

Automatic Collection of Smart City Resources

Minakshi S. Kumbhar

*Department of Computer Science Engineering
Walchand Institute of Technology, Solapur, Maharashtra, India*

Pratibha S. Yalagi

*Department of Information Technology Engineering
Walchand Institute of Technology, Solapur, Maharashtra, India*

Abstract- Government is mainly focused on, to make cities smart, change the quality of life and modify city assets. These all development must meet with the person's residency requirements. Smart city is one of the concepts of Internet of Things (IOT). IOT is a network of Internet enabled objects interacting with web service objects. These technologies are such as RFID (Radio Frequency identification), sensors, and smart phones. IOT is one paradigm which helps in making our nation smart. The system consists of two smart city modules, namely - Automatic Garbage Collection uses Sensor and Automatic Water Supply. With the help of sensor, Arduino microcontroller, SIM shield, servo motor implementing these modules. In, Garbage collection system checks the garbage level of dustbin according to that with the help of GSM system will send short service message to the diver. Each dustbin contains unique id. Second is Automatic Water Supply in this supplying the water according to area, date and time using servomotor. Checking the water level and supplying it.

Keywords – Arduino microcontroller, GSM, Ultrasonic Sensor, USB cable, Servo Motor, SIM shield, Jumper Wires, Bread Board

I. INTRODUCTION

TheWith the rapid growth of urbanization, in today's city people face new challenges Everyone is running towards technological growth. Our nation mainly focused on developing the city assets, changing quality of life. IOT is a paradigm which connects everyday objects like smart control. It can connect services with new ways and trying to transform urban centers in the Smart Cities. It uses technology to make cities more efficient and that must be of people satisfactory.

To develop the first module garbage collection management at all see on street side, bins are getting filled and garbage spread out surrounding bins and spread over the street. Government should take care of such things as garbage results in unhealthy climate. When the garbage reaches the level of the sensor, then that indication will be given to microcontroller. The controller will give an indication to the garbage collector as which garbage bin is completely filled and needs urgent attention. The controller will give an indication by sending Short Message Service (SMS) using GSM technology. If both the garbage bins are full at the same time, then the message will be displayed. Also Short Message Service will be sent to the garbage collectors, mobile one by one.

To develop second module all know, major problem in current city is the lack of water. A person does waste the water due to our laziness. Once completing water usage everyone switches off the tap to save water. But no one bothers about it. Another reason for wastage of water is operating error. To avoid such wastage the system proposes to implement water distribution supply method which automatically on valve whenever necessary on and off.

II. LITERATURE REVIEW

In the previous research study different techniques and methods are used for different application based on different user content.

“Survey on Technology Tools for Water and Garbage Management for Smart City Planning”

The proposed system implements two modules of the smart city- Water distribution supply and Garbage collection management respectively. The system has done research related to previously implemented papers on the above two modules. And the system has discovered different methodologies used in previous papers for implementing same modules [1]

“Industrial Data Communication; Industrial Ethernet”, in this paper the theft of water can be monitored and calculated by flow sensors. System automation is based on an electronic sensor. To improve water distribution they use Zigbee technology. The system includes Remote Terminal Units (RTU) over a large geographical area [2]

“Automated urban drinking water supply control and water theft identification system”, in this paper with the help of flow sensor water theft can identify. They use supervisory control and data acquisition for optimization process and Decision support system (DSS) for data driven [3]

“Smart Water Grids for Smart Cities”, in this the system implemented a prototype for a smart water metering system. For water flow supply they use harvesting technology is an open metering technology used for implementing a meter system for water consumption [4]

“Smart Water Supply Management” ,in this system they use microcontroller to count and major the flow rate using a sensor and wireless transmitter to transmit the flow rate the valve turns on /off by central PC [5]

“SENSOR NETWORKS FOR MONITORING AND CONTROL OF WATER DISTRIBUTION SYSTEMS” ,in this paper they use Water Wise technology that supports the dynamic prediction of water demand application and hydraulic value or state, online prediction and detection of events and data mining for identification of long-term trends [6]

“AUTOMATED WATER DISTRIBUTION SYSTEM USING PLC AND SCADA”, in this system they use two technologies SCADA PLC and. SCADA is used for water monitoring and PLC for water control distribution. Whole system depends on PLC and SCADA [7]

“Design and Implementation of a Network Management System for Water Distribution Networks”, in this it would provide a solid waste collection in time and also overcome the disadvantages such as low fuel cost, clean environment, usage of minimum rate available vehicle [8]

“Automation in drinking water supply distributed system and testing of water,” ,the system consists of RFID technology. They use GPRS, GSM and GIS for map server, data server and control server. GPS is used to exact truck location. The information is transferred through GPRS to a central database. The users can easily view the current location of each truck via a web-based application [9]

“Automated Water Supply System and Water Theft Identification Using PLC and SCADA”, in this paper a remote monitoring solution has been implemented, providing the user possibility to interact with the system by using a web browser. The system architecture depends on sensor nodes and that use of Data Transfer Nodes (DTN) in order to provide to a remote server. The extracted data values from the garbage bins filling [10]

“RFID and Integrated Technologies for Solid Waste Bin Monitoring System” ,in this paper, it focuses on the current municipal solid waste management system of Thoubal Municipality and it make add with some new suggestions which may be useful to work on further to improve the current management systems [11]

“Integrated Sensing and Communication Technologies for Automated Solid Waste Bin Monitoring System”, in this paper it uses RFID radio waves to identify people and any object using GPS, GIS and GSM technology [12]

III .BLOCK DIAGRAM

A. Automatic Garbage Collection System

A.1. Arduino Microcontroller-

Arduino is an open-source platform. Easy-to-use software and hardware. Arduino microcontroller is able to read inputs and display the required output. It's work depends on Integrated development environment (IDE).According to user instruction it works. Over the years. It is the brain of more than thousands of projects.

A.2. GSM Shield-

It is used in Arduino for making and receiving the voice call. For this purpose GPRS is used. GSM used for short message service. SIM shield is also used to send/receive short message service. It is connected to Arduino microcontroller. It follows the instruction to send /receive the message or voice calls.

A.3. GSM Technology-

Global System for Mobile communication (GSM) is an open technology. Today's mobiles are based on this technology. It is used for digital wireless telephone system (TDMA, GSM, and CDMA). It works only 900 MHz or 1800 MHz frequency band.

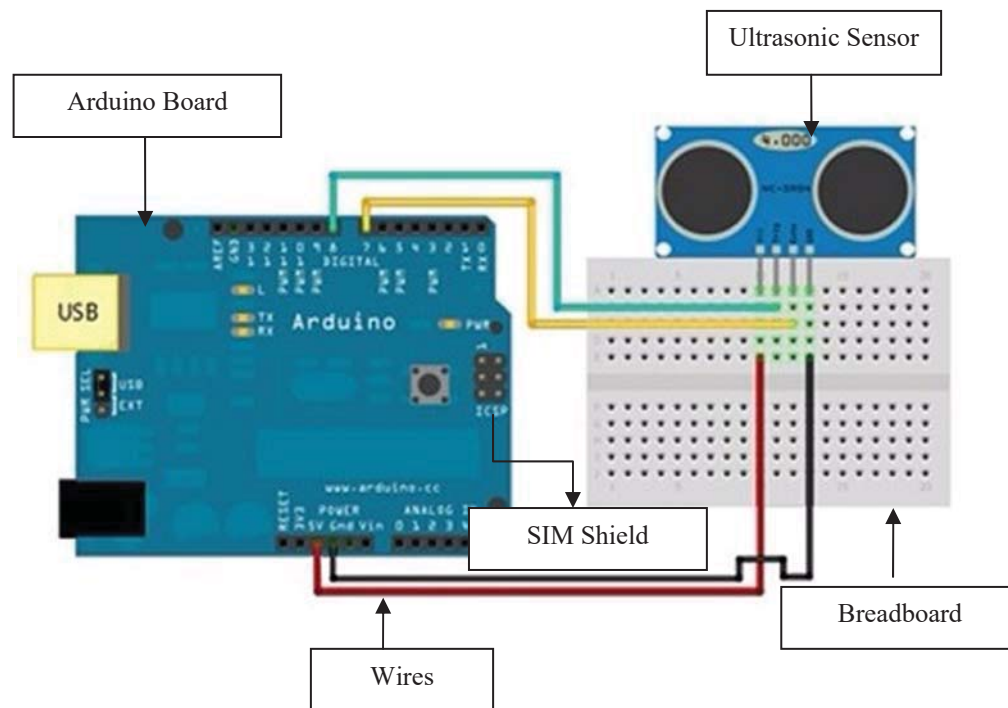


Figure 1. Automatic Garbage Collection System

A.4 Ultrasonic Sensor-

The Ultrasonic Sensor sends a high-frequency sound pulse and then checks how long time echo takes to reflect back the sound. The sensor contains two openings transmits like a tiny speaker and the second one is receives like a tiny microphone. In the air the speed of sound is 341 meters per second. To determine an object distance along with the time difference between receiving and sending the sound pulse.

Distance can be measured by

$$\text{Distance} = \text{Time} * \text{Sound speed}/2$$

Where Time = the time between an ultrasonic wave is received and transmitted.

Direction of wires connection as follows:

1. Power Supply 5V
2. Input Trigger Pulse
3. Output Echo Pulse
4. Ground 0V

Required Electric Parameter

1. Working 5V DC
2. Working 15mA Current
3. Working 40Hz Frequency
4. 4m Max Range
5. 2cm Min Range
6. 15 degree Measuring Angle
7. 10uS TTL pulse Trigger Input Signal
8. The range in Proportion Dimension 45*20*15mm and Echo, Output Signal Input TTL level signal

A.5 Timing Diagram

For this need to the input supply 10uS pulse and then the module will send an 8 cycle burst at 40 kHz and raise its echo. The Echo is the range in proportion and distance object that is pulse width. Then calculate the range through the interval time between and receiving echoes signal and sending trigger signal.

Formula: $\mu\text{s} / 148 = \text{inch}$; $\mu\text{s} / 58 = \text{centimeters}$, or

Range = high level time * velocity (340M/S) / 2.

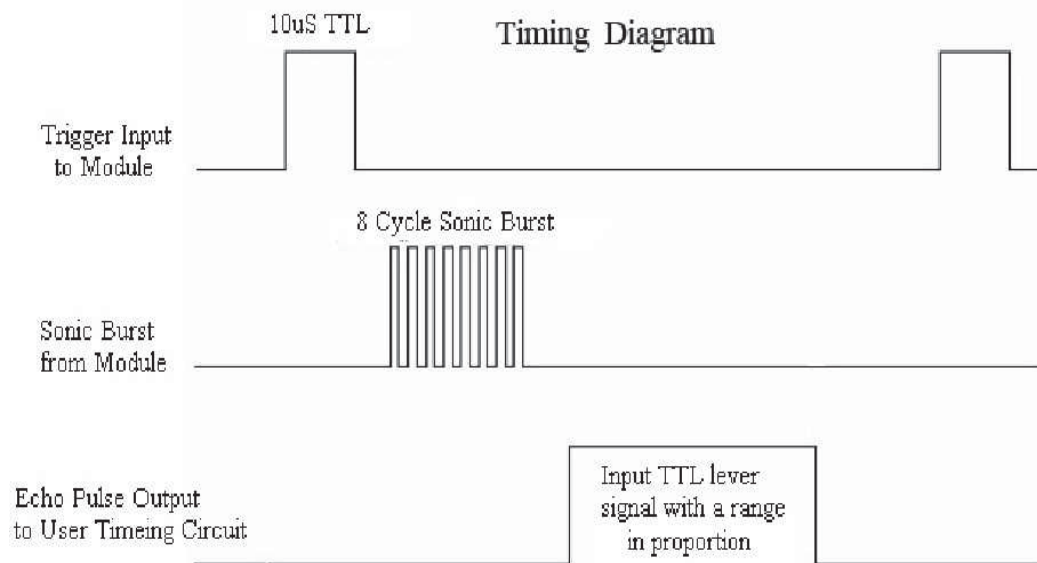


Figure1. Automatic Garbage Collection System, in that ID number is given to each dustbin and sensors are placed on both sides of dust bin, So that communication is overhead. If the dust bin is full at that time the compatibility between arduino and GMS module will be taken care by a chip on the receiver side. The GSM Module is interfaced with the arduino board through the chip. GSM Module has a SIM card; it sends an SMS to garbage user. They are used for sending and receiving SMS alerts.

B. Automatic Water Supply Management-

B.1 Water Valve-

The valve is used to turn on and off condition and supply is given to the main valve. The output from the Arduino is necessary to give switch function using a relay to on and off the valve. If the water level in the storage tank reaches the maximum main valve is automatically turned on. The set point is fixed for other valves. If anyone one of its

valve or both the valves attains the set point the main valve is turned off. The valve will be turned on after 24 hours later. The valve is used to control the flow rate.

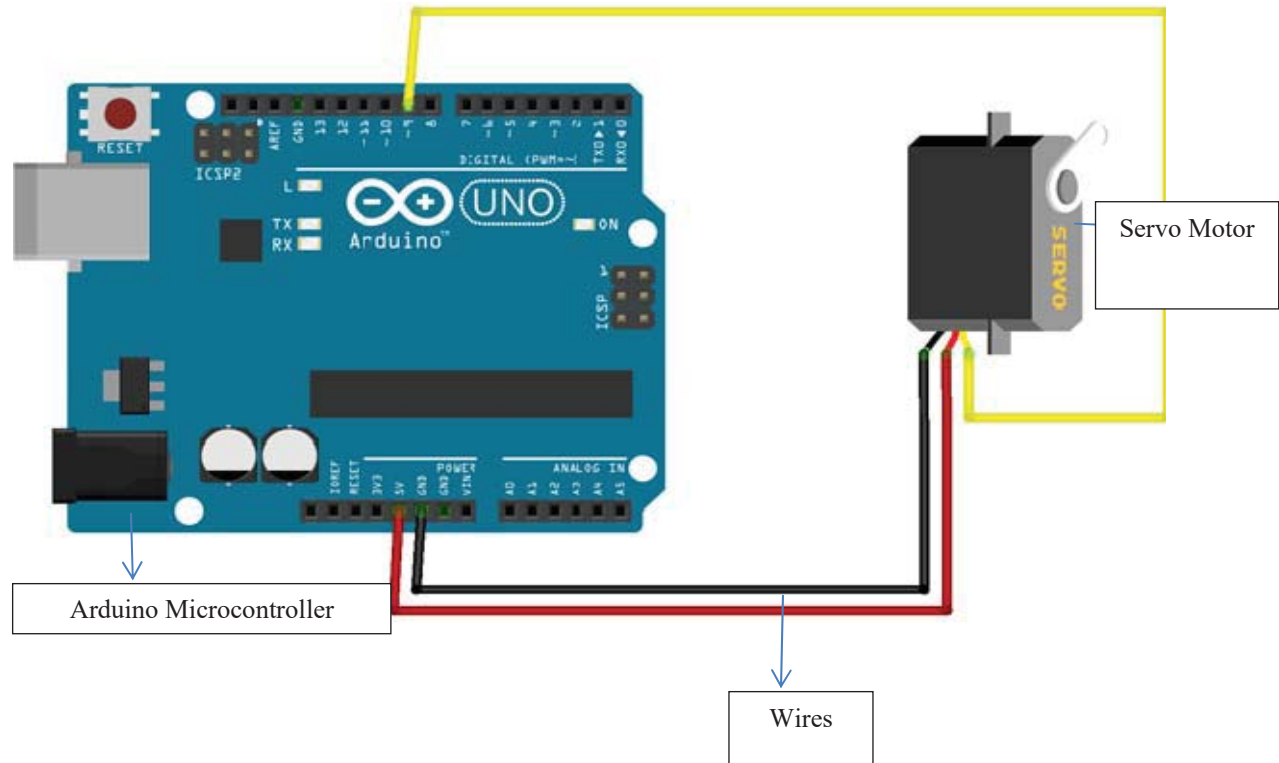


Figure2. Automatic Water Supply Management

B.2 Servo motor

Servo motors are used in many applications for a long time. They are very energy efficient and small in size. They can be used to radio-controlled toy cars, airplanes and robots or to operate remote –controlled applications and also used in robotics, in-line manufacturing, in industrial applications, food services and pharmaceuticals.

Servos are controlled through the control wire by sending a pulse width modulation (PWM) or electrical pulse of variable width. There is a maximum pulse, minimum pulse and repetition rate. A servo motor can usually only turn 90° in either direction for a total of 180° movement. A servo motor can usually turn 90° total of 180° movement.

IV. EXISTING SYSTEMS DISADVANTAGES

1. Less effective and Time consuming process, trucks go and empty containers, whether they are full or not.
2. Cost is high.
3. Environment gets Unhygienic.
4. Smell spread bad everywhere and human beings may cause illness.
5. More Noise and traffic.
6. Water distribution is unequal.
7. Not fix Time.
8. Lots of water wastage.

V. PROPOSED SYSTEM ADVANTAGES

1. On the fill level of the dustbin, Real time information will get.
2. Based on the actual needs deployment of a dustbin.
3. Resource optimization and Cost Reduction.
4. Environment quality improves.
5. Fewer smells -Cleaner cities, intelligent management of the services in the city.
6. Effective usage of dustbins.
7. Water distribution is equal.
8. Fix timing.
9. Water wastage will be avoided.
10. Cost is low.

VI.CONCLUSION

Rapid growth of urbanization, to avoid people facing many problems related to city assets and changes their quality of life. And avoid mankind laziness, wastage of water, illness in the city. Proposed system implements two modules. So that it reduces the wastage of water and dustbin overflow. The development of this system can reduce the waste of water and make the management of water more effective and convenient in the city. The proposed system would solve a lot of problems related to solid waste collection, monitoring, minimizing cost and accelerate the management.

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Engineering, Faculty of Engineering & Built Environment Universiti Kebangsaan Malaysia, Bangi, Selangor DE, Malaysia
Email: md.abdulla@siswa.ukm.edu.my, hannan@eng.ukm.my, shafique@vlsi.eng.ukm.my, aini@eng.ukm.my.

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