

ARDUINO BASED SMS CONTROLLED IRRIGATION SYSTEM

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Abstract - Here we have made use of simple and cheap components which are readily available in the market. We have made use of one of the most upcoming micro- controller known as Arduino. It has ATMEGA2350 micro- processor IC with 28 input pins. The name of our project is "SMS controlled irrigation system". This project is based on GSM communication. Functioning of our project is entirely based on the reception of SMS. This project is user friendly as its initiation is very easy it starts working with the reception of SMS which is send by user from there module (cell phone)..We have incorporated a GSM module, an electronic controller consisting of electronic component, arduino, L293D IC, DC motor, and irrigation pump. The function of device starts with the reception of SMS from user to device module. This activates the relay component used in electronic controller. With this the message received at the module get read and this start the execution of the program. This process ends up giving output as first LED glows then DC motor starts running. With this we get our final output. But in case there is some fault then an error message will be send to the user so that the process can be started again.

Index Terms: SMS (short service message), UNO, Arduino, LED, ATMEL AVR Microcontroller, and GSM.

I. INTRODUCTION

In today's life we have many electronic devices with which we can control any electrical device of use in our daily life like AC, house lighting and many another just to make our life more comfortable. In this very field we have tried to bring further more advancement by introducing SMS system in this field. With our research and analysis we have constructed an electronics device with which we can control the state of any electrical appliance like in our project is irrigation pump. We can on or off the appliance with just sending a SMS.

Arduino Uno: Also, in this project incorporated the most recent technology in micro-processors called Arduino. it is the foremost advance micro-processor playing range of operations on one platform. Arduino is Associate in Nursing ASCII text file electronic prototyping platform supported versatile, easy-to-use hardware and software system. It's meant for artists, designers, hobbyists, and anyone curious about making interactive objects or environments. it is a single-board microcontroller designed to make the method victimization in physics in multidisciplinary comes a lot of accessible. The hardware consists of supply open supply hardware board designed around Associate in Nursing 8-bit Atmel AVR microcontroller, although a brand new model has been designed around a 32-bit Atmel ARM. The computer code

consists of a typical programming language compiler and a boot loader that executes on the microcontroller

Arduino Uno R3 Board

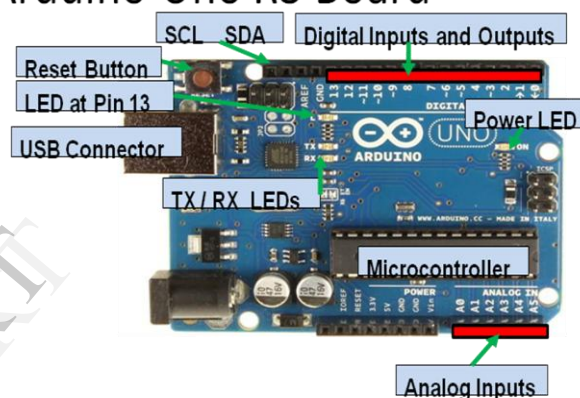


Fig 1 : Arduino Uno R3 Board

II. PRINCIPLE BEHIND ARDUINO BASED IRRIGATION SYSTEM

In this irrigation system we use the latest technology in micro-processors known as Arduino. It is the most advance micro-processor performing number of operations on a single platform. Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. Arduino work as in this to start the irrigation pump to flow the water. The two type of circuit connect to arduino first one is relay circuit and second is L293D and DC motor circuit relay circuit use to open the SMS.

It initializes the process, and starts the uploading of the program code finally resulting in execution of desired operation. We have made use of the GSM system which forms the important part of the communication system. The advantage offered by this is the availability of network over a wide range on land area. With this we mean that this system will work irrespective of where the user is the only requirement of the device is reception of SMS. Second circuit work to start the irrigation pump in this the program is upload on the arduino and arduino will connect to the relay circuit this circuit will open the SMS and after then the led will glow and DC motor starts run and irrigation pump will start. This

project has advantage of simplicity of circuit component used and advance technology incorporated. This project achieves its goal of power conservation also, as we can remove the power supply of an appliance and can put it off when not required. With this device we will be able to make our lives easier and comfortable.

III. DESIGN & IMPLEMENTATION OF PROJECT

This project is developed with the objective of ease in operating and controlling an alliance and most important, power consumption. The analysis of the project resulted in production of such a device which when initialized can generates its results without any human interference. These are the basic requirement of this project:-

- 4x 2N2222 transistors
- 10x 1K resistors
- 1x Pack of Misc. LEDs(small size)
- 5x relays with 5v coil
- GSM module(a cell phone for connecting from device)
- L293D IC
- DC Motor

The analysis of the project is divided in parts. First part is the SMS generation and reception.

➤ GSM Module:

This project has the basic requirement of a GSM module which is used for receiving SMS from user. From this point the whole process will initialize. Here it acts as a receiver which receives the SMS. Once the message is received it is read automatically by the module. This happens when relay connected to it gets activated. Because of the action of relay received message is read automatically. One the message is open and read the program is uploaded. When program is uploaded completely a LED connected to circuit glows indicating that program is uploaded completely. And then further operations are executed.

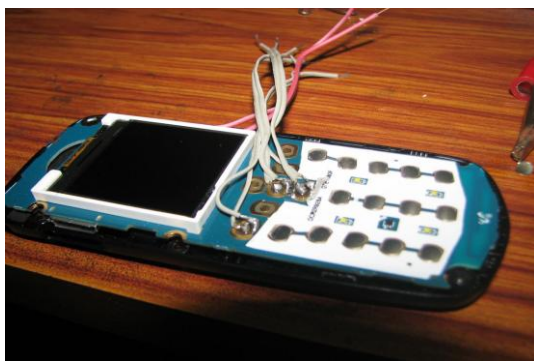


Fig 2: Connection of Cell Phone Keypad

The first thing to try with the phone is to find out what are the minimum number of different buttons you have to press to send the drafts message, start to finish. The numbers of buttons you need are the number of relays you need on the keypad controller circuit. Also connect up the relays from the keypad controller in this step. Before starting to modify the phone, we have to make sure that we have altered the main menu listing on the phone so that we have to use the least number of buttons on the keypad. Also the phone is to be set on "Vibrate Once", on receiving an SMS. Solder on the

connections from the relay pins to the keypad so that connecting to the Arduino is easy.

➤ Electronic Controller Part 1:

Second is working of relay circuit on PCB.

The second part is construction of relay circuit. It consists of 3 relay of 5 or 6 volt coil. This coil has in all 8 terminals 6 in pair and other 2. With this we connect 3 NPN transistors (2222n2 tip) and 3, 1 k resistors. Each of these transistor and resistor are connected in series with one terminal of relay and other terminal in given a common supply (Vcc). The negative terminal is connected to first terminal of relay and then resistor is connected. These are soldered on zero PCB with positive terminal grounded.

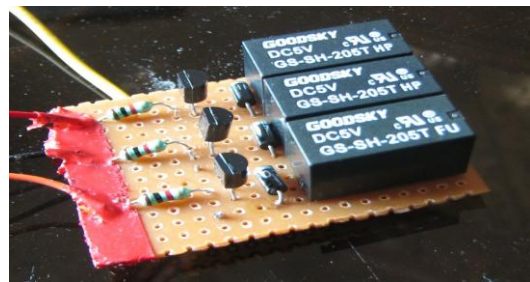


Fig 3: Electronic Part with 5v Relay

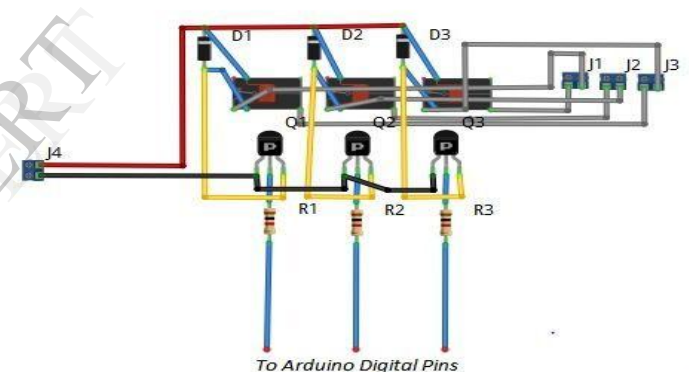


Fig 4: Circuit Connection of Electronic Controller

The bases of transistors are connected to the Arduino digital pins via 1K resistors to limit the current draw from the pins. The snubbing diodes prevent any power spikes from the relay coils frying the circuit. The collectors of the transistors are connected to a common ground shared by the Arduino.

➤ L293D:

Third half - association of L293D IC.

L293D contains 2 intrinsic H-bridge driver circuits. In its common mode of operation, 2 DC motors are often driven simultaneously, each in forward and reverse direction. The motor operations of 2 motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 can stop the corresponding motor. Logic 01 and 10 can rotate it in dextral and anticlockwise direction, respectively. Modify pins 1 and 9 (corresponding to the 2 motors) should be high for motors to start out operative. When a modify input is high, the associated driver gets enabled. As a result, the outputs become active and add part with their inputs. Similarly, once the alter input is low, that driver is disabled, and their outputs square

measure off and within the high-impedance state. With this configuration it's connected on a zero PCB. With an equivalent circuit light-emitting diode connected.

➤ Dc Motor:

Forth part is connection of DC motor with L293D.

For project level we have used DC motor to run irrigation pump. Here we attach a fan with DC motor. Final the negative terminal is connected to the terminal of L293D and positive to Fifth part is assembling different parts of circuit.

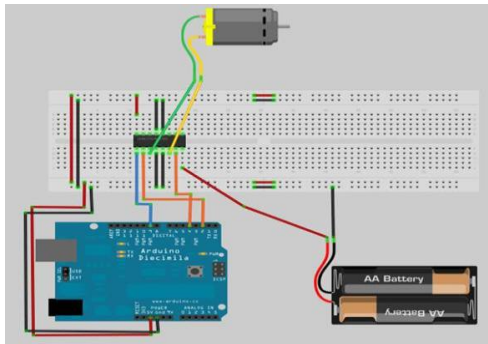


Fig 5: Connection Of DC Motor L293D With Arduino

➤ Electronic Controller Part 2 -Arduino:

The final assembling is done by connecting all the parts to arduino. Attach the Keypad controller's pin 1, 2 and 3 to Arduino digital pins 4,5 and 6 respectively. Then attach the relay controller's "relay control" wire to the Arduino digital pin 3. Connect the power LED to the 3v and GND. (if additional power LED is attached). After this connect the relay controller's 9v and GND to the Arduino respective pins. Attach the previously soldered keypad wires to the keypad controller. Connect a 9v power supply to the Arduino ". We should also confirm once more with the circuit diagram that everything is attached to the proper pins before continuing.

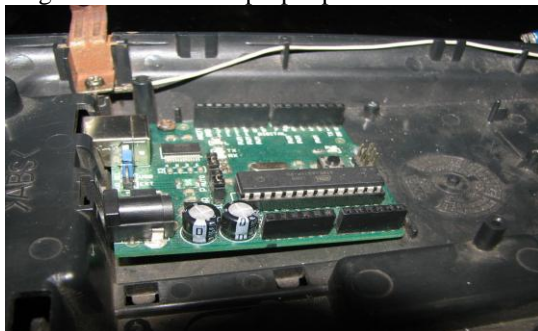


Fig 6: Set Up Of Arduino

IV DESIGN FLOW

The flow design is shown in figure below:

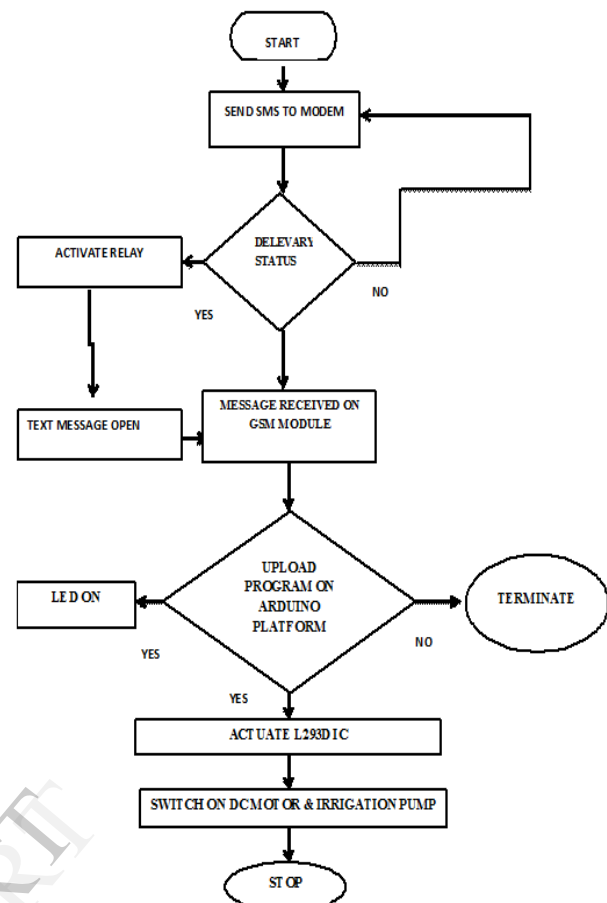


Fig 7: Design Flow

V. SIMULATION RESULTS

We have assembled our circuit component in such a way that the complete design of device remains simple and less complex. This is one of the advantages of our proposed work. We have given different circuit and component used here in particular order and they are according to position at which they are placed and connected. They are as follows:

1. GSM mobile cell phone, for receiving message from user.
2. Zero PCB 1, containing relay with 5/6 volt coil, transistor (2222n2TIP) and 1k resistor, for opening and reading message on module hence initializing process.
3. Zero PCB 2, containing L293D connected along with LED, for controlling the operation of motor and fan. LED for indicating uploading of program code.
4. DC motor for running irrigation pump on or off.
5. Arduino , for connecting all other component together and execute the command as per program
6. Connecting USB cord, for connecting arduino micro-processor with source code.

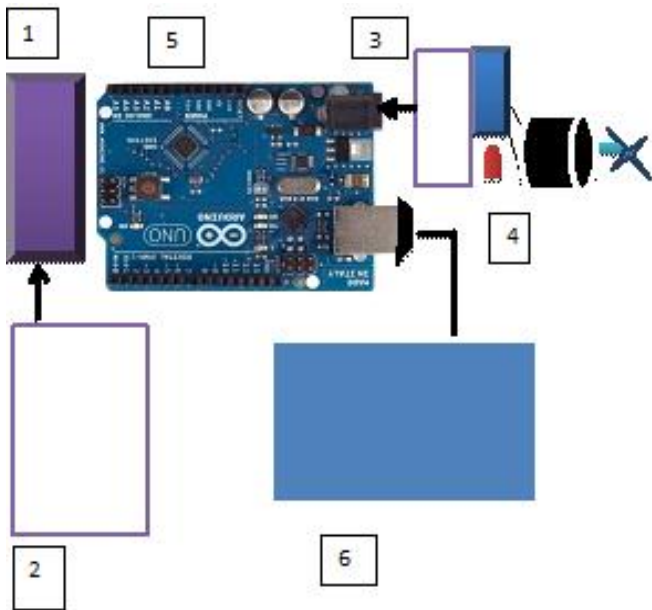


Fig 8: Design of circuit connection

In electronic controller part 1 we have relay with 5volt coil, NPN transistor and resistor. The entire process starts with reception of a SMS send via user. When GSM module receives SMS the PCB gets its supply and relay gets activated. With this activation the unread SMS gets automatically opened. This result is fed in electronic controller part 2 via GSM module.

Here GSM module initializes the process of operating device. This starts with reception of SMS via user. As a result of the output of electronic controller part 1, received SMS is automatically read. This means the module reads unread message without pressing any button i.e without any human interference. This is the result displayed by GSM module. This output is send to electronic controller part 2 which is micro controller arduino.

As soon as the unread message is read by module a signal is send to arduino. The source code which has been already burned inside arduino chip gets uploaded on receiving the signal from module. With this initialization execution of commands of source code begins.

The final task is done over here.

At this stage we can see the actual output of program. Execution of program leads to initialization of the DC motor an running of the fan which is the requirement of our project. Hence our final result is running of fan with the reception of a SMS. If the fan does not run and program is not executed properly then an error message is send to user.

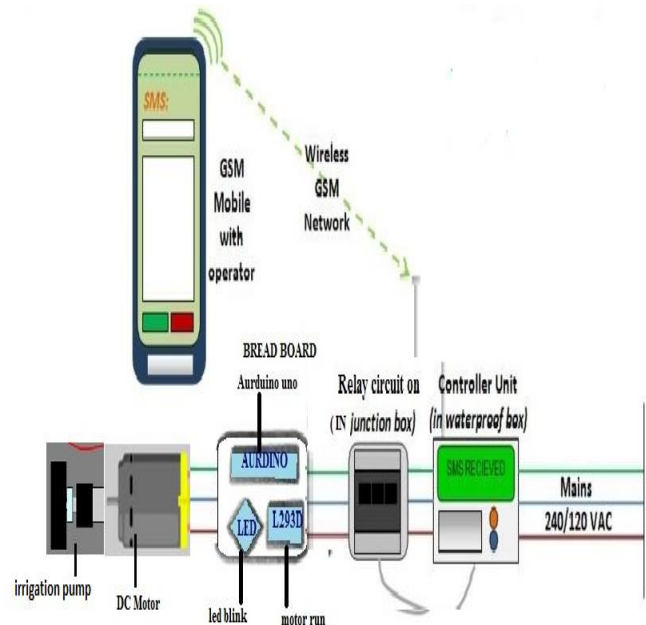


Fig 9: Block Diagram

VI. CONCLUSION

With this we come to conclusion of our work done. This project can be of good use in practical scenario because of some important advantage offered by it. As it has cheap cost of production its implementation is possible at rural areas. Project has enormous potential and may be used in various other ways, due to its cheap and cost efficient design.

Managing feed and water levels for livestock, detecting flooding, managing wind turbines, reporting intrusion, remotely opening and closing gates to allow stock to move between pastures or return to barn, or remote monitoring of aquaculture systems.

Hence we conclude that by incorporate GSM system we can increase efficiency of the device as well as of output. GSM makes communication possible at very great level therefore range of work area will not be a matter of concern. And lastly we are also getting error report of the device that too at the very same moment of malfunction saving our time which otherwise is first required for detection of the error and hem for its cure..

VII. FUTURE WORK

Our projective involves use of GSM system; so it are often incorporated with several different devices for higher peromance.this may sure as shooting build that task easier and can be of price{low cost} implementation cost. Below we have got listed a number of the long run work which might be exhausted our project and giving substantive output. They are listed below:

- By changing this whole circuit in AC we are able to construct associate in nursing irrigation system

controlled by SMS.

- Use it as a home automation controller, by adding a number of a lot of 240v relays.
- Remotely perform jobs
- Use it in conjunction with a electrical devices, in order that the whole system is eco-friendly.
- Use afloat switch during a tank, so the system mechanically shuts the pump down, once the reservoir is full.
- To notice the MCB trip, use associate degree OPTO isolator to live the voltage across the motor.

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