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Remote Control and Monitoring System using GSM Technology

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Abstract: ***Industries have optically discerned revolution in terms of automating the tasks that used to be earlier performed b the human laborers. In today's times PLC and SCADA systems have been employed which has a HMI (human machine interface) to control various parameters of a machine like controlling speed or changing the tasks of a machine. Paper mills use a HMI to change the speed of printing of papers. Different industries use automation techniques to perform different tasks. But another important parameter is to be able to control the tasks of switching mechanism remotely. This paper focuses on remotely controlling the industrial panels through GSM. The main aim of this project is to provide a mechanism which can facilitate the switching of industrial panels remotely using mobile through GSM technology. The proposed work uses arduino nano as the controller which will help to perform the task of switching mechanism. GSM module is used to receive switching commands from the user and also it can send the status of relay module to indicate whether the system is on or off. Generally the systems are provided with a module to only switch on and off the system but an important aspect considered here is also the monitoring of the status of devices. Industrial panels or machines / devices have to be remotely controlled remotely owing to the critical or crucial applications they are involved in. the designed system module is a novel technique to control and monitor the systems through GSM technology.***

Keywords: GSM, Arduino, Relay module.

I. INTRODUCTION

Automation has been an integral part of industrial development. There has always been a need of automated systems which can control the industrial devices / panels remotely because there are many applications where it is not possible to employ labor for a mere task of switching on/off the devices. GSM as a technology has been chosen due to a variety of its advantages over other techniques such as IOT which needs internet connectivity that is a problem in areas where generally industries and plants are setup. To avoid these hassles, GSM is well suited for this application. There are a variety of industries that can make use of this system like paper mills, water bottle filling plants, small manufacturing units that usually deal with switching on/ off various modules while chemical processes takes place and it is not advisable for humans to go near those panels for HMI. The system sends the status to the GSM user but also it provides continuous control over the switching mechanisms. LCD display is also provided to display the output signals for the purpose of receiver section.

II. LITERATURE REVIEW

1) *Bluetooth Home Automation System Utilizing Cell Phones:* In Bluetooth predicated home automation system the abode devices are connected to the Arduino at input output ports utilizing relay. The program of Arduino module is predicated on high caliber interactive C language of microcontrollers; the connection is made via Bluetooth. The password protection is provided so only sanctioned individual is allowed to access the appliances. The Bluetooth connection is established between Arduino board and phone for wireless communication. In this system the python script is utilized and it can install on any of the Symbian OS environment, it is portable. One circuit is designed and implemented for receiving the feedback from the phone, which betoken the status of the contrivance.
2) *Zigbee Predicated Home Automation System Utilizing Cell Phones:* To monitor and control the domicile appliances the system designed and implemented utilizing Zigbee. The contrivance performance is record and store by network coordinators. For this the Wi-Fi network is utilized, which utilizes the four switch port standard wireless ADSL modern router. The network SSID and security Wi-Fi parameter are preconfigured. Over Zigbee network, Zigbee controller sent messages to the cessation. To truncate the expense of the system and the intrusiveness of respective installation of the system Zigbee communication is subsidiary.

3) DTMF based home Automation System

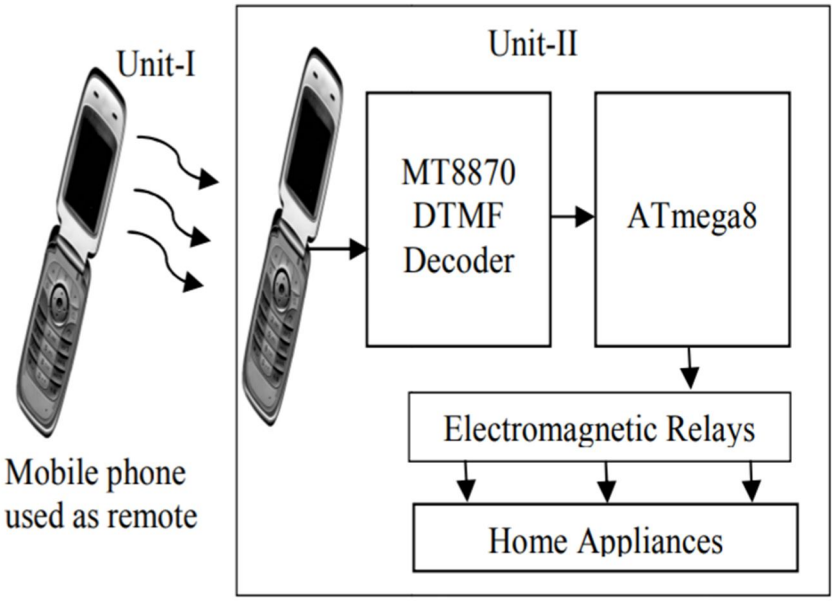

Fig: DTMF based automation system

In this mobile phones are required where one indicates transmitter and another indicates receiver. Dual tone multi frequencies are used for communication and it has the disadvantage of an increased hardware as well as a need to charge the battery to keep the system activated at all times.

III. PROPOSED SYSTEM

The proposed work represents a GSM system which is the communication medium between user and the controller section. The controller here used is Arduino Nano which helps to provide the relevant signal to the relay. Another important aspect which is essentially very important is keeping the status of relay accessible to the user. Thus user can first monitor the system parameters and only then it can allow the controlling part to the users.

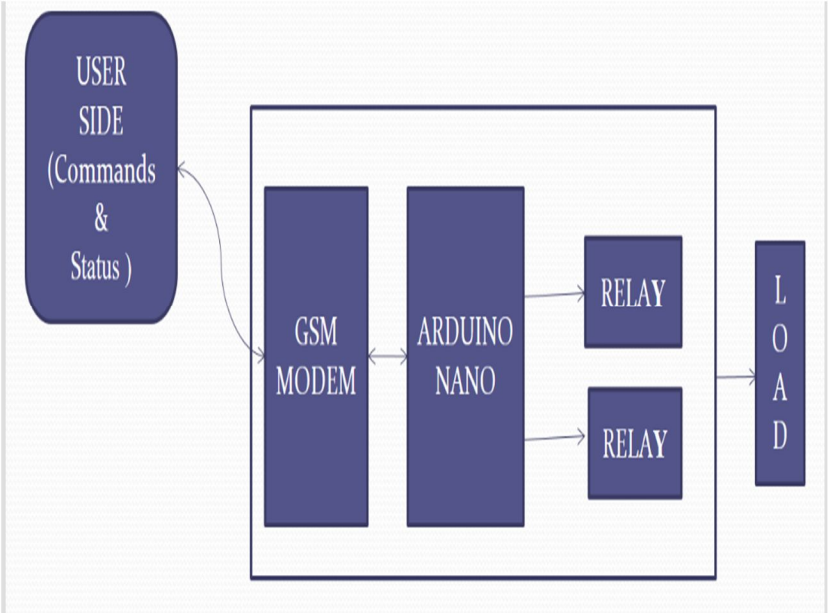

Fig block diagram of remotely monitoring and controlling system using GSM.

A. Steps to be followed for GSM module

1) Step 1: Prepare Your Tools and Parts

2) Step2: Insert a SIM Card to the GSM 900 module

3) Step 3: Communicate With Arduino by Hardware Serial.

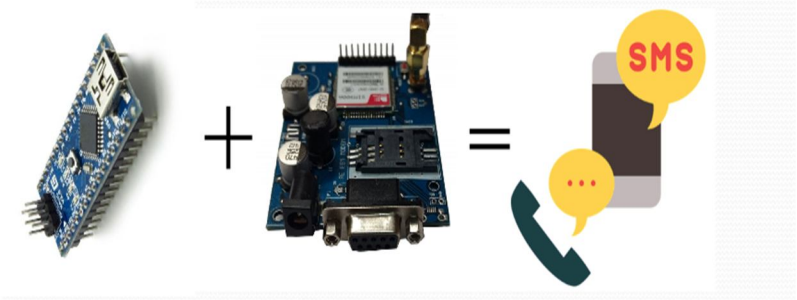

Fig basic communication of proposed system

As the system is turned on, initially it will check for commands from user and will provide the data if status is queried by the user. GSM commands will be sent by the user to turn on or off the systems according to the present status of the system. The inputs and outputs are controlled by the controller which is arduino nano in this case. Switching mechanism is done using the relay logic. LCD display ensures the status of receiver is known.

B. Hardware Details

1) GSM Module: The technology which is reliable to be used in communication medium is GSM at present. Initially gsm modem is programmed to read the status of relay module through controller. The initialization process is first performed to authorize user. Mobile Number of user is fed in program to send and receive message through that particular user only. The GSM modem communicates through AT commands and for different tasks, different mobile numbers are used.

Fig: GSM modem 90X

2) Arduino Nano: It is the controller which is economically feasible for commercial application based prototypes. It is the most popularly used version while automation works are undertaken by them.

Fig: arduino nano

3) *Relay Module:* It is an electromechanical switch which can change its state as normally on or normally off. It takes input from one side and gives output from other side. Any type of load can be connected on this module; the direct connection of device is done with relay itself.

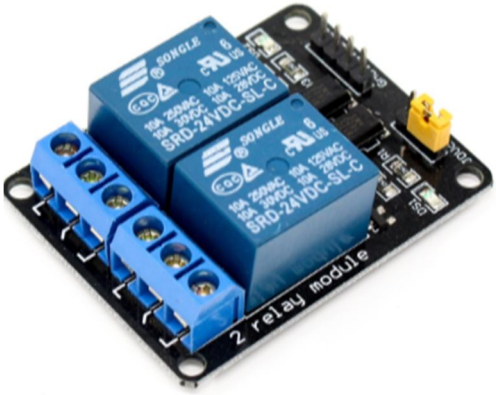

Fig relay module

4) *LCD Display:* The data is available at the users screen but if there is an operation under taken then it should be displayed on the designed module side as well hence the LCD display is made available for accessibility of users.

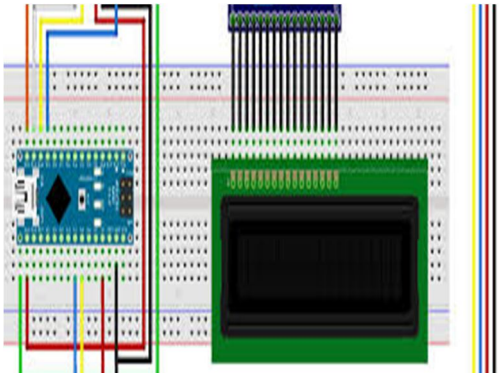

Fig LCD display.

5) *Load Connected:* Any load can be connected to the relay module like controlling and monitoring of panels or automating the task of switching on/ off mechanisms of different devices.

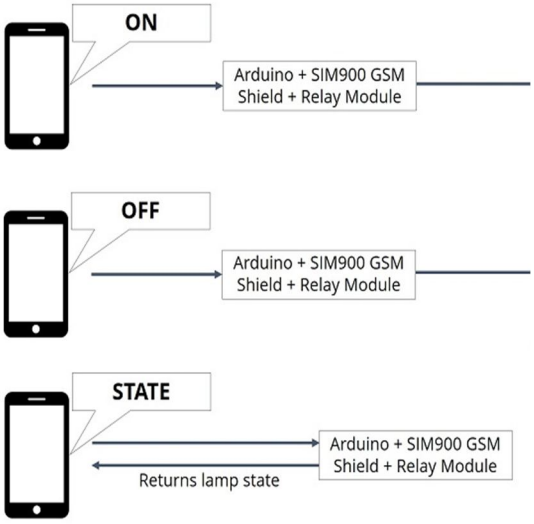

Fig: example of connected load

C. Software Details

1) Arduino IDE: As the arduino needs to be programmed, it is programmed using an open source software arduino ide. Steps involved in programming arduino nano:

a) Step 1: select a new project

b) Step 2: write the program, verify and select board to upload

c) Step 3: to check the functionality of the program.

IV. RESULTS AND CONCLUSION

This paper has discussed a novel approach to control and monitor the industrial automation in an efficient manner which is also economically feasible as it does not involve rather complex circuitry and hardware costs. As GSM is used, it comes with added advantages of high speed connectivity to the circuitry as well as good network coverage owing to the expansion of various telecom operators. This system facilitates the switching mechanism and also provides the facility to check for the status of operation of machines and devices in industrial environment as well as this designed system module is useful in homes , schools, colleges and offices as well. It is a cost effective solution.

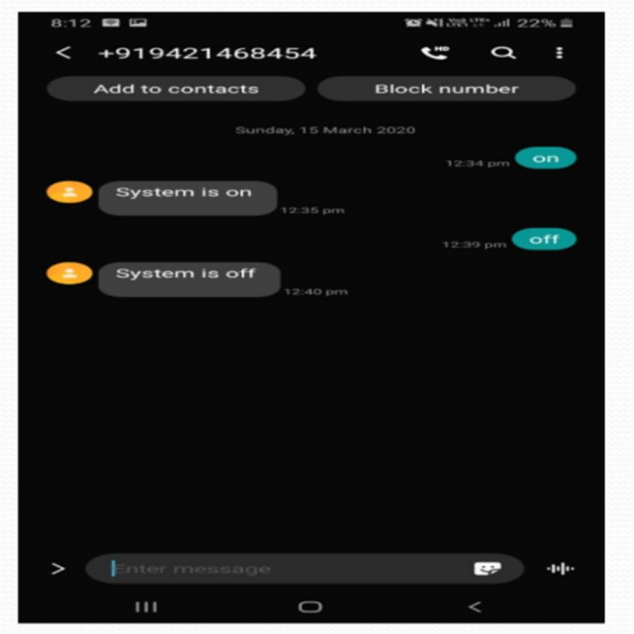

Fig Mobile user-end screenshot

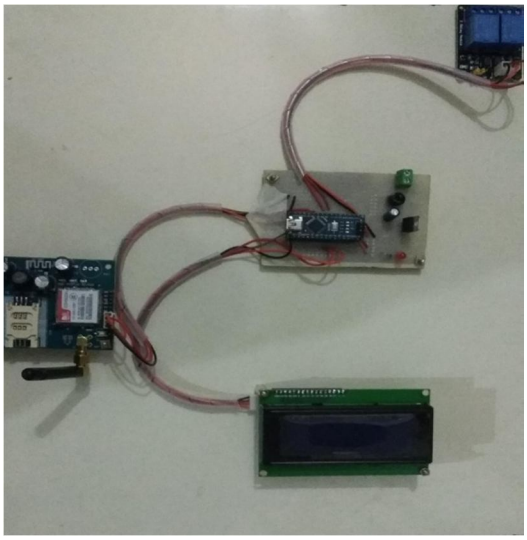

Fig : Implemented hardware module

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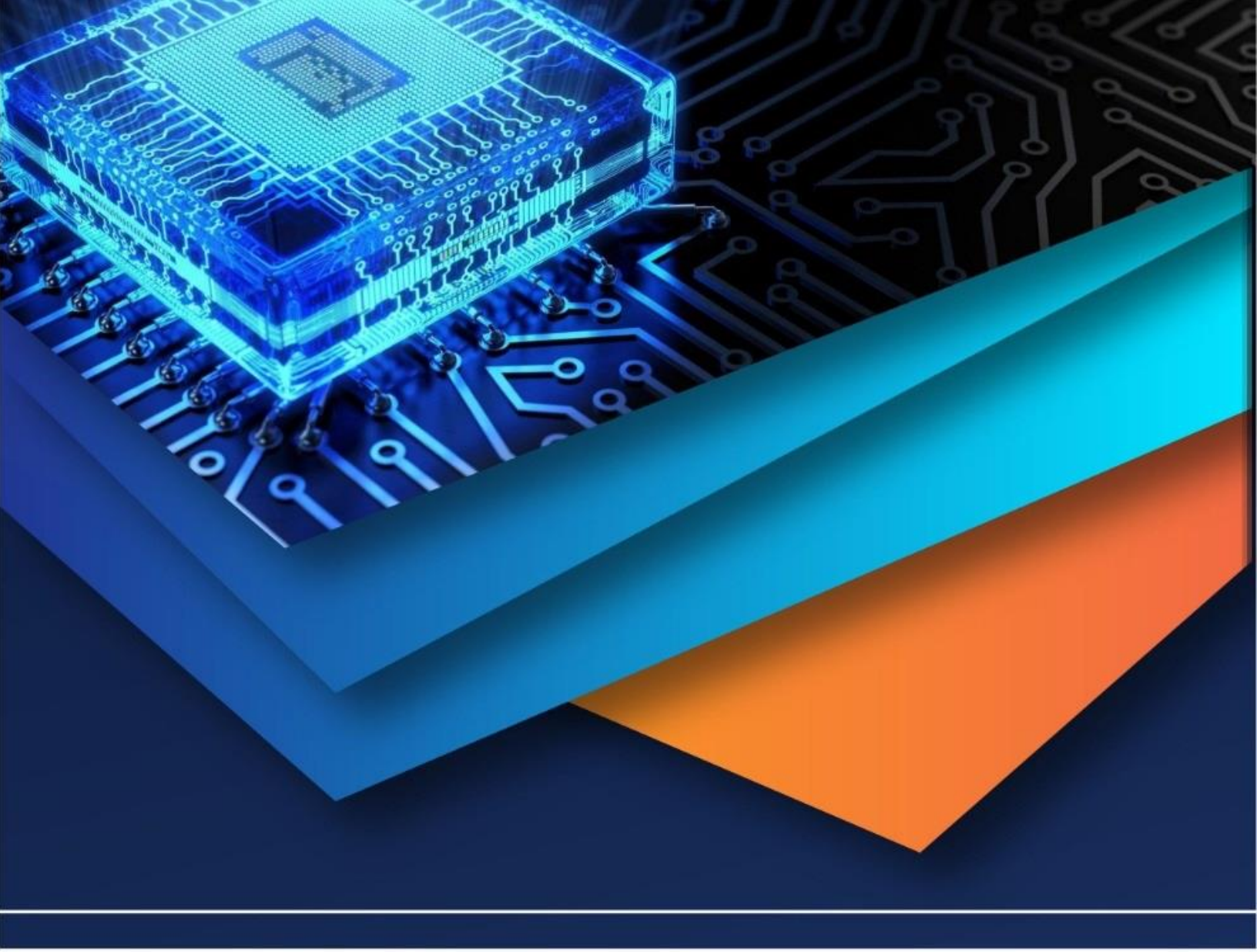

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