 8: Complete Circuit Diagram of a SMS Operated Switch/SMS Appliance Control

Fig 3.7 and 3.8 above are the developed working circuits for the design. The experimental and practical analysis was done on proteus 9.2 and the simulation was done to get the required result.

4. RESULT AND DISCUSSION

The device was tested for each appliance connected to its four output sockets. The results were as follows:

1. To show on or off the television, a user should send "1200 ON1 " to turn on the television and "1200 OFF1" to turn off the television
2. To show on or off the radio, a user has to send "1200 ON2" to turn on the radio and "1200 OFF2" to turn off the radio
3. To show on or off the PC. A user will send "1200 ON3" to turn on the computer and "1200 OFF3" to turn off the computer
4. To show on or off the refrigerator. A user will send "1200 ON4" to turn on the fridge and "1200 OFF4" to turn off the fridge.
   The messages can be send to any variety that is within the modem connected to the programmed system. Any android phone can be used to send the message; what the entire user wants is to follow the above format before turning on or off any of the appliances.

5. CONCLUSION

From the testing and result obtained, it can be seen that the design conferred a way of controlling a set of appliances by the android phone through sending SMS with an embedded microcontroller system. Specifically, it demonstrates the chance of extending the practicality of the android phone from the standard use as a means of communicating between people separated by distance to the control of appliances from anywhere. Whereas the design has its limitations, it provides a chance for future enlargement of the current design in future years.

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