Indoor Environment Sensing Service in Smart City-A Review

Vibhuti K. Satone,Anagha G. Harne,Oshin S. Wanjari
Department of Computer Engineering
Bapurao Deshmukh College of Engineering,
Sevagram, Wardha-442001
Email: anugharne@gmail.com,oshinwanjari.simran@gmail.com, satonevibhuti@gmail.com

Abstract—Indoor sensing is key technology to provide low cost smart services in smart city. Due to rapid growth in device and computer technology, threat to personal data and national security had also increased. So there was a need to introduce a technology that secures our data more efficiently. Our present work is to develop Indoor Environment sensing using Atmega328 microcontroller. Monitoring of environmental factors has increased in importance of water level management to increase the underwater level. In home environment we have to consider various factors such as temperature, heat, atmospheric pressure, sound generating in house and security regarding this type of information.

Keywords: *Microcontroller, monitoring system, sensors, GPRS, GSM Modem.*

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I. INTRODUCTION

In a smart city information and communication technology (ICT) enables several services to improve the quality of life of the citizens and to establish contacts between the citizens and government. Indoor Environment sensing is based on Internet of things(IOT).The internet of things (IOT) is the internetworking of physical device,vehicles (also referred to as connected devices and smart device), buildings and other items-embedded with electronics,software, sensors, actuators and network connectivity that enable these objects to collect and exchange data.The global standards initiative on Internet of things (IOTGSI) defined the IOT as the infrastructure of the information society in 2013. The IOT allows ob-jects to be sensed and/or controlled remotely across existing network infrastructure creating opportunities for more direct integration of the physical world into computer-based system, and resulting in improved efficiency, accuracy and economic benefit.Current market examples include home automation (also known as smart home devices) such as the control and automation of lighting, heating (like smart,thermostat), air-conditioning systems, ventilation, and appliances that use Wi-Fi for remote monitoring. Our project Indoor Environment Sensing in Smart city is based on the area internet of things. IOT has involved from the convergence of wireless technolo-gies, micro electromechanical system (MEMS), micro services and internet. The convergence has helped tear down the silo walls between operational technologies (OT) and information technology (IT), allowing unstructured machine generated data to be analyzed for insights that will drive improvements.This paper attempt to propose a system for indoor environment
sensing in which ATMEGA328 microcontroller is used with sensors.GSM Modem used to operate over a subscription to a mobile operator,just like mobile phone.GPRS , a packet oriented mobile data service on 2G and 3G cellular commu-nication system.Generally used for mobile internet, MMS nad other data communications.To provide these smart services,it is important to collect various indoor data not limited to energy and grasp the indoor environment.

II. RELATED WORK

In 2013, A. Anbarasi [1] presents a methodology for the evaluation of wireless smart homes and home automation network in indoor scenarios.Using smart distributed sensors and implementing data fusing and mining algorithms the final user is enable to access Real time data and undertake appropriate actuation strategies, via internet, any time and everywhere worldwide. This paper describes a successful ap-plication of the above concept in a challenging environmental monitoring context.In this paper,.It is shown the effectiveness of this solution to monitor common parameters using simple, unobtrusive, commercial and cheap sensors, forwarding their measurements by the means of a heterogeneous infrastruc-ture, GPRS communication and ordinary internet data transfer (TCP-IP protocol),GSM Module SIM900 used for SMSs.Data coming from sensors are stored in a database that can be queried by users everywhere in world, only using a laptop or a PDA: the smart user interface also allows to read and to analyze data in an easy way. The transmission of control information in smart homes has been an actual research topic during during the last years. Smart homes are not widely spread practice so far.
In 2005, Hayoung Oh [2] proposed scheme divides the home area into sectors and locates a manager node to each sec-tor.The manger node receives collected data from sensors and delivers the data to the base station through for field irrigation energy conservation saving water irrigation. In this paper the principle of field irrigation energy conservation and saving water integration control system is introduced in the pa-per.aian this paper, we present a new sensor souting scheme for home automation networks, namely RDSR (Relative Direction based

Sensor Routing). The scheme divides the home area into sectors and locates a manager node to each sector.The manager node receives collected data from sensor devices in

its corresponding sector and then transfers the data tp the base station through the shortest path of the 2-dimentional (x,y) coordinates.In this process, we use relative direction based routing in 2-dimentional (x,y) coordinates. The RDSR divides the home area into sectors and locates a manager node delivers sensed data to the base station efficiently through the shortest path of the 2-dimentional (x,y) coordinates.

In 2016 Padma Nyoman Crisnapati [3] proposed a system comprised of few embedded sensors and networking devices in the house that connected to the Internet architechture.It can be used in many applications, leading to the emrging concept of the internet of Things(IoT). The IoT describes the future where everyday things (or objects) will be connected to theinternet and be able to communicate themselves to other devices.In par-ticular, it includes a single board computer, microcontrollers, responsive web technology, database system, environmentally sensitive devices, tornado server software,cameras and could computing.The system is also implemented a fuzzy logic artifi-cial intelligence to adjust the intensity of light and air condition in a room.Information will be recorded and calculated so that home owners will be more efficient in managing and monitoring.

In 2014 M. Jayashree Agarkhed [4] proposed a technique wireless sensor network (WSN)moderately modest computa-tional hubs that measure nearby natural conditions or different parameters and forward such data to nonessential issue for suitable procedure called as Sink or Base station.WSNs hubs can sense the earth can correspond with neighboring hubs, and can, much of the time perform essential calculations on the information being gathered. Being an appropriated design, brilliant home environment needs certain level of interoperabil-ity to oversee sub-frameworks are created in detachment and compromise of various working frame work and level of ad-ministrations.The physical media, gadgets and administrations designed in keen homes are upsetting savvy homes towards information concerntrated environment,bringing about couple of operational issues. The main issue is that the functionalities of savvy homes reply on upon higher heterogeneity of sub-frameworks worked with various detail and conventions.WSNs are progressively being utilized as a part of uses where QoS and minimal effort are the overriding contemplations .Ordinary plans of utilizing sensor hubs and joining these three wonders (unwaving quality , accessibility and serviceability) to achieve QoS can viably enhance the dependability of the general WSNs as well as security also.

In 2016 R.Gnanavel [5] has proposed a wireless sensor net-work based smart home monitoring system for such elderly people to monitor their health and provide them with a safe and secure living.The wioreless sensor network deploys various sensors to identify the occurrence of specific events.By replacing wearable sensors on waist of the persons, the sensor values are computed and assessed.The contact sensors are used to determine if a door is open or not.Starting with raw data, the implementated orientation filter provides the correct orientation of the subject in terms of yaw,pitc, and roll angels.In case of any emergency, SMS will be sent to the caregiver and the nearby hospitals using GSM modem to take preventive action.

In 2016 Seiji Sakakibara [6] is proposed a n actual autonomous sensor box with Rasberry Pi and Phidgets sensors.Then it implemented a prototype service which automatically transmit environment data to cloud based on smart city informa-tion.Also deployed the autonomous sensors boxes on practical indoor environments and executed indoor environments and executed indoor environments sensing.With deploying sensor box for each house in the smart city and integrating data to cloud, indoor environment sensing can be realized without cost-intensive infrastructure.To provide smart services, it is important to collect various indoor data not limited to energy and grasp the indoor environmens.

III. EXISTING SYSTEM

The Existing system consist of actual autonomous sensor box with Raspberry Pi and Phidgets sensors. Then prototype service is implemented which automatically transmit environment data to Cloud based on smart city information. Also deployed the autonomous sensor boxes on practical indoor environments and executed indoor environment sensing. Typical environment data include temperature, humidity, lighting intensity, atmosphere pressure, sound volume, human motion, and vibration. Measured data is utilized for various smart services.Scallop4SC (SCALable LOggingPlatform for Smart City) is a data processing platform, which accumulates and utilizes various big data log obtained in the smart city. With Scallop4SC, we link environmental data measured by the Sensor Box with information data such as location or owner.Figure 1 shows the entire architecture of smart city indoor environment sensing service in this study. The proposed service roughly comprises follow S1-S4 elements.

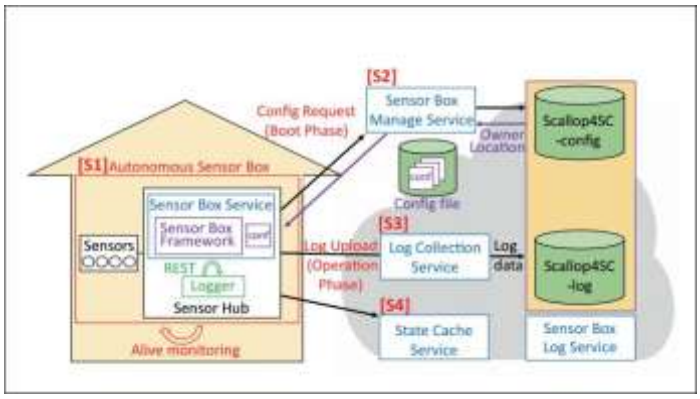

Fig. 1. Existing Architechture

S1: Autonomous sensor box

With power and network connection, execute indoor envi-ronment sensing autonomously and upload data to Cloud.To execute indoor environment sensing, we use Sensor Box.To use sensor box framework, need sensor box configuration file.Then, in the autonomous sensor box, manage definition file on Cloud centrally. When Sensor Box boot, Sensor Box download appropriate definition file.

S2: Sensor Box Management Service

Manage all Sensor Box definition file in smart city and con-figuration information.Sensor Box Manage Service is Cloud service, which cooperate with Scallop4SC and manage all Sensor Box in the smart city.Sensor Box Manage Service manages network connection information (IP address and others) of each Sensor Box and use this information to remote test or maintenance.

S3: Log Collection Service

It collect centrally measured Sensor Box data in the smart city to large scale database as time series data.Log Collection Service is a service, which collect environment data measured by Sensor Box and accumulate as time series data.Logger in Sensor Box, in every time of measurement, create data based on the schema and modify to JSON format text, then upload to the Log Collection Service. Collected time series sensor data is used by various applications through Sensor Box Log Service (bottom right corner in the figure 1).

S4: State Cache Service

It has Cloud service, which keeps measured new Sensor Box data in the smart city to memory.State Cache Service is a service, which saves only the latest data sent one after another from Sensor Box.State Cache Service, sensor box ID as Key and current value as Value, save latest measured value on memory, then realize quick access to the current value of any Sensor Box.With upload measured sensor value to both Log Collection Service and State Cache Service, autonomous sensor box realizes efficient data provision to both the application which utilizes the past and current data.

IV. PROBLEM STATEMENT

As seen in Existing system the collected data is not secure .Protection of personal information is necessary to utilize data to inform the user through mobile notifications.While in pro-posed system the collected data in database will be secured by using SHA and MD5 Algorithms.In Existing system, the Sen-sor Box contained environment sensors execute autonomously environment sensing without human work, and collect data to Cloud, cooperating with three Cloud services.But the collected indoor environment data is not utilized,so in Proposed system the user will get information on mobile phones through GSM Modem. In addition to this the proposed system has smoke and fir sensors along with other sensors.

V. PROPOSED WORK

The proposed method shows the Sensors connection with the microcontroller along with GPRS and GSM and its database connectivity. The Figure shows the work flow for the proposed system.The input image having hardware and software. The hardware having ATMEGA328 microcontroller which is developed by ATMEL in the megaAVR family.the most common implementation of this chip is on the popular Arduino devel- opment platform, namely the Arduino Uno and Arduino Nano models.To execute this project we are using microcontroller, LCD display,GPRS modem, apache web server,my SQL. Microcontroller ATMEGA 328 will read all sensor values and process them display into LCD server as well as sensor information will send by using GPRS modem through internet to web server. Web server will get all data and process and store them into database which will be MySQL(open source). All these process will continue will a specified delay in a loop. For database using Php, and My Sql and apache server.With this system wherever they are, they can access a data or they can access their information about their fields. This is the advanced technique which is useful for fields.The GSM Modem will provide all the information or readings of sensor to the mobile through subscription to mobile operator.It will be connected to computer allowing data stored in Database to reach to user through GSM Modem.

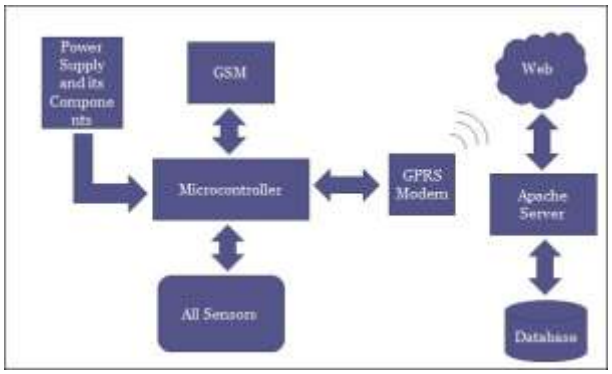

Fig. 2. Proposed architechture

VI. IMPLEMENTATION OF PROPOSED METHODOLOGY

In the proposed system the sensors are connected to the microcontroller to detect the temperature, gas leak-age,humidity,.sound,smoke,light,vibration and fire to notify android application and display it through LCD.

These will interface with the internet with the help of GPRS system and this will connect to the mobile by GSM. The owner of the field can access a data from anywhere with the help of GPRS and GSM system.

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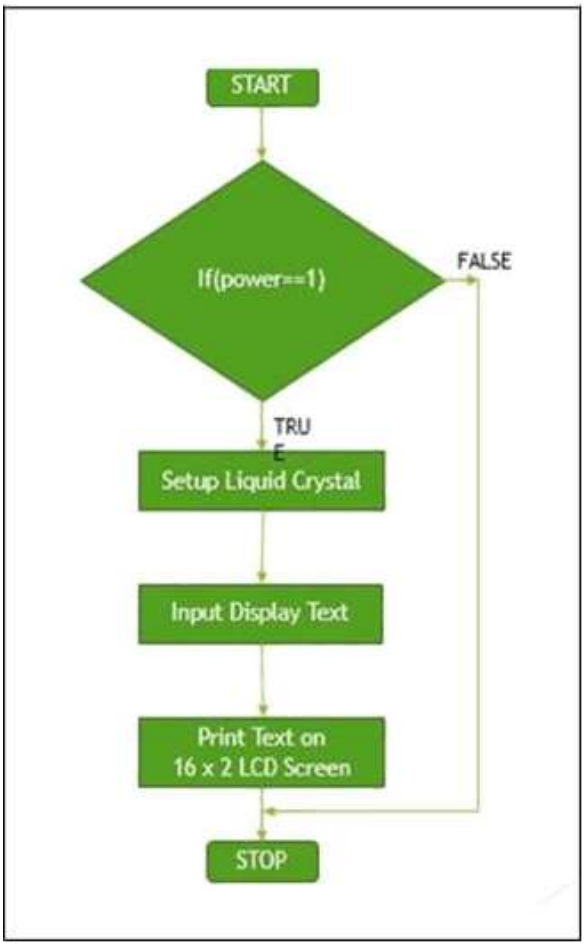

Fig. 3. LCD Flowchart

A. Algorithms

MD5 and SHA-256 are hash functions(SHA is actually a family of hash functions)they take a piece of data, compact it and create a suitably unique output that is very hard to emulate with a different piece of Data. They dont encrypt anything - you cant take MD5 or SHA output and Unhash it to get back to your starting point. The difference between the two lies in what algorithm they use to create the hash. Also note that MD5 is now broken as a way was discovered to easily generate collisions and should not be used nor trusted anymore.

Algorithm 1 MD5
Step 1: Append Padding Bits
Step 2: Append Length
Step 3: Initialize MD Buffer
Step 4: Process Message in 16-Word Blocks
Step 5: Output

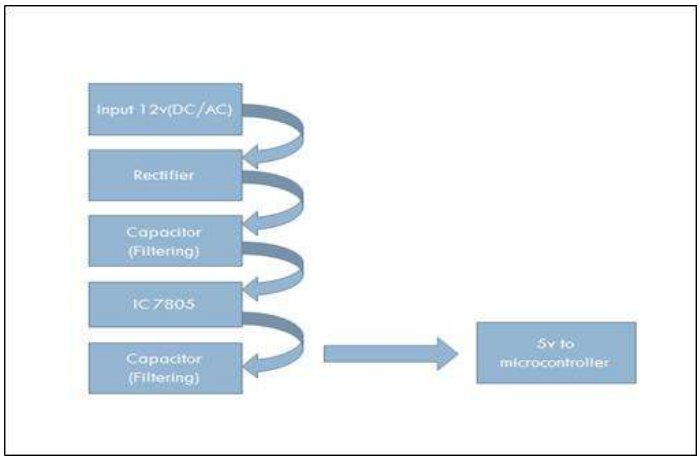

Fig. 4. Powersupply

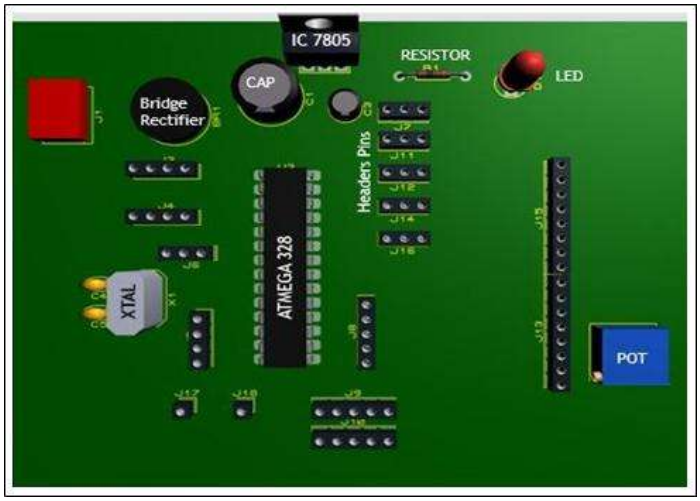

Fig. 5. Proposed System

VII. CONCLUSION

Thus, the Indoor Environment Sensing with different sen-sors will be developed.We have good opportunity to develop a system that enables us to monitor the indoor environment and allow us the analyse collected data. Thus by developing such system will be a small step to support Digital India.

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