

IOT BASED SMART CITY

Choodamani.P¹, Kubra Banu², Manjesh.V.L³,

Dhirendra Kumar Patel⁴, Prof. C. Rangaswamy⁵

⁵Assistant Professor, Dept. of ECE, Sambhram Institute of Technology, Bangalore, India

^{1,2,3,4}Students, Dept. of ECE, Sambhram Institute of Technology, Bangalore, India.

Abstract—SWACHH BHARATH ABHIYAN is a nation wide campaign in India that aims to clean up the streets, roads, and infrastructure of India's cities, towns and rural areas. It was launched in Raj Ghat on October 2 2014 by Prime Minister Narendra Modi. The objectives of this campaign is to make India clean through behavioral changes to promote the idea of smart city, to eliminate the burden of communicable diseases which India has like malaria, diarrhea and cholera, it also focuses on various other objectives. Internet of things (IoT) plays a major role to achieve these objectives. Internet of things (IoT) is a concept which enables communication between internetworking devices. IoT usage in embedded domain brings in new techniques of waste management for the fast growing human population. This paper features the usage of wireless sensor nodes for analyzing scientific studies focusing on environmental sustainability and smart city concept. It offers a view of the city where service providers use information technologies to engage with citizens to create more effective urban organization and systems that can improve the quality of life.

Keywords—IoT, waste management, wireless sensors, internetworking devices.

INTRODUCTION

IoT is a network of physical objects or 'things' embedded with electronics, software, sensors and connectivity to enable it to achieve greater value and service by exchanging data with the cloud, servers and connected devices. Its compatibility makes it suitable for numerous domains improving the methodologies. Its applications so far developers achieve automated appliances, health monitoring. The system consists of a centralized microprocessor interfaced with many sensors for making the villages cleaner and smarter. The project aims to bring smartness in five different aspects of any village such as Digital Display of the Government Subsidies and offers to farmers, smart garbage management, E-learning for the students in schools, intensity based street light monitoring and digital water supply system. The IoT is a recent communication paradigm that envisions a near future in which the objects of everyday life will be equipped with micro-controllers, transceivers for digital communication, and suitable protocol stacks that will make them able to communicate with one another and with the users, becoming an integral

part of the Internet. The IoT concept, hence, aims at making the Internet even more immersive and pervasive. Furthermore, by enabling easy access and interaction with a wide variety of devices such as, for instance, home appliances, surveillance cameras, monitoring sensors, actuators, displays, vehicles, and so on, the IoT will foster the development of a number of applications that make use of the potentially enormous amount and variety of data generated by such objects to provide new services to citizens, companies, and public administrations. This paradigm indeed finds application in many different domains, such as home automation, industrial automation, medical aids, mobile health care, elderly assistance, intelligent energy management and smart grids, automotive, traffic management and many others.

Why do we need to introduce IoT in Smart City?

Waste management, the major issue of our country. Managing the dry waste and wet waste is a very important aspect in waste management. Managing waste is not sufficient enough, managing it in a more efficient way is very important. There are many still traditional ways used to manage the waste but using IoT we can manage waste in more systematic way. The efforts must be made to separate the waste and convert the biodegradable waste into useful things. IoT not only helps us to manage waste but it also helps us in monitoring water supply and street light management. IoT is very helpful

in monitoring the supply of water to every street, it helps us to keep a track in water supply to every street and the feedback of the consumers can also involved in improvement process, by their valuable feedbacks this can be done with the help of IoT .

RELATED WORKS

Abdulrahman alkandari et al [2]. The project concentrates on Smart city survey, the project aim is to keep the city clean in a smart and efficient way. A smart city is one that uses a smart system characterized by the interaction between infrastructure, capital, behaviors and cultures. Smart cities need smart architecture. The aim is to develop an evaluation of smart cities based on ICT by providing services that people need. A new way to manage and protect proprietary data effectively in smart cities is the technique of digital watermarking. This involves the incorporation of information into digital signals that is difficult to remove. The smart city depends on building a smart infrastructure based on a wireless sensor network which represents the backbone of the city depending on the global network.

Payal A Lathi et al [1]. The paper based on energy harvesting using piezoelectric sensors. The primary sources of energy are from non renewable energy resources, in which thermal energy contributes major part but these resources depleting and causing environmental pollution.

The solution to this problem is the use of renewable energy sources like piezoelectric sensor, hydro solar etc. Piezo sensor converts mechanical stress applied on to it to electrical energy. They are made up of crystals which are polar in nature without electrical field being applied. When mechanical stress is applied the charges go out of balance. A net non zero dipole moment builds up producing output voltages. It has higher energy storage per unit weight and slower discharge response. The idea can be extended to generate electrical energy for higher load application. The energy generated is proportional to the garbage weight and weight of the road humps and speed of the motional vehicle and sensor can be employed at crowded public place and highway.

Emy glasmeier et al [3] . Thinking about smart cities the project title .The smart city is market for urban management and is to reignite interest in cities as engines of growth.it examines current debates around the goals, ethics , potential and limitations of a concept that has become metaphor for the urban modernity. although the smart city concept has emerged from long persisting ideas about urban technological utopias and the perfectly competitive city, it also differs from these urban visions in some important ways. Smart city advocates not only include large information economy businesses such as IBM, CISCO, SAP ,INTEL, SIEMENS, but also academic and philanthropic

organizations .The drawback of this survey is It is a survey paper and there is no implementation of water,sewer,transportation and varios other issues.

It largely looking into the immediate future which is not possible

Evelin priscilatrindade et al [4]. Sustainable development of smart cities its a systematic review of the literature survey.To ensure efficient service delivery of basic services and infrastructure such as public transportation, water supply and drainage, telecommunication and other utilities. Only concentrating on transport system and water supply. Some of the efforts brought up the concept of intelligent cities that is the predecessor of smart cities. Smart cities arise due to the intelligent use of digital information for example in areas like human health, mobility, energy use, and so on . The drawback of this project is only monitoring the utilities and there is no automation

OBJECTIVES

- Monitoring the street light by using sensors.
- Generation of power from the pressure generated on road humps.
- Garbage bin monitoring and updating information to the concerned unit using IOT.
- Separating the waste and converting the bio-degradable waste into useful things.
- Water tank monitoring and check the quality of water.

- Purification of chemicalized water (by making layers of sand and limestone).
- Gather all the information of the objectives and update it to the cloud.
- To keep villages and cities clean. Solid and liquid waste management through BBMP.
- To lay water pipelines in all area of cities, ensuring water supply to all households.

PROPOSED SYSTEM

This project proposal is to develop a smart city system using Arm V7, **ARM** is a family of instruction set architectures for computer processors based on a reduced instruction set computing (RISC) architecture developed by British company ARM Holdings. A RISC-based computer design approach means ARM processors require significantly fewer transistors than typical processors in average computers. This approach reduces costs, heat and power use. IoT plays important in the system. Limitations or drawbacks of existing waste management systems can be overcome. The project working on piezo electric sensors helps in power generation. Segregation of waste into dry waste as well wet waste and converting the biodegradable waste into useful things. The garbage collection is different for the developed countries and the developing country. In developed countries we don't face much problem related to the garbage collection as the population is less, plus the garbage is collected twice daily and they have a strong workforce to

support it. The field is divided into suitable divisions and wireless sensors are arranged for monitoring the water supply, street light as well as waste management.

SYSTEM DESIGN

Basically the system consists of a centralized microcontroller interfaced with many sensors for making the city smarter. The project aims to bring smartness in five different aspects of any city Digital Display of the Government Subsidies and offers to farmers, smart garbage management, E-learning for the students in schools, intensity based street light monitoring and digital water supply system. A set of IR sensors are interfaced with the processor which are in turn mounted on the dust bins so as to monitor the garbage level. Whenever the level reaches to the maximum then information will be passed to the concerned authorities for quick actions.. LDR light sensors are interfaced with the processor so as to detect the intensity of light falling and accordingly the street lights will be controlled. The optimization of the street lighting efficiency is an important feature. In particular, this service can optimize the street lamp intensity according to the time of the day, the weather conditions and the presence of people. In order to properly work, such a service needs to include the street lights into the Smart City infrastructure. Then, Piezoelectric sensor generate voltage on each and every step of a foot. For this purpose, piezoelectric sensor is used in order to measure force, pressure and

acceleration by its change into electric signals. This system uses voltmeter for measuring output, led lights, weight measurement system and a battery for better demonstration of the system. Relays are interfaced with the processor for turning on and turning off the water valves according to convenience by mobile phone. Since the whole village is connected with internet modem and digital display all the government offers and schemes for the farmers will be displayed on the display system using a wireless app used by the government. Advanced E-learning for the school children is introduced using the same technology where the rural students also can get the quality education under Edu-sat IOT based Learning.

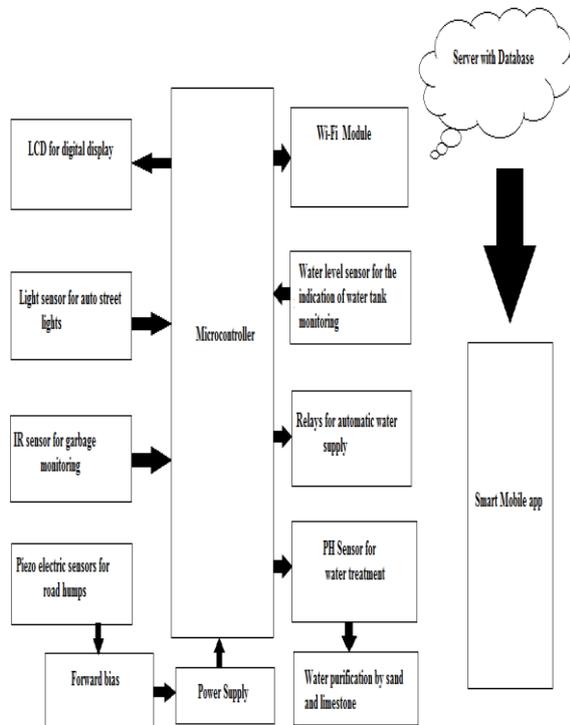


Fig.1. Block diagram of proposed system

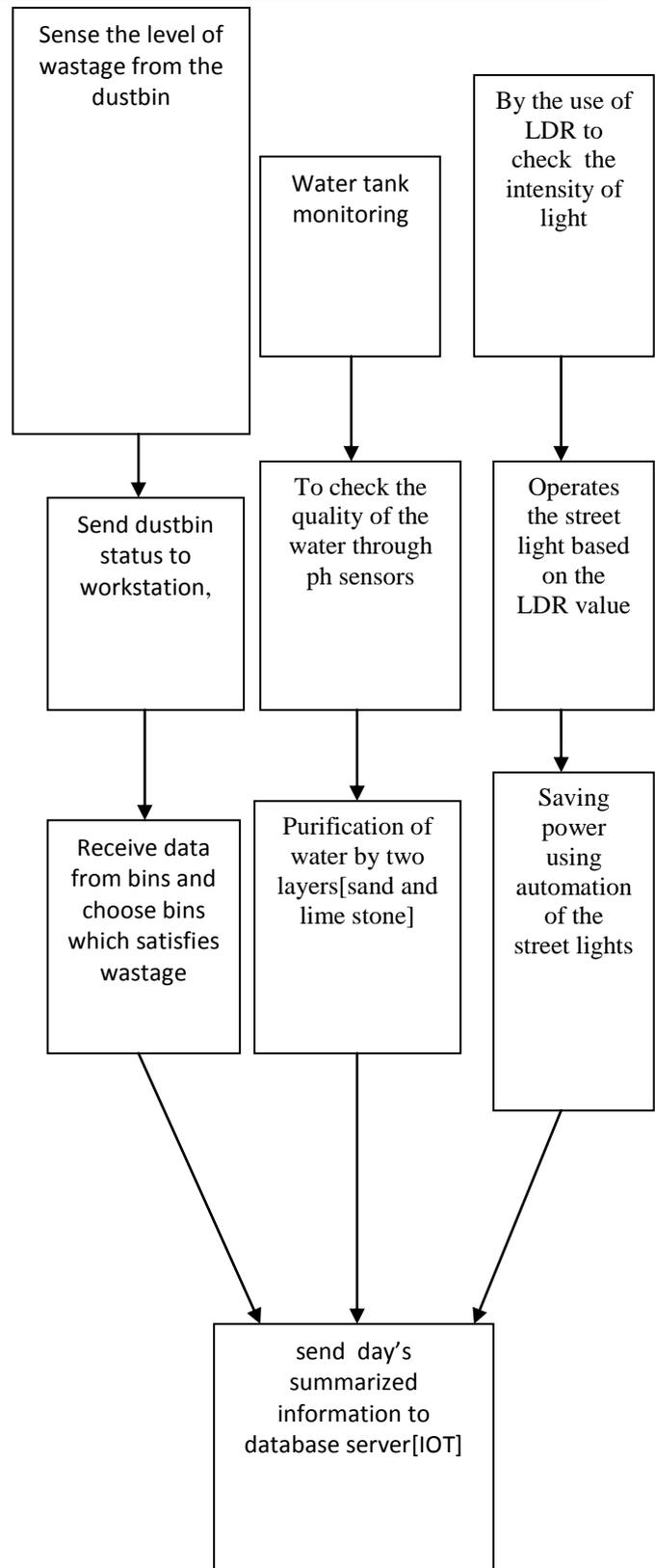


Fig.2. Methodology of proposed system

WASTE MANAGEMENT

Waste management is a primary issue in many modern cities, due to both the cost of the service and the problem of the storage of garbage in landfills. A deeper penetration of ICT solutions in this domain, however, may result in significant savings and economical and ecological advantages. For instance, the use of intelligent waste containers that detect the level of load and allow for an optimization of the collector trucks route, can reduce the cost of waste collection and improve the quality of recycling. To realize such a smart waste management service, the IoT shall connect the end devices, i.e., intelligent waste containers, to a control center where an optimization software processes the data and determines the optimal management of the collector truck fleet.

Using the pressure of the waste through the piezo electric plates power generation can be done and generated power is utilized to work with the model

INTENSITY BASED STREET LIGHT

CONTROL

In order to support the directive, the optimization of the street lighting efficiency is an important feature. In particular, this service can optimize the street lamp intensity according to the time of the day, the weather conditions and the presence of people. In order to properly work, such a service needs to include the street lights into the Smart City infrastructure. It is also

possible to exploit the increased number of connected spots to provide WiFi connection to citizens. In addition, a fault detection system will be easily realized on top of the street light controllers.

DIGITAL WATER SUPPLY

In order to reduce the complexities associated with water supply management IoT has brought a smart solution in which water supply can be done using a mobile phone. Water can be supplied to any part of the city any time by sitting at one place

Along with detecting the quality of water using ph sensor we are also concerned about purifying the water through the two layered water purified unit which has sand layer and lime stone layer

ADVANTAGES

- A lot of power can be saved since intensity based street lights are used.
- All Govt. related schemes and Market price of the grown crops can be directly displayed on the Digital display system using a Smart Web App maintained by Government.
- City can be kept clean since smart garbage management system is developed.
- IOT based smart E-learning for students have been introduced in the village level..
- By sitting at one place water can be supplied to an entire city using GSM.
- Power can be generated from the waste dumped in the dustbins.

- Power can also be generated from the pressures which is obtained from the road humps.
- Reduces water wastage by 80%.
- Increases recycling rates.
- Improve in the health conditions of all the citizens and helps to ease burden on the current health facilities.
- It will help in generating employment through tourism and boost India's GDP.

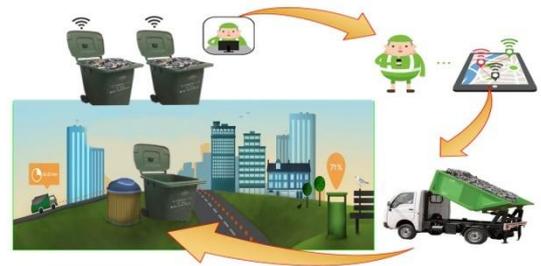
APPLICATIONS

- The concept can be used in hospitals for making the things smart.
- The concept can be applied in industries for automation purpose.
- It can be used in multi-national companies for digital facilities..
- It has smart street lights which permits an energy saving of more than 50% compared to normal street lights.
- It has smart waste management techniques.
- Smart bin collection.
- Environmental monitoring.

EXPECTED RESULTS

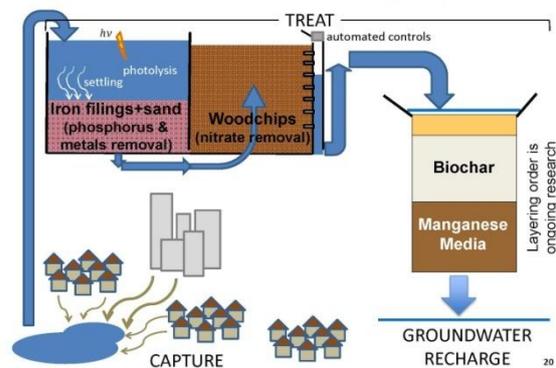


- a) IoT based smart cities make maintenance and control of street lamps more straightforward and cost effective with the help of LDR.



- b) To optimize waste collecting schedules by tracking the amount of garbage in the dustbin by IR sensors.

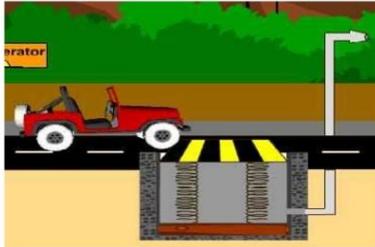
Capture, Treat, and Recharge System



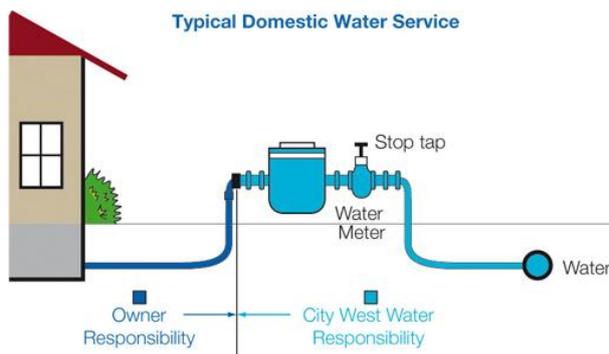
- c) Indicating the level of water and it also helps in purification of chemicalized water by sand and limestone components.

WORKING PROCESS

- Vehicle approaching the speed breaker



- d) IoT based smart city solutions helps in generation of power from the pressure generated on road humps.



- e) To lay water pipelines for proper ensurement of water supply

CONCLUSION

Currently in India waste collection has been treated in a static way. Using Internet of Things approach we are proposing to tackle the problem of waste collection by dynamic method. As waste directly affects public health, it has become an important issue. Domestic waste has been growing day by day and hence wastage management has very high priority. The generated waste needs to be collected and proper transportation should be made as well as proper

waste treatment and disposal. Improper disposal & improper maintenance of the domestic waste creates issues in public health & environmental pollution. This project attempts to provide practical solutions to help the local municipal administration in waste management system. i.e., monitoring of domestic wastage clearance at proper time to avoid damage to the public health. In this project, Waste Collection System architecture using Internet of Things has been proposed. The architecture consists of embedded device with sensors and microcontroller for sensing information of Bins and sending to workstation, which is situated at municipal office for finding shortest path. This technique of waste removal will keep the city clean. The proposed system is an attempt to improve current waste collection system in India for the “Clean India Mission”. The system will also generate reports about waste gathering and fuel consumption.

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