



Waste Management Using Solar Powered Manet

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ABSTRACT -

As a developing nation and as the second most populous country in the world we in India are facing unique problem that requires solution in a unique way. One such problem among them is the solid and liquid waste management. In this project we propose a self-sustaining maintenance free system that uses a combination of recent developments in the field of communications like MANET and solar power. We are using ultrasonic sensors that are used to monitor the level of the wastes present in the garbage bins that are located on the lids of the same. When anything or object comes into the area of covered circuit then its frequency sound reflected to receiver and alarm is triggered. MANET is an infrastructure less IP based network of mobile and wireless machine nodes connected with radio. MANET nodes require ad-hoc type routing protocols to overcome the distance coverage limitation. To monitor this work we use GIS system based on mapping applications. The location if garbage cans is spotted with accuracy by using GIS and GPS.GIS can be a great planning and decision making tool for wireless telecommunication. GPS systems are extremely versatile and can be found in almost any industry sector. They can be used to map the drainage holes and garbage cans at each place.

KEYWORDS: solid, liquid, waste, ultrasonic sensors, GIS, MANET, solar power, GPS.

I. INTRODUCTION

Our proposed system comprises of an effective way of waste management on a timely basis. The wastes are always produced on daily basis, be it domestic or industrial purposes. Only the type and amount of the wastes differ but their infectious nature remains the same. Disposal of waste to the biosphere has given us a way to think as well as to implement an integrated waste management method. However, due to inefficient infrastructure, not all of these wastes are collected and transported effectively to their dump sites. This may result in serious health impacts and problems

related to our surrounding environment. Development of advanced technologies for recycling and the disposal of waste has led to positive ecological effects. If we consider a mobile ad-hoc network, it is feasible in order to maintain dynamic routing tables which constantly needs to show the changes in the overall network topology. So different garbage bins in different areas within the city form a multi-hop network that can give information to any nearby local corporation office and to the head office also at the same time. If the local bodies do not function properly, then the information will be passed on to the head office. Hence this acts as a double-check on part of government authorities also.

II. LITERATURE REVIEW

In existing system, the wastes are managed periodically but we usually come across overflowing bins all around. By implementing this system, the level of garbage in the bins or drainage fluids are monitored and cleared periodically. The intimation is given even before the bins get filled up to the brim. Using an integrated system which makes the locating the bins easier and can be done using GPS (Geographic Positioning System)[1]-[2].

III. PIC MICROCONTROLLER

The dsPIC30F4013 is a high-performance digital signal controller. The controller has the properties such as dual data fetch and all the DSP (Digital Signal Processing) instructions are of a single cycle but has multiply accumulate (MAC) operation. This controller has modified Harvard architecture with flexible addressing modes. Its peripheral features include high current sink source I/O pins for about 25 mA. The essential attribute is that it has up to two addressable UART modules with FIFO (First in First Out) buffers and 3-wire SPI (Serial Peripheral Interface) module which supports four frame modes. The processor also has 12-bit analog to digital converter and programmable brown-out detection and reset generation. Enhanced Flash program memory, self-reprogrammable under software control, flexible watchdog timer, programmable code protection, and fall-safe clock monitoring are its special features.

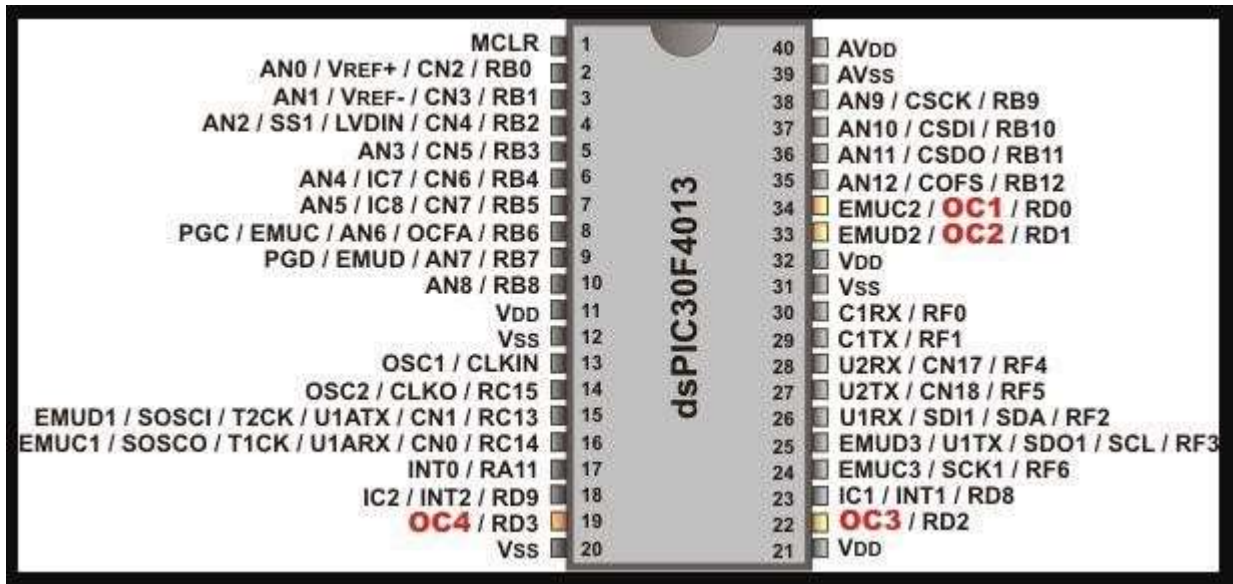


Figure 1. dsPIC30f4013

Figure 2. Circuit Diagram

IV. CONCEPTUAL BRIEFING

The smart way of managing both the solid and liquid wastes with one system can be done by implementing the techniques of an embedded software operated microcontroller. The microcontroller used for this purpose is the dsPIC30F4013. The system consists of the ultrasonic sensor because this type of sensor has the capability of detecting any kind of wastes irrespective of its state of matter. That is because they are distance sensors and they merely detect any object's interference within their range of operation. These sensors are installed on the lids of the garbage cans or sewage pits [3]. The sensors are energized from the output of solar PV panels which are installed on the lid at the upper surface. Depending upon the capacity of the bins, the fill Figure 2. Pin Diagram of dsPIC30F4013 range is determined, and the distance range at which the sensor has to sense is programmed. When the wastes reach respective threshold values, the sensor intimates it to the microprocessor

the respective nodes can be found. The microprocessor is connected to a GPS. A database is which contains the details about the position the garbage cans or sewage pits at various locations of a city or area is prepared in prior. The GPS receiver is interfaced with the dsPIC30F3014 and so when there is intimation from the sensors on the lids, their location, and the shortest route to attain their location is easily obtained. In case of negligence or unattended and filled garbage bins or sewage pits, it is also informed to the head office at the same instant [4]-[6]. This provides an effective cost-efficient method at current times for timely removal of wastes from the living areas. In current times, our aim is to build smart cities and henceforth waste management should also be smarter [9]-[10].

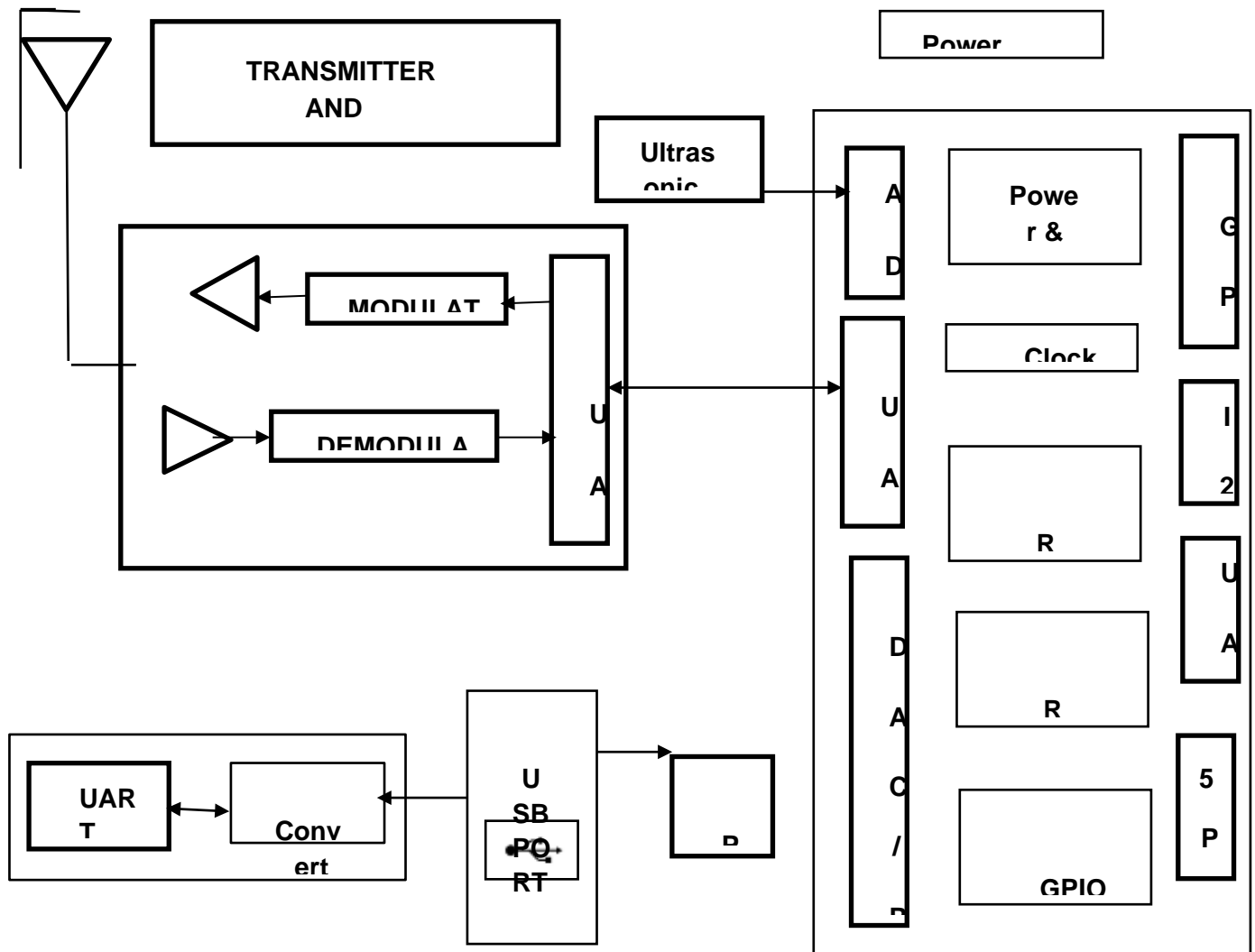


Figure 3. Basic Block Diagram

V. INTERFACING OF GPS AND SENSOR WITH dSPICE

The programming part includes two sections, (1) Setting the threshold levels and indicating it to the main office. (2) Identifying the location of filled bins and MANET is a dynamic network consisting of mobile nodes which is useful in location detection. One of the major challenges is providing a mechanism dealing with some changes in the dynamic topology. Most of the protocols were of statically designed, which were not able to be adopted in ad-hoc networks [11]. The GPS receivers which are very expensive and widely available is made available at all nodes. These nodes can communicate among themselves which can act as routers. Its performance improvement requires knowing about the information regarding its position. If

the location of the node is known then, the distance between formulating shortest route to reach them.

For serial UART communication between the microprocessor and GPS receiver, the microprocessor has to be configured for UART communication [7]. Similarly, for interfacing the ultrasonic sensors is made by pins [8] +. The sensor consists of four pins namely V_{CC}, trigger, Echo pin and ground. The triggering pulse activates the operation and interfacing circuit consists of capacitors which will stabilize the oscillations generated by the crystal oscillators. The microcontroller is programmed in such a manner to meet both the expectations.

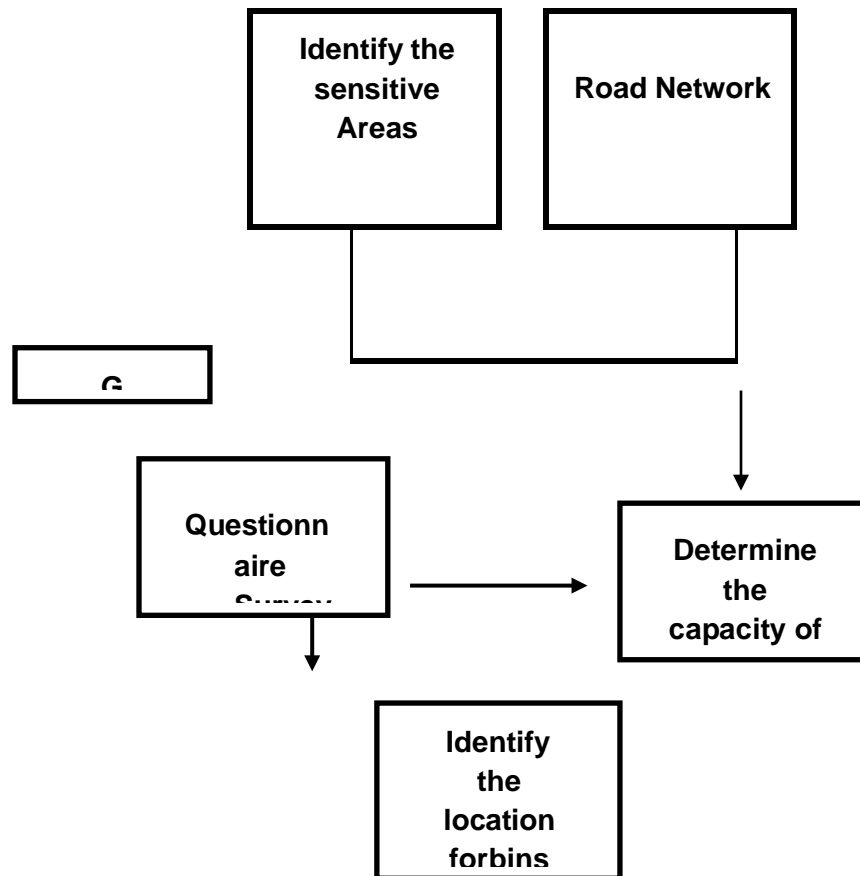


Figure 4. Flow chart for locating the bins

VI. FUTURE SCOPE

Planning as well as design of the waste management requires complete analysis of waste generation. In order to achieve this with respect to the current generating trends and also by facing various fast growing areas will be a challenging task.

VII. CONCLUSION

Waste management is always a challenging task which if not done on time might result in both

physical illness as well as mental irritation. Simplicity and cost effectiveness are the two important factors when it comes to cleanliness of a whole city or state. The sensors are energized by means of solar power that are generated by the solar PV panels placed on the bin or pit which is monitored. The concept of implementing a single system for management of all types and forms of waste with a simpler technique is tedious while this system achieves it.

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