

**WIRELESS MODEL FOR MONITORING AND
CONTROLLING WATER NETWORKS AND STATIONS
IN KHARTOUM**

Ibrahim khider*

Mohamed abdalla*

Khalid Hamid**

ABSTRACT

In this study, monitor and control of tow pumps and ground tank in station and pipe line in network using Atmega16 microcontroller is activated Visual basic programming language (BASCOS AVR), at main point Mobile. At remote points Atmega 16, another external modem is required for asynchronous communication. Both sides can call each other to sent status information. With this system monitor and control of water pumping stations and motorize valve can be activated. The system name Monitoring and Controlling Unit (MCU).

Key Words: ULN2003, Atmega16, GSM Modem, MAX232, Relay, SMS, Pressure sensor, LCD, Pump.

* Sudan university of science and technology

** University of science and technology

I. INTRODUCTION

Monitor and control the water networks and stations for better water utilization in Khartoum State Water Corporation (KSWC) by design an electronic circuit in order to measure pressure, quantity and level water in stations and pressure water in networks using sensors, send the pressure information to the operation engineer through GSM, and control the water pumps and water motorized valves depending on water pressure information.

II. MONITOR AND CONTROL SYSTEM

Remotely the system allows the user to effectively monitor and control the appliances and equipments via the mobile phone set by sending commands in the form of SMS messages and receiving the appliances status. The main concept behind the project is receiving the sent SMS and processing it further as required to perform several operations. The type of the operation to be performed depends on the nature of the SMS sent. The principle in which the project is based is fairly simple. First, the sent SMS is stored and polled from the receiver mobile station and then the required control signal is generated and sent to the intermediate hardware that execution according to the command received in form of the sent message.

The application of this technique has more efficient, comfortable and reliable apply in Khartoum State Water Corporation (KSWC). The comfort of being able to take control and monitor of pumps in (Stations, Wells) and valves in networks one location for saves a lot of time, cost and effort.

III. WORKING PRINCIPLES OF SYSTEM

The main task of the system is data flow control between Mobile side (Operation Engineer) and microcontroller sides (Station - Well - Network) to arrived to best operation in KSWC (efficiency - quality - cost) and provide data sharing shown in Figure 1.

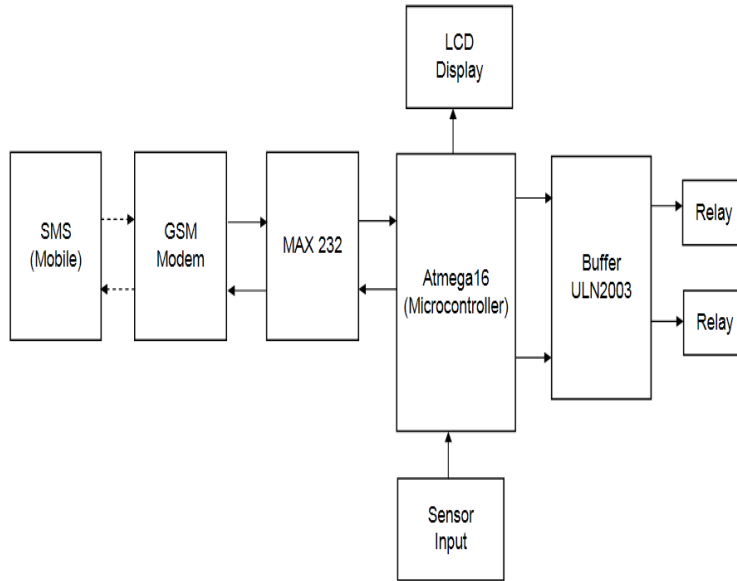


Figure 1: Block Diagram for system

The MCU in station read the (Pressure - Level) water by sensor (Pumps - Ground tank) then control in the operation pumps depending on the amount of values and send SMS to a central device every 1 minute (Pressure – Quantity – Level) water and display on LCD also. The MCU had two mode operation Auto mode and Manual mode, In Auto mode the MCU control pump automatic depend on value pressure outlet main pipe from station and level water in ground tank. In manual mode the operation engineer have control pump by send SMS for MCU (Open – Close) pump shown in Figure 2.

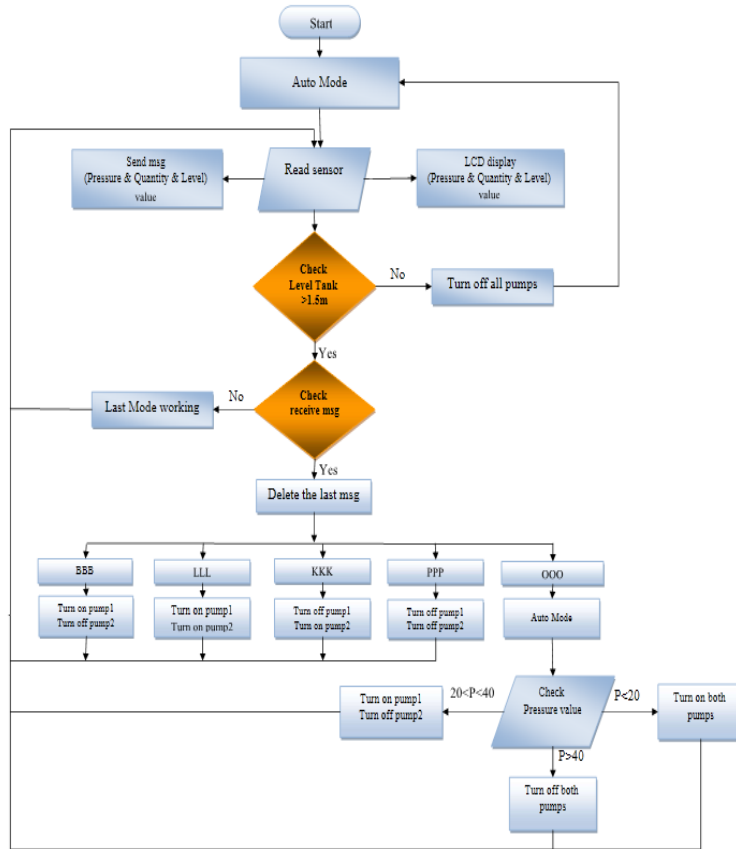


Figure 2 :Flowchart system operation (station)

The MCU in network read the pressure water only by sensor then send SMS to a central device every 1 minute (or any time slot determine by operation engineer) contain pressure water and display on LCD also. The MCU had one mode controlling by operation engineer, can control motorize valve by send SMS for MCU (Open – Close) motorize valve shown in Figure 3.

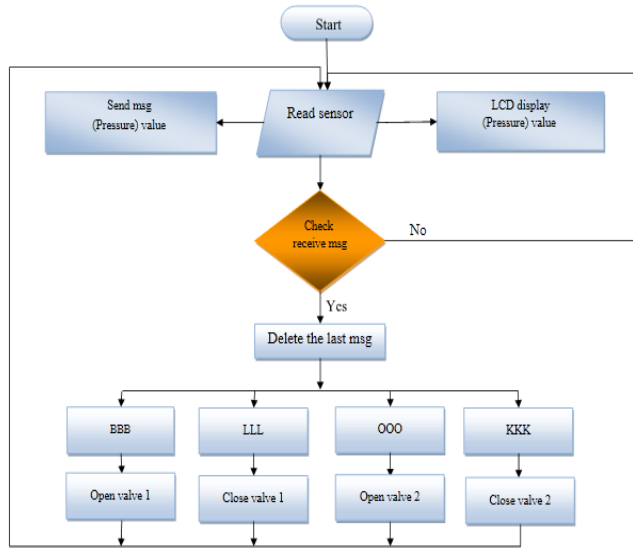


Figure 3 :Flowchart system operation (Network)

III. TESTING AND RESULTS

Started many test before assembly electronic circuit (MCU). First: known actual water pressure in networks and stations in Khartoum State Water Corporation (KSWC), Second: testing electronic circuit in simulation (Protues). Selected location testing devices (Logger) in the stations and network after knowing the areas of weakness and strength of the water by maintenance engineers in the State Water Corporation Khartoum, shown in Figure 4. Started the pressure tests period from April 2012 to September 2012, we had obtained the following location and results for Stations and Networks shown in Figure 5.



Figure 4 :Testing devices (Logger)

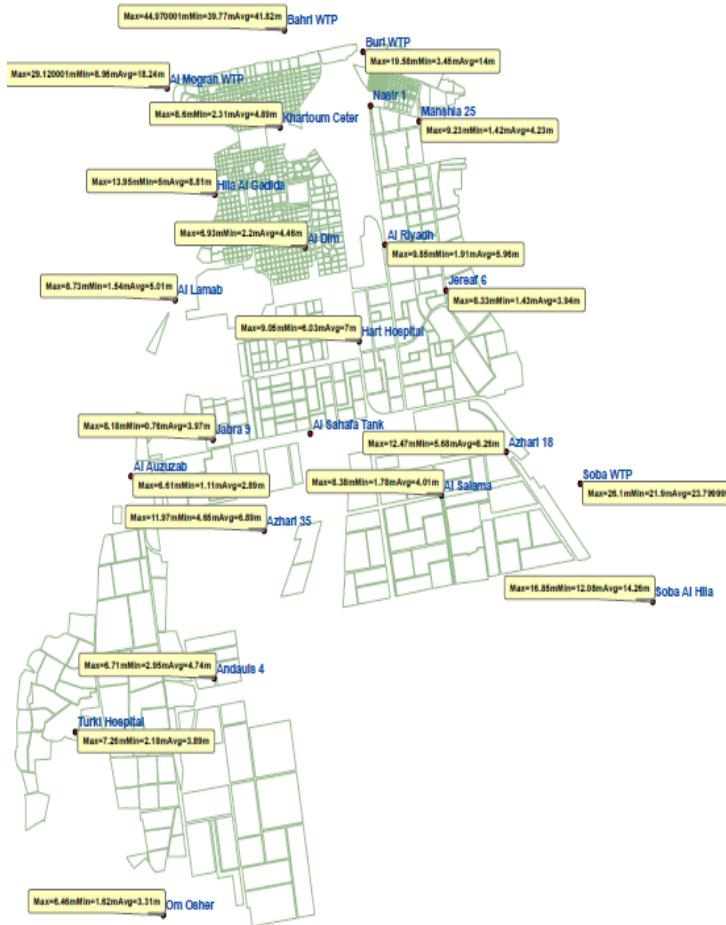


Figure 5: Map showing the location and results in Khartoum area

Found some difference between MCU in station and Network (Design-function-contain

SMS)

Station:

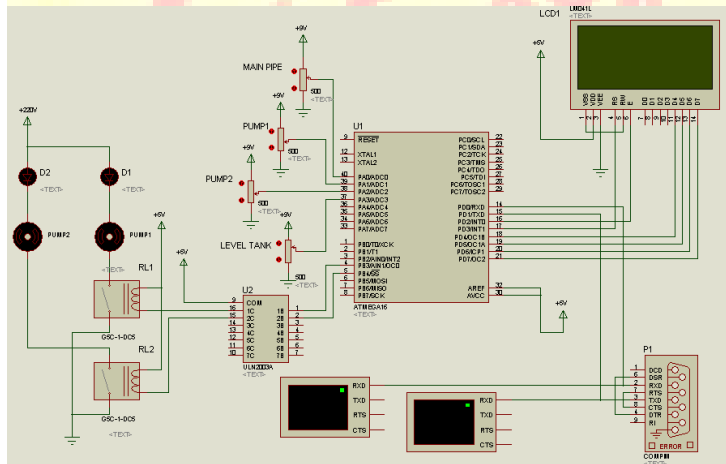


Figure 5 :Circuit Diagram (Station)

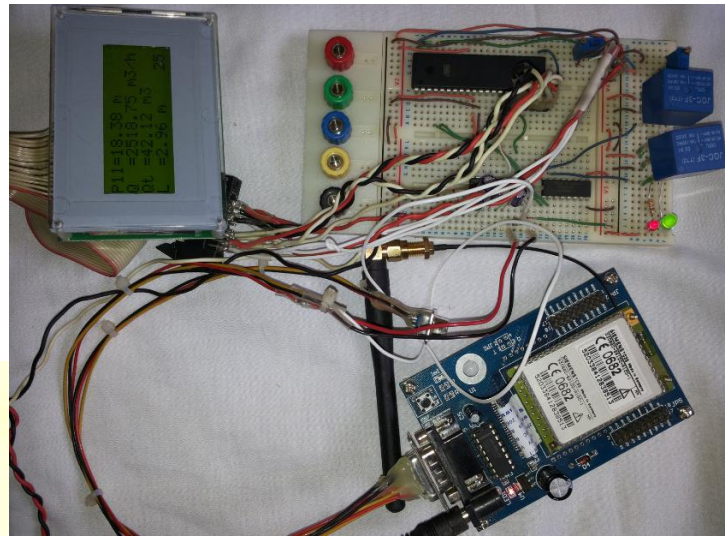


Figure 6 :Electronic Circuit (Station)

Network:

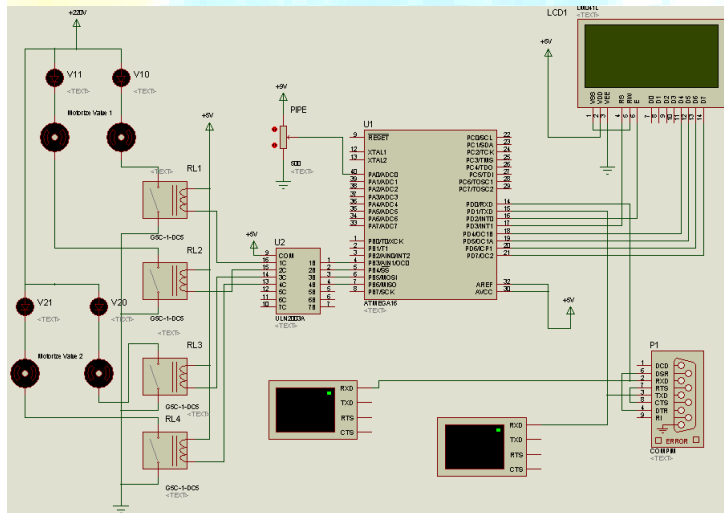


Figure 7 :Circuit Diagram (Network)

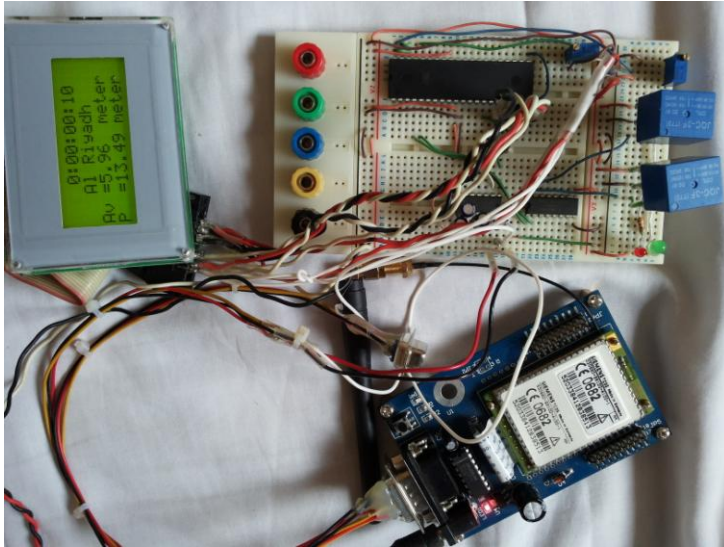


Figure 8 :Electronic Circuit (Network)



Figure 9 :Message in Mobile

V. CONCLUSION

An attempt is made to integrate the two most widely used technologies namely Microcontroller and GSM for developing monitoring and controlling system. It is found that, it is possible to integrate microcontroller with GSM modem for reliable pressure and quantity water information and to ascertain the coverage area in Khartoum State Water Corporation (KSWC) for improve level service by low cost compare to wireless radio, PLC and SCADA.

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