ISSN: 2366-1313

IoT Based E-Campus Super Sensor Nodes by Using Arduino

[1]M. MohanaVenkata Prasanthi, [2]Challa Haritha,[3]Kotapati Poojitha, [4]M. Venkata LakshmiSatya Latha,[5]Dr. P. Nageswara Rao

[1]BTech Student, Dept.of ECE, Malineni Lakshmaiah Womens Engineering College, Guntur, AP

[2]BTech Student, Dept.of ECE, Malineni Lakshmaiah Womens Engineering College, Guntur, AP

[3]BTech Student, Dept.of ECE, Malineni Lakshmaiah Womens Engineering College, Guntur, AP

[4]BTech Student, Dept.of ECE, Malineni Lakshmaiah Womens Engineering College, Guntur, AP

[5]Professor (Ph.D), Dept.of ECE, Malineni Lakshmaiah Womens Engineering College, Guntur, AP

Abstract: *New technology like (IoT) in recent years rapidly developing in a computing world. The Internet of things will change the real world, activities and objects from simple to most complex. Beside areas as Business, Cities, Transportation, Healthcare, Agriculture and different areas, The IoT will also have a major implication in institute/college. In digital era our college campus needs of IoT technology for classy environment to utilize secured & modern technology for e-campuses activities in academic course of action. In general, campuses spread over a fairly large area and it's very difficult to control for management to track everything happens. This project focuses on need of adopting IoT technology in campus using Secured for (e-Educational)-Campus academics. In near future drastically make changes for students in highly enabled IoT. Starting from needs and advantages ending with a possible architecture based on smart objects.*

Keywords: Internet of Things, E-Campus, situational awareness, Arduino, microcontroller.

I. INTRODUCTION

The Internet of Things (IoT) is a modern communication model that sheds light on the near future.Everyday objects will be equipped with microcontrollers, digital communication transceivers andthe appropriate stacks of protocols that will allow them to communicate with each other and with users to becomean integral part of the Internet. By working in this way, reaching out and communicating with different taxaGadgets and devices include cameras, voice recorders, smart watches, Google Glass, widescreen digital displays, sensors, etc. The Internet of Things will promote the improvement of learning conditions that take advantage of the vast amount of data on this topic.Created by these objects to provide dynamic services to teachers, students, and even content developers ona modern campus. The smart e-campus allows us to use IoT methodologies to make available for class

ISSN: 2366-1313

notesEverywhere within the network area [1].

We are trying to make our campus an intelligent campus which can be our primary goal. Here, we're clean with a brilliant campus concept in which we intend to implement sensors virtually in such a way that they can inform us of movements that occur in changes in temperature, humidity, sound levels, etc. [two]. We are exploring how the campus infrastructure can be used by designing a prototype. At first, we can try to detect vital use cases, such as sensors inside classrooms, floors, libraries, halls, labs, etc[2]. Be private to the entire campus. We plan to manually place the sensors on campus to include basketball, soccer, and volleyball courts and in an indoor arena where other indoor centers such as conference rooms, classrooms, auditoriums, staff lounges, and meeting rooms are located. Off-campus, we'll have motion, humidity, and temperature sensors; indoors, like bright rooms and staff rooms, we can have sound, RFID, fire, smoke, infrared, and light sensors. These tiny sensors can be widely disturbed, unobtrusive, unsafe, and unassuming. These want less power to be relatively cheaper, have low protection and be easy to install and work quickly [3]. In terms of privacy, private information will not be received because the sound sensors will tell us what is being spoken approximately in decibels, but not the records.

At this point, we'll outline the trade-offs for great sensors: large sensor nodes with enough power to do more than provide value to the server. While fat nodes will use additional electricity, the running price is high, and the purchase may be more luxurious, which means higher installation fees. We realize there is no practical limit for the Raspberry Pi [4]. The energy consumed is not suitable for building campus infrastructure because the better the number of nodes, the higher the energy usage and the higher the complexity. Simultaneously updating statistics on the website, email, and text messages can become a difficult task to complete. The most practical advantage of using standard mobile devices for excellent sensor nodes for cyber campus infrastructure is that they can be remotely configured and reprogrammed, allowing us to restore the sense of infrastructure using existing sensors in a new way.

II. RELATED WORK

Kristian Hentschel et al.[5] Here they have outlined the motivation for super sensors, based on inexpensive Raspberry Pi devices attached to off-the-shelf sensors. System uses Python language which is

ISSN: 2366-1313

well supported on Raspberry Pi it also provides various libraries for connecting hardware interfaces.

Tejas Thaker et al.[6] Here authors considered a cost of a designed Wireless network , here we use Low cost and energy efficient ESP8266 Wi-Fi module for developing a Wireless Sensor Network. ESP8266 module provides high performance, high integration performance.

Shopan Dey et al. authors focused on home automation using smart phone and computer. The IoT devices controls and monitors the appliances that may be electronic, electrical or mechanical systems. Single admin controls the various devices connected to the cloud server and also facilitates a number of sensors and control nodes.

Marian Cata et al.[6] In this paper, the author developed the idea that a university campus may represent the ideal place for the creation of a smart environment. As many universities are connected through internet the implementation of the concept is a practical idea. The concept of smart university is defined like a small world where sensor enabled and networked devices work continuously and in collaboration to make the infrastructure smarter.

Csar Cheuque et al.[7] Here they demonstrated a university project to control the LED devices. The purpose of the project is to give the first approximation of a system using Web technology Raspberry Pi. The system allows inclusion of modules and can be a real alternative in the implementation of a Smart Home.

Sheikh Ferdoush et al.[8] Here author described about a wireless sensor network system developed using open-source hardware platforms like Arduino and Raspberry Pi. The system is low-cost and highly scalable. The various type and number of sensors can be connected hence it is suitable for wide variety of applications related to environmental monitoring.

Yoneki et al.[9] authors introduced the RasPiNET, it is a form of a Delay Tolerant Network consisting of Raspberry Pi computers. Each Raspberry Pi is equipped with WiFi communication capability and a battery pack and RasPiNET can operate a data mule communication.

S. Banerjee et al.[10] gave a unique design of a secure sensor node prototype. The proposed system communicates over bluetooth using RC4 encryption algorithm between a mobile phone and their monitoring equipment.

R. Szabo et al. They have described generic framework for smart city applications which is built upon XMPP ie. Extensible Messaging and Presence Protocol for mobile participatory sensing .

III. RESEARCH AND DESIGN OF SMART CAMPUS UNDER SITUATIONAL AWARENESS

In maximal differential computational investigations, the situational awareness technique has been applied [18]. In short, the situation is realized explicitly through sensors to enable IoT devices to understand the current situation intelligently. According to the situational awareness of the actual needs of teachers and students on campus and thinking about the needs of college coaches and students, we can use the mobile Internet era or create a simple sensor combined with the wishes of teachers, students, and college students to build a complete machine—smart campus hubs in unique perceptual environments [19]. Under the context-aware device, the user scenario library is the foundation of intelligent campus design. In design technology, the consumer's unique state library is constantly evolving. The process of thoroughly studying and designing a situational awareness-based innovative campus mainly includes application service layer middleware, operator core layer middleware, core provider middleware, user layer, and resource layer [18]. Complete situational awareness design makes specialization of intelligent communication between each layer, and a straightforward person context database is based on IoT generation. A detailed introduction to situational awareness is illustrated in Figure 3.

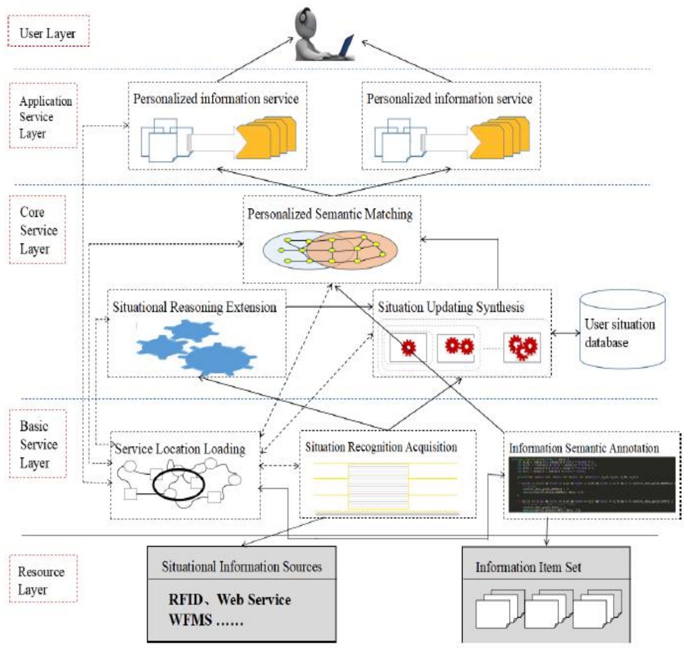

Fig.1 The structure of situational awareness.

IV. INTERNET OF THINGS INFORMATION SERVICE

Colleges and universities mainly rely on computerization in their creation process. With the continuous improvement of information generation, the combination of intelligent campus production and the

ISSN: 2366-1313

Internet of Things era has become the focus of information production in colleges and universities. The intelligent campus building is carefully related to the Internet of Things. The lecture room, dormitory, library, and various items on campus need the Internet of Things era. Technically, each object is connected intelligently to recognize the wise omnidirectional service. They are notifying the user of pervasive perceptual data aggregation, according to pre-designed well-designed ideas, the many elements, and the interconnected Internet to achieve high-level management, intelligent information change, and communication. IoT statistics service is a complex IoT data provider provisioning platform; these platforms are IoT application information providers. The intelligent campus device contains many data and complex systems, with a large organization of people and a multi-stage provider device. Due to the characteristics of the smart campus that are exceptional from the traditional campus, the advantages of the Internet of Things data operator era are highlighted. By combining IoT technology with campus body objects, using information generation to handle a variety of valuable records improves the operability of innovative campus design. Colleges and universities mainly rely on computerization in their creation process. With the continuous improvement of information generation, the combination of intelligent campus production and the Internet of Things era has become the focus of information production in colleges and universities. The intelligent campus building is carefully related to the Internet of Things. The lecture room, dormitory, library, and various items on campus need the Internet of Things era. Technically, each object is associated with intelligence to recognize the wise, multi-way service. They are notifying the user of pervasive perceptual data aggregation, according to pre-designed well-designed ideas, the many elements, and the interconnected Internet to achieve high-level management, intelligent information change, and communication. IoT statistics service is a complex IoT data provider provisioning platform, and these platforms are IoT application information providers. The intelligent campus device contains many data and complex systems, with a large organization of people and a multi-stage provider device. Given the characteristics of the intelligent campus that are exceptional from the traditional campus, the advantages of the Internet of Things data operator are highlighted. By combining IoT technology with campus structure objects, using information

ISSN: 2366-1313

generation to handle a variety of useful records improves the operability of smart campus design.

CLASS MONITORING SYSTEM

Different classes are full of people like college students, college students, and more. Our mission node is designed to display all campus lessons in a video to show instruction. Here, we use a PIR sensor, also known as a motion sensor, to detect actions within the classroom . This sensor detects those movements and reviews the central unit in which all the statistics are collected, and then this information is processed to get the desired result. Motion detection uses light sensors to detect the presence of infrared light emitted by a thermal object or the absence of infrared light when an item interrupts a beam emitted using any other part of the device. A PIR sensor detects infrared light emitted by a heated object. It is made up of thermoelectric sensors that allow any change in its temperature to be input into the electrical signal. When infrared light moves a crystal, it produces an electric charge. Thus, the PIR sensor is used to determine the presence of moving objects and people within the detection location within a range of about 14 meters.

V. SMART CAMPUS SERVICE DISCOVERY ALGORITHM

As a universal computing environment, all kinds of campusservices in smart campus are deployed in different environments.The key to reflect its ``intelligence" of smart campusis to study how campus users can efficientlyobtain the appropriateand available campus services. The research of servicediscovery technology in smart campus can help campus usersquickly find the required smart services in the network, detectthe changes in service availability, and finally provide userswith intelligent services.

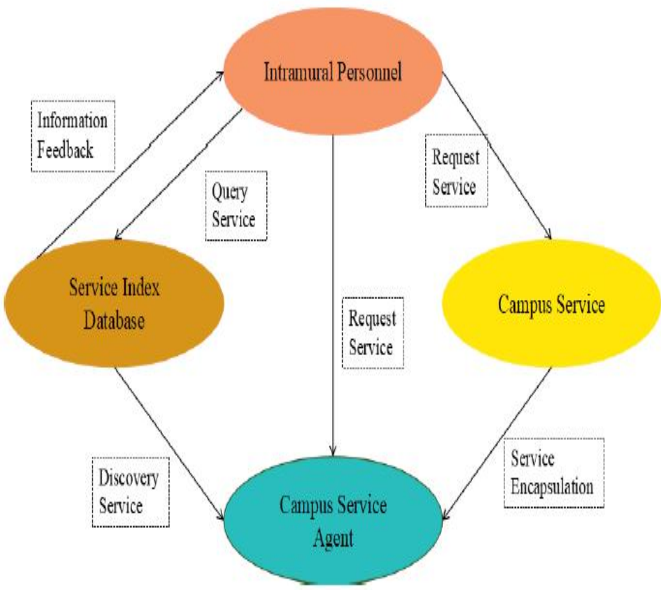

Fig.2 The relationship in service discovery of smart campus.

In addition to maintaining the service information providedby the smart campus service provider, the service indexeralso provides the school staff with index information forrequesting services so that they can enjoy the service. The

ISSN: 2366-1313

servicesprovided by smart campus should be configurable. Theoperation flow of the service registration discovery model is

as follows:(1) In the smart campus system, the deployment of serviceindex database is to manage and maintain the informationof index database through indexer. Service agents need toknow the gateway location of the service indexer in advance,and register the information they own into the service indexdatabase through the gateway of the indexer.

(2) Personnel *s* gets the location of the index server andthen gets the service list *Ls* through various smart campusservice applications on intelligent terminals, but *Ls* is not necessarilythe service *Lt* in the index database. It may be a listof service classes in the area *Z* and environment *E* where theschool staff are located or a list of services computed by thekeyword *A* and the fuzzy matching algorithm *F*. Therefore,the final list of services received by campus users is

$$L_s = f(L_t, A, E, Z)$$

(3) The user selects the appropriate service *s* from the servicelist through intelligent terminal devices. After enteringthe service parameter *p*1; *p*2; : : : ; *pn*, the service user willaccess the service provided by the service provider. And thecalculation result *R* is abstracted as

$$R = s(p_1, p_2, \ldots, p_n)$$

After the end of service, whether the service execution issuccessful or not, the user's intelligent terminal equipmentand services make final confirmation.

SYSTEM ARECHITECTURE

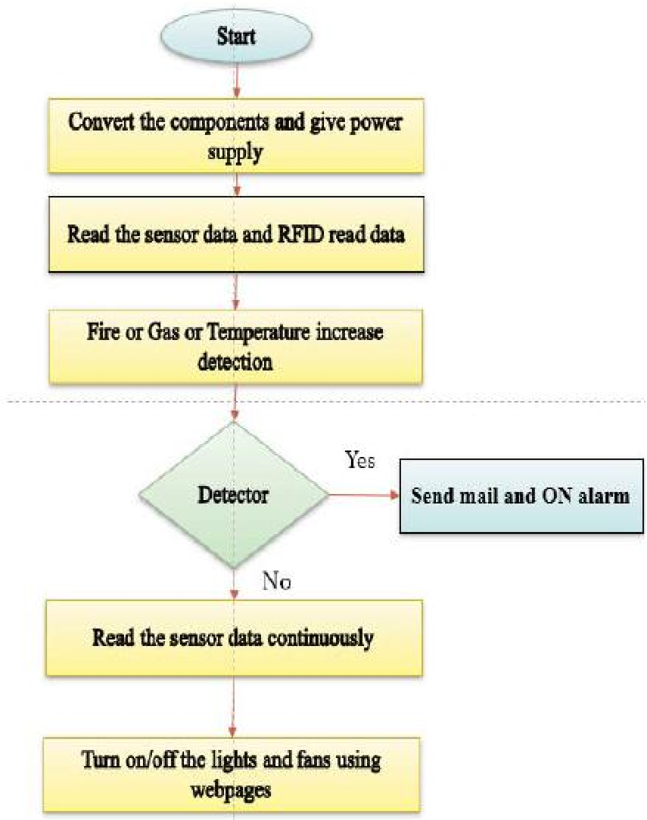

Fig.3 Flow chart

Location tracking system

Here, we use a separate unit known as the GPS unit to track the location in terms of latitude and longitude coordinates with the geographical coordinates of the earth. This tracking machine is delivered to the campus to locate and stumble upon the accident point. The proximity in which

ISSN: 2366-1313

some significant changes are determined concerning the normal values that can be indicated to the consumer.

Fig.4Website for retrieving the values from the nodes

Fig5Website for automat ion purpose

V. CONCLUS IONS

We have defined the reason utilization of super sensors built on reasonable raspberry pi connected to Arduino Nano which acts as an interface among raspberry pi and sensors. The tremendous sensor node is currently being installed within the campus a nd to guide the prolonged use cases. The sensors of facts is stored in raspberry pi and maybe queried through website, email and SMS. We presently have deployed wherein the gadget includes one node. The common node-generated community visitors is 0.2Kbps, increasing the database through 8MB according to day. The discrepancies between stop users must reassure the management of the college, college students and college.[1] Future work will focus on improving the model's accuracy and decreasing the variety of mistakes, which can permit the machine to be applied in numerous types of application, including save positioning in purchasing shops and smart museum.

REFERENCES:

L. Atzori, A. Iera, and G. Morabito, ―The internet of things: A survey,‖Comput. Netw, vol. 54, no. 15, pp. 2787–2805, 2010.

[2]. Dlodlo N, Foko T, Mvelase P, and Mathaba S ―The State of Affairs in Internet of Things Research‖ The Electronic Journal Information Systems Evaluation Volume 15 Issue 3 2012, (244-258), available online at www.ejise.com

ISSN: 2366-1313

[3]. ―Five ways the internet of things is already broken—and how to fix it‖ by Leo Mirani September 23, 2014 retrieved from http://qz.com on 12 feb 2015.

[4]. ―The State of Affairs in Internet of Things Research‖ by Nomusa Dlodlo, Thato Foko, Promise Mvelase, and Sizakele Mathaba CSIR Meraka Institute, Pretoria, South Africa in EJISE journal Volume 15 Issue 3.

[5]. ―Investing in an Internet of Things (IoT) Solution: Asking the Right Questions to Minimize TCO‖ by IDC Custom Solutions and sponsored by Aeris Communications in January 2014 retrieved from www.idc.com.

[6] E. J. M. Lauría *et al.*, ``Mining academic data to improve college studentretention: An open source perspective,'' in *Proc. ACM Int. Conf. Learn.Analytics Knowl.*, 2012, pp. 139_142

[7] Salunke D, Peddi Prasadu, Mane D, Joshi R. Customized convolutional neural network to detect dental caries from radiovisiography (RVG) images International Journal of Advanced Technology and Engineering Exploration. 2022; 9(91) : 827-838. DOI:10.19101/IJATEE.2021.874862.

[8] W. Z. Cui, ``Study and development of smart campus application systembased on Internet of Things,'' M.S. thesis, Dept. Elect. Electron. Eng.,North China Electr. Power Univ., Beijing, China, 2016.

[9] M. Alvarez-Campana, G. López, E. Vázquez, V. A. Villagrá, andJ. Berrocal, ``Smart CEI Moncloa: An IoT-based platform for people flowand environmental monitoring on a smart university campus,'' *Sensors*,vol. 17, no. 12, p. 2856, Dec. 2017.

[10] Z. H. Qian and Y. J. Wang, ``IoT technology and application,'' *ActaElectron. Sinica*, vol. 40, no. 5, pp. 1023_1029, May 2012