Smart Attendance Monitoring and Counting System

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ABSTRACT: *This paper presents a Smart Attendance Monitoring and Counting System based on IOT. Counter system is designed to count the objects in class room, auditorium, offices, malls, industries etc. In today's scenario the effective utilization of power management is required either for a building used as a mall, classroom or a factory purpose. This goal can be achieved by counting the number of person or object in that building, so that we can manage the power and lightening conditions as per the required density in that building premises. The designed system can count and with the help of Internet of Things, anyone can remotely monitor the presence of persons in the premises. The entry and exit of the person is determined by this system. It will display the count on LCD panel in real time basis and also mail the number of count to the specified email ID .This system can be economically implemented in all the places where the visitors have to be counted and controlled. This system can be used for conserving the energy by automatically switching off the fans and lights when no one is present inside that building.*

Keywords—IOT (Internet of Things), IR (Infra Red)
General Terms – Counter System, Temboo

I. Introduction

In this paper the counting is taken as the action of going regularly in and out as well as monitor the absolute count value of the object or a person[1]. The manual counting system is not an efficient way as more time is required to record as well as count each, present inside the room and this counting process cannot even sync with the power management of the building. An Automatic attendance management system will help in saving time and money by eliminating a great deal of manual processes involved in counting and saves many hours attended for counting. Our new system can also feed the output to the power management entity so that at right time right amount of power is feed to that building. We install our system in college premises it automatically count the number of persons in the class room so that teachers can more accurately and quickly track student's timing in the classroom as well as it provide the real time temperature to the air conditioning systems so that they can effectively regulate the temperature of that class which in turn save power. This system is a low cost highly effective and can reduce paperwork which saves time as well as money spend on mobile and cloud based management system. It also eliminates wrong data entries and errors in time and attendance entries. Previously designed systems the entry and exit gates were different. This new system can also work effectively for a single gate entry and exit. Various

attendance monitoring and counting system such as RFID and biometric systems were already developed and used in various schools, workplaces etc. but those systems are not cost effective. It can also be used at workplaces to monitor attendance records of employees. For any type of organization, company needs people to operate it. Staffs and workforces of an organization are its biggest asset. So, for a business owner it is very important to make sure that he will keep a track of employees working hours. So, this system becomes very useful in different scenarios.

This system consists of three components i.e. IR sensor, LCD display and CC3200 Launchpad. The system works on the principle of IR sensing. The CC3200 Launchpad is programmed to count the number of person going in or out for the room and displays it on the LCD. It is conserving the energy by automatically switching off the fans and lights when nobody is present inside the room. The Launchpad is also programmed to send an email to the specific email address of user at a particular defined interval of time. Also, this interval of times is set by user only using real time clock extraction process [1]. This system can be used in shopping malls, schools, colleges, workplaces etc.

II. Internet of things (IOT)

A. Definition of IoT:

The rapid development of Information Technology (IT) has brought forward a hyper connected society in which objects are connected to mobile devices with the Internet and communicate with one another. In the 21st century we want to be connected with anything, anytime and anywhere. The potential benefits of Internet of things (IoT) are almost limitless and IoT applications are changing the way we work and live by saving time and resources and opening new opportunities for growth, innovation and knowledge creation [2]. The IoT has enormous potential to support an ageing society, to improve the energy efficiency and to optimize all kind of mobility and transport.

III. OVERVIEW

A. Existing System

The existing conventional method of attendance record was manual therefore time taking and inefficient. Other technologies which have been developed to replace manual system include finger print, retina scan, voice recognition etc. [3]. Problem with manual system is that it is time taking

and inefficient while technology-based system is quite expensive.

B. Proposed System

It is an automated Attendance monitoring system based on IoT. Both IR sensors are used at the entrance of the premises to sense presence of any persons and increment and decrement the value of count accordingly. Based upon the value of count in database attendance can be monitored from anywhere and anytime to the admin.

III. METHODOLOGY

Two infrared (IR) sensor modules are used each for up and down counting, respectively. Whenever an interruption is observed by the first IR sensor, it increments the counter value. Similarly, when the second sensor detects an obstacle, the count is decremented.

- The count value is calculated depending upon the sensors' input and is displayed on a LCD simultaneously.

- Each time the first sensor is blocked, it gives a high signal and the count value gets incremented. The value gets decremented when second sensor, gives high input. At each step, the value of the counter is sent to be displayed on the LCD.

- If the count values comes out to be zero i.e. when no one is present inside the class then lights and fans switches off automatically.

- The count is sent to the mentioned email address after particular time interval.

- This can achieve by the IOT feature of the TI CC3200 Launchpad.

IV. FEATURES OF CC3200

1.Wi-Fi CERTIFIED™ Chip

2.ARM®Cortex®-M4 Core at 80 MHz

3.RAM (Up to 256KB)

4. 8-Bit Parallel Camera Interface

5. Dedicated External SPI Interface for Serial Flash

6. Wi-Fi Network Processor Subsystem

   6.1 Featuring Wi-Fi Internet-On-a- Chip™

   6.2 Dedicated ARM MCU (………….)

7. Clock Source

7.1 40.0-MHz Crystal with Internal
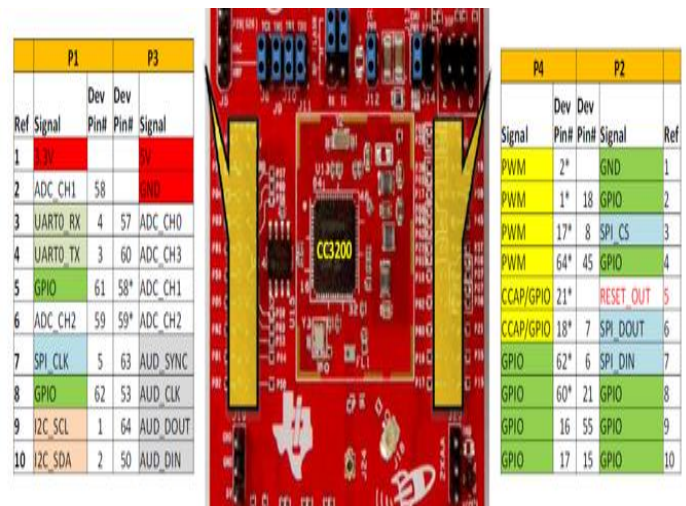
7.2 32.768-kHz Crystal or External RTC Clock

Fig. (1): PIN Layout for CC3200 MCU

V. MODULE CC3200 TI LAUNCHPAD

CC3200 is a Wi-Fi controlled MCU that helps in developing an IOT solution. The application MCU subsystem contains an industry-standard ARM Cortex-M4 core running at 80 MHz. The device includes a wide variety of peripherals, including a fast-parallel camera interface, I2S, SD/MMC, UART, SPI, I2C, and four-channel ADC. CC3200 Wi-Fi module is the internal part of the Smart IR device [4].

CC3200 family includes flexible embedded RAM for code and data and ROM with external serial flash boot loader and peripheral drivers. The Wi-Fi network processor subsystem features a Wi-Fi Internet-on-a-Chip and contains an additional dedicated ARM MCU that completely offloads the applications MCU. This subsystem includes an 802.11 b/g/n radio, baseband, and MAC with a powerful crypto engine for fast, secure Internet connections with 256-bit encryption. The CC3200 device supports Station, Access Point, and Wi-Fi Direct modes. The device also supports WPA2 personal and enterprise security and WPS 2.0. The Wi-Fi Internet-on-a-chip includes embedded TCP/IP and TLS/SSL stacks, HTTP server, and multiple Internet protocols. The Launch Pad CC3200 includes the following features to improve performance.

- Protocols for Cloud Connectivity.
- UART and USART.
- Access Control.
- Internet Gateway.
- Wireless Audio.
- IP Network Sensors Node.
- 1 Mb Flash Memory.
- Programmable Buttons.
- Ambient temperature range: -40°C–85°C.
- Watchdog Timer.
- 802.11 b/g/n Radio, Baseband, MAC, Wi-Fi Driver, TCP/IP Stack.
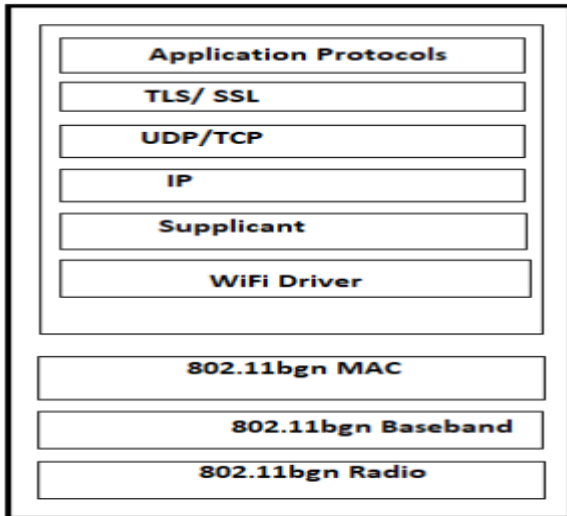
VI. PROTOCOLS

Fig. (2) : Layered Protocol for CC3200

Fig (2) shows various layers of protocols used in TI CC3200 launcpad. A porotocol is a set of rules that describes how information are exchanged between two entities. Networking task often require more than one protocol to perform a task, such as file transfer.

VI. (A) APPLICATION PROTOCOL

Fig. (2) shows the layered protocol architecture for CC3200. The application layer is a layer in the Open Systems Interconnection (OSI) seven-layer model and in the TCP/IP protocol suite. It consists of protocols that focus on process-to-process communication across an IP network and provides a firm communication interface and end-user services[4]

VI.(B) TLS/SSL

Introduced in 1904 as Secure Socket Layer (SSL) by Netscape Inc. to secure e-commerce, the protocol evolved to be the de facto standard for Transport layer security, more specific for Transmission Control Protocol (TCP) based connections[5].Transport Layer Security (TLS) and its predecessor, Secure Sockets Layer (SSL), both frequently referred to as "SSL", are cryptographic protocols that provide communications security over a computer network. Several versions of the protocols find widespread use in applications such as web browsing, email, Internet faxing, instant messaging, and voice-over-IP (VoIP). Websites use TLS to secure all communications between their servers and web browsers.

VI.(C) UDP/TCP

TCP is one of the basic protocol of Internet Protocol suite.It provides various functions such as reliable, In sequence

delivery of a stream of Bytes from a program on one computer to another program on other computer[6].UDP (User Datagram Protocol) is an alternative communications protocol to Transmission Control Protocol (TCP) used primarily for establishing low-latency and loss tolerating connections between applications on the Internet. Both UDP and TCP run on top of the Internet Protocol (IP) and are sometimes referred to as UDP/IP or TCP/IP.

VI.(D) IP

The Internet Protocol (IP) is the method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it from all other computers on the Internet.[9]

VII. DESIGN LAYOUT
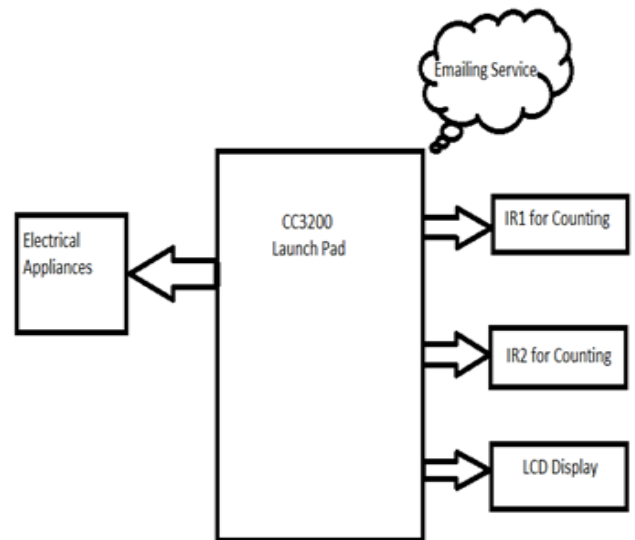
Fig (3) shows the design layout of this System

Fig (3) : Shows the Design Layout of the given System

VIII. FLOWCHART

Flow Chart given in Fig-(4) shows the sequence of movements or actions involved in this complex system.

IX. CODE AUTOMIZATION

The Analysis of some part of code is provided in this section:

Library used are as follows:

#include "LiquidCrystal.h

#include <SPI.h>

#include <WiFi.h>

#include <WiFiClient.h>

#include <LiquidCrystal.h>

#include <Wire.h>

#include <RTClib.h> //Library For Clock

#include <Temboo.h>

#include "TembooAccount.h" // Contains Temboo account information

The voltge1 and volate2 are referring to the first and second IR sensor respectively. The first IF condition will increment the count as the person will enter the room and the second IF condition will decrement the value of count. This logic is implemented in code given below:

```
If  (voltage 1 > int(14))
{
Count = count =1;
}
if (voltage2 > int (10) && voltage2 < int(14))
{count=count-1;
}
```
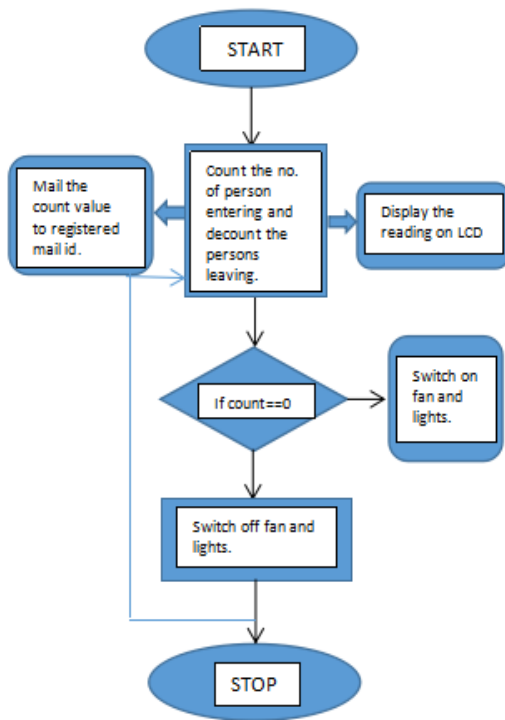
Fig (4) : Flowchart of Automatic Attendance Monitoring and Counting System

Fig (5) shows the Counting System Display which shows the value of output at any particular instant.

The LCD is showing two rows in which first rowing is showing the "COUNTING SYSTEM" and the second row is displaying the real time count which is done using the below code.

```
Lcd.clear();
Lcd.print("COUNTING SYSTEM");
Lcd.setCursor(0,1);
Lcd.print("COUNT");
Lcd.println(count);
```

Libraries used in the code for sending the real time count to the user email address using internet. The library WiFi.h is used to connect to the internet and the library Temboo.h is used to send the email to the user . Code to implement this thing is shown below :

```
#include <EiFi.h>
#include <Temboo.h>
```

Fig (5). Counting system Display

The count value from the LCD display is send to the email of the user email address as shown in below picture. Fig (6) shows the screenshot of Computer Screen showing output received via Gmail.
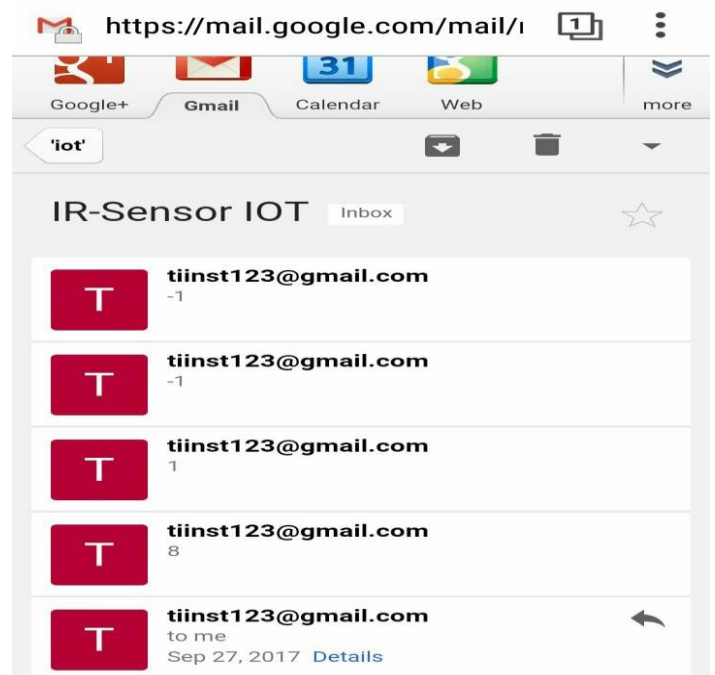
Fig. (6) : Screenshot of Computer screen showing output received via Gmail

X. CHARACTERISTICS OF PROPOSED SYSTEM

- User Friendly: The proposed system is very user friendly.

- Attendance reports can be easily generated.

- All paper work regarding attendance are totally eliminated.

- IoT provides an added advantage that this system can be monitored from anywhere and anytime.

X. APPLICATIONS

The proposed system has wide range of applications. Some of them are as follows:

i. Used to count the visitors of an auditorium, hall, offices, malls etc.

ii. Used in Parking Lot.

iii. Used in elevator to prevent maximum limit of weight.

iv. Used as home automation system to ensure energy saving by switching on the loads and fans only when needed.

XII. CONCLUSION

The project demonstrates real time attendance monitoring and counting system. We have successfully designed a system which not only helps the to count the number of person but can effectively contribute in power management of the building. The counter system calculates the number of people entering and exiting into a particular room. The counter value will increment if the person is entering the room and its value will decrement if the person is leaving the room. This count value of person entering or exiting is displayed on the 16x2 LCD in the real time basis. An e-mail is sent using Internet to the afore mentioned e-mail address of the user in a particularly defined interval of time using the real time clock extraction process. In future the systems performance will be improved by replacing the infrared to ultrasonic sensors. This may be a future scope of work.

X. REFRENCES

1. Aman Jobunputra, Shubham Jain,Kruttika Choithani, "Smart Attendance Management System" International Journal of Computer Science. Volume-4 Issue-5 , Sep-Oct 2016.

2. Dr. Ovidiu Vermesan , "Internet of Things- from Research and Innovation to Market Deployment", River Publisher.

3. Aman Jobunputra, "Smart Attendance Management System" International Journal of Computer Science. Volume-4 Issue-5 , Sep-Oct 2016.

4. B.V. Sai Chaitanya, T. Chandra Shekhar and N.V.K. Ramesh "IOT Based smart Ir sensing device using CC3200" International Journal of Science and Technology. Vol 9(16), April 2016.

5. Christopher Meyer, " 20 years of SSL/TLS Research An Analysis of Internet's Security Foundation", 9th feb 2014.

6. Santosh Kumar, Sonam Rai , "Survey on Transport Layer Protocols: TCP & UDP" ,Vol-46, May 2012.