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Application Device Prototype with Global System for Mobile (GSM) Unit and Arduino

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Abstract: The growth of remote controller technology has grown-up rapidly down with the development of communication technology nowadays. The simplest communication technology available is by using Global System for Mobile (GSM) protocol. In this paper, a prototype of electronic application controller tool via SMS by using Global System for Mobile (GSM) is proposed. Global System for Mobile (GSM) protocol was selected because it does not depend on mobile devices' platform. Global System for Mobile (GSM) SIM 900 and Arduino for controlling a relay unit were utilized here. Relay share worked in agreement with instructions given through SMS and the mobile tool then received the feedback of the command. For annoying drive, ten (10) different types of input thread as a knowledge controller was proceed. Relay effort according to tips directed from the say string submitted and information messages from the command given before was provided.

Keywords: Arduino, Electronical applications controller, Global System for Mobile (GSM) unit, SMS.

I. Introduction

Communication information connecting mobile devices and machines is rising fast in composed industrialized and globalized world. The communication technology is typically used for controlling and observing. The transportations protocol used in existing technology include internet protocol, Global System for Mobile (GSM), and small-sized arithmetical radio with low power protocols [3], [4]. Collection of the protocol depends on the gear that we need to watch or controller, cost, effectiveness, as well as the distance of communication. In this paper a prototypes of electronic application controller with by SMS using Global System for Mobile (GSM) protocol was proposed.

The controller of electronically application by using mobile devices is the basic concept of a stylish home because it can connect a diversity of plans fair by using heterogeneous communication protocols [1], [3]. The earlier researches, there were rare study regarding the regulator of cordless control outfits. There was a study on the remotely controller scheme to the house electronic applications by using voice recognition [5]. Message be done in these study by using many Programmable Micro Remote Controller (PMRC). Here were too educations that controller led some kit in hospices by using Infrared Remote (IR) Supervisor [6]. In addition, there are a number of studies that use computer networks to behavior controlling and observing [7]-[9].

Global System for Mobile (GSM) protocols controller has also been applied to controller and observing system with multiple devices. The previous research used the Global System for Mobile (GSM) protocol for motor energy circuits and LCD (Liquid Crystal Display) [10]. Research was carried out by using the units SM5100B. Beside using a Global System for Mobile (GSM) unit there was also a research by using Arduino to read the electronic meter [11] and also applied for controller and observing of water systems [12], [13]. There is also research to monitor electronical distribution transformers [14]. The using of Global System for Mobile (GSM) unit is also useful in some applications the Internet of Things (IOT) [15]-[19].

In contrast to previous studies, here we planned a prototype to controller electronical application via SMS using Global System for Mobile (GSM) SIM unit 900 and Arduino. Controlling is done by a relay unit via SMS controller. In addition, the controller also sends status messages from the conveys. Electronically kit settings via SMS was diagram in order to make the setting does not depend on specific platform of mobile devices.

II. Materials and Method

A. Arduino UNO

In the plan of prototypes we use Arduino UNO. Arduino UNO is single of accepted Arduino that use ATmega328 [20]. Arduino UNO has 14 input / output digital pin (6 of which can be used as PWM outputs), 6 equivalent inputs, an oscillator mineral 16 MHz, a USB joining, a power jack, an ICSP header, and a retune button [21]. It can be seen in Fig. 1. The characteristics of the Arduino UNO can be seen in Table I.

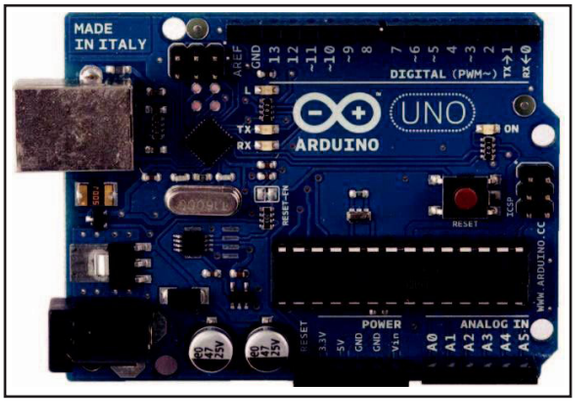

Fig. 1: Arduino Uno Prototypes

Table I: Arduino Uno Characteristics Table

Mikrokontroler	ATMega328
Operation Voltage	5 V
Input Voltage	7 – 12 V (recommended)
Input Voltage	6 – 20 (limit)
I/O	14 pin digital input / output (6 pin for PWM) dan 6 pin only for analog input
Current	50 mA
Flash Memory	32 KB
EEPROM	1 KB
Speed	16 Hz

B. SIM900 GPRS/ Global System for Mobile (GSM) Unit

SIM900 widely used in Global System for Mobile (GSM) protocol communication [22, 23]. SIM900 is a complete Quad-band Global System for Mobile (GSM) / GPRS share in a SMT type and flat with a very powerful single-chip processor integrating AMR926EJ-S core [24]. A Global System for Mobile (GSM) unit SIM900 has be interfaced with the 32-bit ARM processor-based LPC2148 microcontroller. It is connected to LPC2148 through a USB to RS232 driver. The unit contains a SIM card owner, RS232-based sequential port for construction, an antenna for sending / getting signals to the SIM and an LED as a status for power, signal and incoming call. Feature an industry-standard border, the SIM900 delivers Global System for Mobile (GSM) / GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form issue in addition to with low power consumption [23]. It can be seen in Fig. 2.

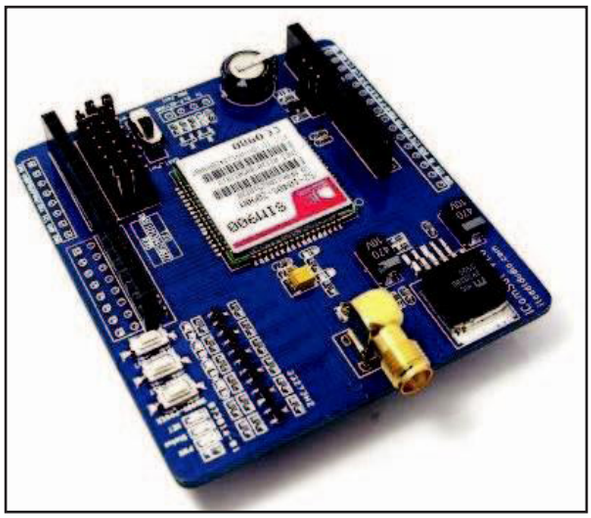

Fig. 2: SIM 900 GPRS/Global System for Mobile (GSM) Unit Plan

C. RM54OC Relay Unit

Relay Unit is a unit that is very real intended for use as a main button relay for 4 channels project with microcontroller base electronic circuits. This unit turns on / off other electronic devices that are power-driven by 240 VAC electronically AC or DC high-voltage devices (up to 28 VDC), such as tall Power DC motors. It has a maximum current of 7 Ampere for each channel in [25]. The figure of RM54OC Relay part be able to be seen in Fig. 3.

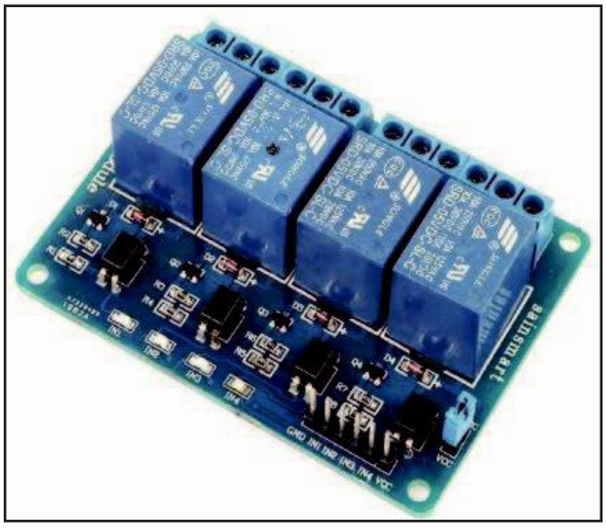

Fig. 3: RM54OC Relay Unit Plan

D. Prototype Plan

The plan of the prototype consists of two stages: the plan and programming of SMS manager circuit and microcontroller. The block diagram of scheme can be seen in Fig. 4. SIM900 GPRS / Global System for Mobile (GSM) unit will be associated to pin Rx/Tx of in Arduino. SIM900 GPRS / Global System for Mobile (GSM) Units used to receive and send content mails to mobile plans. RM54OC Relay Unit will be connected to the I/O Arduino pin. RM54OC Relay part will obtain the orders from the Arduino to turn on or off. Schematic SMS controller circuit can be seen in Fig. 5.

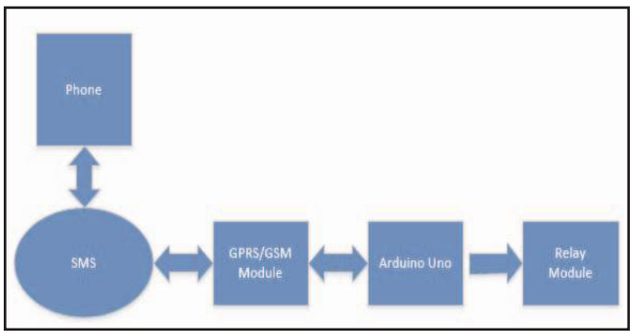

Fig. 4: Block Diagram of System Model

Microcontroller programming is use to mark the programming rules to translate input string obtain from SIM900 GPRS / Global System for Mobile (GSM) unit to turn on or turn off the relay. Beside that it is also used for script code to send AT commands to SIM900 GPRS / Global System for Mobile (GSM) unit that will send SMS to mobile devices in response to commands sent. Previous prearranged input string that is second-hand to controller spreads as well as response from Arduino message informs that the controller has been carried out.

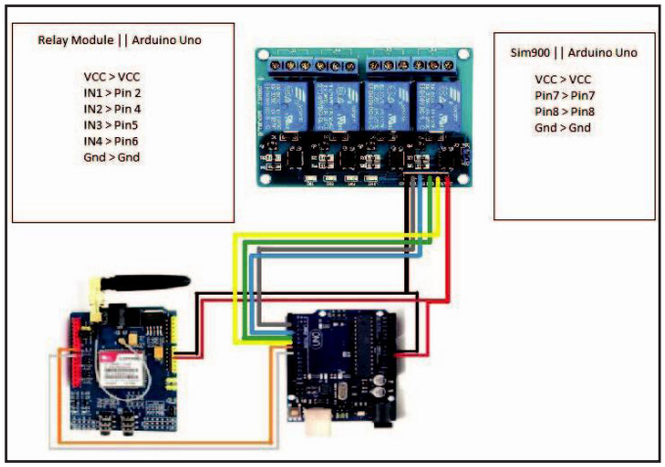

Fig. 5: The Plan of the Prototype Model

III. Result and Discussion

The scheme consists of an Arduino microcontroller as a controller, SIM900 as SMS entry, Relays as outputs and phones as input. The operational attitude is Arduino will receive feedback in the shape of a string of data from mobile phone via SMS gateway. Then Arduino will process the data and controller relay in accordance with the data. If the relay is ON, the electronical kit such as lights, fans, and others will be ON as well and also if the relay off the electronical kit will be off as well. Previous predetermined input string that is used to controller the relay. There are 10 types of contribution series is used for the controller and feedback mail obtained. This can be seen in Table II.

Testing was finished by sending a SMS to all input string listed in Table II below. A study whether the relay works in unity with the exact of the input string was done. Another review was proceeding on the mobile devices to confirm whether there was a memo given as the feedback of earlier command. As the result, it was establish that the relay work normally according to the orders from the submitted input thread and it was able to provide the feedback messages from the previously set command.

IV. Conclusions

From the conducted prototype plan, it can be seen that the prototype worked as expected. By using SIM900 GPRS / Global System for Mobile (GSM) unit and Arduino, a relay unit controller led by SMS can be planned. Prototypes can also provide feedback messages from the command given previously. Furthermore, these prototypes can be useful to controller the actual electronical kit.

Table II: SMS Feedback from Arduino

No	String Data Input	Relay Output	SMS Feedback from Arduino
1	“rl1on”	Relay 1 On	“Relay 1 On Boss”
2	“rl2on”	Relay 2 On	“Relay 2 On Boss”
3	“rl3on”	Relay 3 On	“Relay 3 On Boss”
4	“rl4on”	Relay 4 On	“Relay 1 On Boss”
5	“rlallon”	All Relay On	“Relay all on Boss”
6	“rl1off”	Relay 1 Off	“Relay 1 Off Boss”
7	“rl2off”	Relay 2 Off	“Relay 2 Off Boss”
8	“rl3off”	Relay 3 Off	“Relay 3 Off Boss”
9	“rl14off”	Relay 4 Off	“Relay 4 Off Boss”
10	“rlalloff”	All Relay Off	“Relay all off Boss”

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