

# **Use of Short Message Service (SMS) Based ATmega328 Microcontroller and SIM800L Modules as on / off Control Electronic Equipments**

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## **Abstract**

This article creates a new method of controlling tool on / off electronic devices using Short Message Service (SMS). On / off electronic device controllers have been developed using Siemens C35 mobile phones as receivers on devices and other phones as controllers. In this study the receiver on the tool used SIM800L module, so to operate the device simply use a mobile phone. Apart from being a receiver, SIM800L can also send a reply to the mobile phone that is used as a controller. Work process tools that have been made that the command in the form of SMS sent using the phone will be received by SIM800L and processed by ATmega328 microcontroller. If the command is processed in accordance with the program, then ATmega328 will turn on or off the relay that is connected directly with the electronic devices to be controlled. The created tool has been tested with 5 distance variations. Taken 50 attempts for each distance variation with randomly selected commands. The test results show that the tool is made quite effective to use, with an average accuracy of 92.62%.

**Keywords:** SMS, SIM800L, ATmega328, Relay

## **1. Introduction**

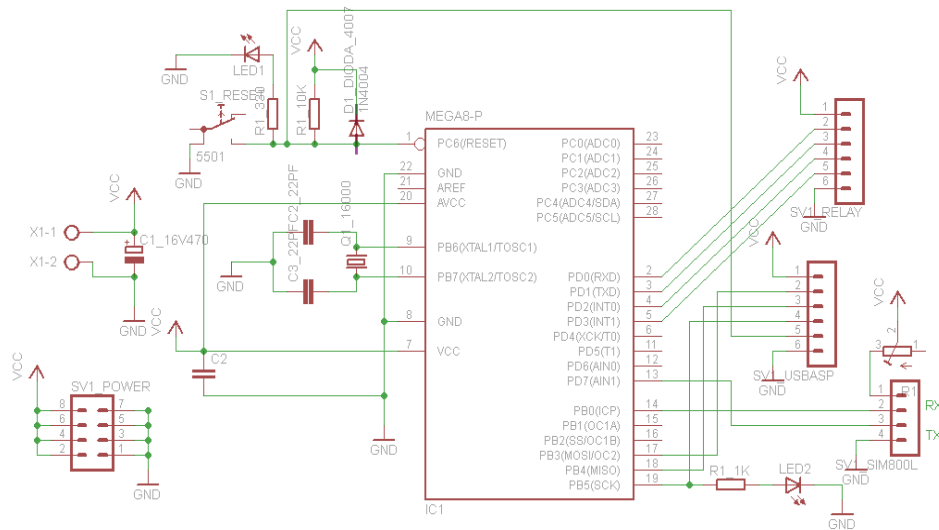
Many methods are used to control on / off electronic devices that have been done as in the journal entitled Development of a Sim800L Based Reprogrammable Household Smart Security System with Recipient Phone Call Alert [1], Embedded Technology for Remote Data Logging, Monitoring and Controlling Using

GSM/GPRS [2], A Smart Control System of Home Appliances Using SMS [3], Intelligent Control of Electronic Appliances Using Remote GSM [4], Remote Controller for Controlling Turning Appliances On and Off [5], Vehicle Locating using GPS and GSM [6], Development of Arduino Based IoT Metering System for On-Demand Energy Monitoring [7], An Approach Towards Arduino Based Automated Plant Irrigation System Using Soil Moisture Sensor [8], Short Message Service using SMS Gateway [9], Design and Development of a BlueGS Gateway for Bluetooth and GSM Protocols [10], Analysis and Performance of a Low Cost SMS Based Home Security System [11], Alcohol Detecting and Accident Alert using SMS [12], but from the methods that have been done, some use internet access to control so at least have to use android based mobile phone, turn off automatic device with sensor, but can only be monitored by handphone, controller with remote control for very limited distance and there also using the arduino minimum system module directly on the tool, but there is no reply from a given command code error. In this research has been successfully made the controller on / off electronic devices equipped with 16 commands that can be used to control, as well as replies from the given command as well as notification of errors sent to the command tool. The tool has been tried with 5 variations of control distance. 50 experiments were taken for each distance variation with randomly selected command, with average tool success rate of 92.62%.

In this paper discussed in part 2 of the tool schematic circuit, section 3 discusses the results and discussion and section 4 discusses the conclusions.

## **2. Schematic Circuit Tool**

The tools used in this research are cellular phone, ATmega328 microcontroller downloader, multimeter, tweezers, solder, screwdriver, scissors, PCB drill, 5 Volt 1 Ampere adapter. While the materials used to design the controller on / off the electronic devices in this research are ATmega328 microcontroller, SIM800L module, capacitor 16 V 470  $\mu$ F, capacitor 100 nF, capacitor 22 pF, resistor 330  $\Omega$ , resistor 10 k $\Omega$ , resistor 1 k $\Omega$ , trimpot, transistor 2N3904, diode 4007, diode 4148, relay 5 V, Crystals 16000 MHz, led 3 mm, connecting cable, project board. For schematic circuits on the tool made using Eagle application and schematic results on the tool can be seen as in Figure 2.1.



**Figure 2.1** Schematic circuit tool.

### 3. Results and Discussion

#### A. Result

The results obtained from this research in the form of control device on / off electronic devices using SMS-based microcontroller ATmega328 and SIM800L module. This tool consists of several main parts, as well as the display commands and replies on the mobile phone screen shown in Figure 3.1.



**Figure 3.1** Controller on / off electronic devices.

#### B. Discussion

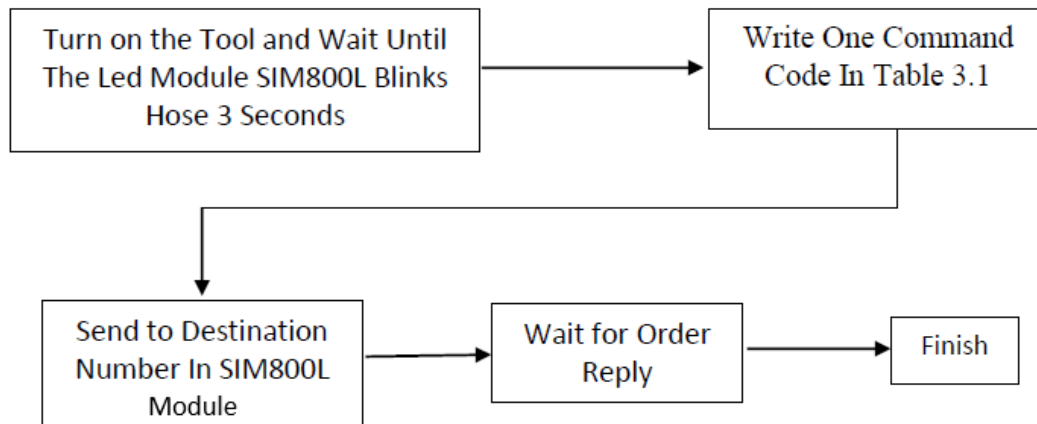
To be able to operate the tools that have been made, it must be known what commands can be used to match the wishes of people who will control. Here are

some commands that can be used to operate a tool made with notes keeping in mind the use of lowercase letters and spaces as in Table 3.1.

**Table 3.1** Some commands to run the tool.

No.	Command	Tool 1	Tool 2	Tool 3	Tool 4	Information
1	all off	0	0	0	0	Turns off all controlled tools
2	4 on	0	0	0	1	Turning on the tool 4
3	2 3 on	0	1	1	0	Turning on tools 2 and 3
4	1 3 4 on	1	0	1	1	Turning on tools 1, 3 and 4

If the command used to run the tool has been understood, then to operate the tool needs to see the short instructions shown in Figure 3.2.



**Figure 3.2** Guide running the tool.

The tool made in this study has been tested with 5 variations of control distance. Taken 80 repetitions for each distance variation with 16 selected commands. From experiments with 5 variations of distance, the tool can not work optimally. The tool experienced several errors while being tested. The success rate of the tool for the 5 m control distance is 89.37%, the distance of 250 m is 93.12%, the distance 500 m is 89.37%, the distance 750 m is 96.25% and at a distance of 1 km of 95.62%. By looking at the percentage of success rate, it can be observed that by controlling the device from a shorter distance it is not necessarily the tool will respond better.

Because the place of data collection is also taken in different places, so the possibility for areas with better signal coverage will improve the tool response even from a longer distance.

#### 4. Conclusions

The tool can be operated with a command program that has been created to control the on / off of electronic devices even from a long distance as long as there is still a communication network between the controller and the controlled device.

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