

# Secure-Lite an Industrial Surveillance and Security Management App

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**Abstract**— Industrial automation is the major need for the scope of improvement for the developing industries as well as developed industries. In the past few years, technology has in a grown at high speed. Also human lives have become much more dependent on electronic devices and appliances. It has thus led to the idea of developing an industrial surveillance automation system. This paper is about industrial surveillance and security management system which would use a smart phone to enable any naïve user to operate all the appliances. When it comes to automation in industries, security is major concern and covering the security bases is not an easy job to do. Threats can arise into any form like may it be unauthorized access, theft, etc so the industry should be prepared and our project helps the industry be prepared in terms of security? In order to secure the industries security majors like CCTV camera services, security personnel are hired. But if we consider the case of a large scale industry the CCTV camera service is required on large scale to cover each and every corner of the industry and alongside enough security personnel is also needed for manual measures. Apart from these some personnel are hired on extra basis to monitor the CCTV footage. All the above facts come into consideration that the owner needs to personally monitor the services hired or he needs to appoint another person to monitor these services hired. Although the above facts consume time and money we can't miss the fact of human errors. And when it comes to security of the industry there are some restricted areas into the industry where only authorized personnel are allowed. Apart from the security threats there are many ways a threat can arise it can arise in a hazardous way like leakage of gas, rise in temperature levels of the building, depletion of oxygen levels in a certain areas in the industry. Not only the threats but monitoring the activities in an industry is not a easy job. A personnel needs to monitor various things like electricity, smoke levels, ph levels of water, humidity in an area etc. SecureLite is a one stop solution for the industrial security. It notifies the industry about unauthorized entry, water hazard level, Smoke hazard level; it helps the security personnel monitor each other's location.

**Key words:** Industrial Surveillance and Security Management App, Secure-Lite

## I. INTRODUCTION

The idea behind making the application is that the owner can monitor the ongoing activities on the go. We provide an android application with different panels for different users, the owner can view all the modules and raise any request of his choice, the operator can only read data, the watchmen whose location we are monitoring can only display their location and are forbidden from doing anything else. Basically we will be providing different provisions to different users based on the requirement.

Every login detail will be saved into the database so that if needed the owner can look into login charts. The application will also notify automatically about hazards occurring in the factory, it will notify if the PH level of water increase significantly, it will notify if hazardous smoke like carbon monoxide is being emitted in large amount besides this it will notify if anyone smokes in a non-smoking zone, apart from this the application helps in monitoring the temperature of the factory and triggers a notification when the temperature is above the concerned level.

The application also would trigger an alarm if any unauthorized activity is found in a secure room or if any entity tries an unauthorized entry in the secure premises. The RFID entry and exit data will be saved into the database and will be able to access by concerned people. This will be the working structure of the application which will be a fully internet based application where nobody can alter the data which helps the owner of factory in many aspects.

## II. LITERATURE REVIEW

### A. Existing Systems

#### 1) Fire Alarms with Spray Mechanism

The current fire alarms with spray mechanism used are of old types and do not differentiate the smoke if they detect any type of smoke they start spraying water. In our project we distinguish types of smokes and based on type of smoke we send a notification. If the smoke is the one released from fire we send a warning about the same.

#### 2) Buffering CCTV Footage over Web Portal

The existing systems provide CCTV footage buffering over a web portal which cannot be feasible in some scenarios. In order to overcome this issue we provide the buffering on android application which can be feasible in any scenarios.

#### 3) Attendance using Biometric Devices

While using biometric devices in a sugar factory at the time of entry it doesn't have a problem but at time of exit at the end of the due to work the hands get bruised up and dirty which renders the biometric device unable to detect the fingerprints which further renders the system unable to take attendance. Using RFID to record attendance surpasses con of biometric unable to record attendance when hands get dirty.

### B. Proposed System

The functional scope of the system is represented in two different parts such as Android Application and Web Application.

#### 1) Android Application

Android Application includes the Client Side Deployment of the Android Application and Web Application in which various Services will be available to the client. Such as monitoring the CCTV footage, PH level testing, electricity

usage monitoring, monitoring the locations of watchmen, look at attendance list.

Provided to the above features the android application will notify for the events such as an unauthorized entry in a secure room, detection of types of smoke, high electricity usage.

#### 2) Web Server

Web Application includes the Server side application in which the admin will handle the all profiles, data entry, and all the Managerial activity.

### III. PROPOSED METHODOLOGY

#### A. Problem Definition

Considering current scenario of the market there is no any android app which can help the owner of the industry monitor the activities going on in the industry in his/her absence. The owner Mahankali Sugar Factory Kavthe Mahankal wanted a system which could monitor the ongoing activities in the factory in his absence.

So the idea behind making the application is that the owner can monitor the ongoing activities on the go. We provide an android application with different panels for different users, the owner can view all the modules and raise any request of his choice, the operator can only read data, the watchmen whose location we are monitoring can only display their location and are forbidden from doing anything else. Basically we will be providing different provisions to different users based on the requirement.

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#### B. Proposed Experiment Work

These are the various modules which we have proposed to do with its specification.

##### 1) Entry using RFID Card

Every employee in the factory will be given a RFID tag and while entering the factory premises a RFID reader will be placed at the entrance. The employee should scan his tag to the reader and go to his work. This collects the daily employee attendance and also prevents unauthorized people from entering the factory.

##### 2) Smoke Detection

Sensors that detect smoke will be fitted which will differentiate smoke types. The sensors will differentiate the smoke type and accordingly send a notification to the operator. Notifications will be provided for smoking in non-

smoking zone, 2069mission of carbon monoxide, fire and rise in temperature.

##### 3) Electricity Monitoring

This module will help to save the electricity by monitoring the electricity usage and making a day to day log. If over usage of electricity is occurred it will send a notification.

##### 4) Humidity Level Testing

In the industry there are areas where the workers are needed to work into a humid environment. If the humidity of the room rises it may cause hazardous effects on some of the workers. In order to prevent this humidity sensor will be used in order to monitor the humidity levels in the room.

##### 5) Obtaining Smartphone Location

The watchmen who take rounds in premises of industry have a chance to skip their rounds and make an entry that round is done. In case of the application a certain latitude and longitude will be given to the watchman and at certain time intervals alarm will be raised and the only way to switch of the alarm is to go towards the area to a certain point which is set in the application and enter a password manually. This ensures that the watchman has covered the round and was actually present to input the password.

##### 6) Detection of Objects using Ultrasonic

A factory has secure room where only authorized personnel are granted access but if any unauthorized entity tries to enter through means of window, for this purpose we provide this module where two ultrasonic sensors will be connected to the hinges in an "x" pattern if an unauthorized entity tries to enter through window the ultrasonic sensor will detect the movement and send a notification.

##### 7) Buffering Live CCTV Footage on Application

Whenever the owner is out of the factory he has to rely on the people working in the factory. He doesn't have a direct eye on the factory when he is at home or anywhere else. In order to give the provision of keeping an eye in the factory when away from factory we provided this module. In this module the CCTV footage which is recorded in the factory will buffered live to the owner on demand.

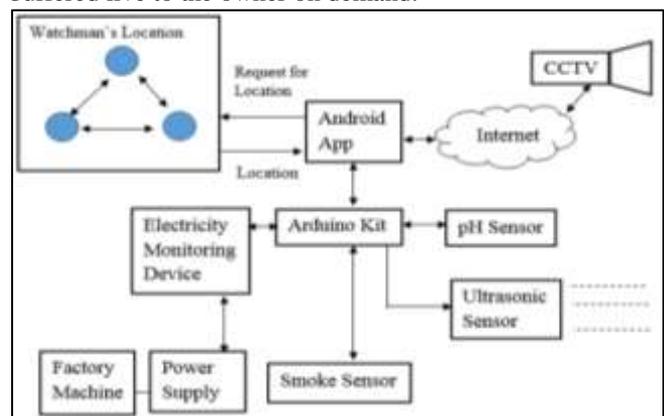


Fig. 1: System Architecture

#### C. Platforms Used

We are using following technologies for completing our project.

##### 1) Android Technology

Android is an open source and Linux-based Operating System for mobile devices such as smart phones` and tablet computers. Android was developed by the Open Handset Alliance, led by Google, and other companies.

2) *Web Technology*

a) **PHP**

PHP is an acronym for "PHP: Hypertext Pre-processor". It is a widely-used, open source scripting language. PHP scripts are executed on the server. It is free to download and use.

3) *Server Side*

a) **PhpMyAdmin**

It is one of the most popular applications for MySQL databases management. It is a free tool written in PHP. Through this software you can create, alter, drop, delete, import and export MySQL database tables. You can run MySQL queries, optimize, repair and check tables, change collation and execute other database management commands. All the Site Ground clients can manage their MySQL databases through the preinstalled PhpMyAdmin software which is integrated in CPanel.

b) **XAMPP Server**

It is a free and open source cross platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP server, MariaDB database and interpreters for scripts written in the PHP and Perl programming languages. XAMPP stands for Cross-Platform (X), Apache (A), MariaDB (M), PHP (P) and Perl (P). It is a simple, lightweight Apache distribution that makes it extremely easy for developers to create a local web server for testing and deployment purposes.

c) **Database**

MySQL is a fast, easy-to-use RDBMS being used for many small and big businesses. MySQL is developed, marketed, and supported by MySQL AB, which is a Swedish company.

d) **Aurdino**

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a microcontroller) and ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board. Arduino provides a standard form factor that breaks the functions of the micro

employees will be collected with help of a RFID card/ tag and a RFID reader

2) *Data Flow for Smoke Detection*

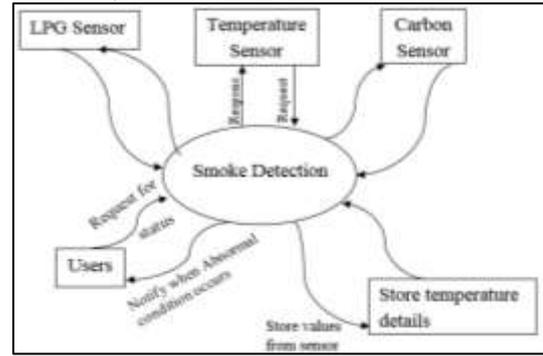


Fig. 3: Data Flow for Smoke Detection

The above diagram (Fig 3) shows representation of data flow diagram for the Smoke detection module, in which if the smoke is generated the sensor will detects and notify through android app.

3) *Data Flow for Ultrasonic Sensor*

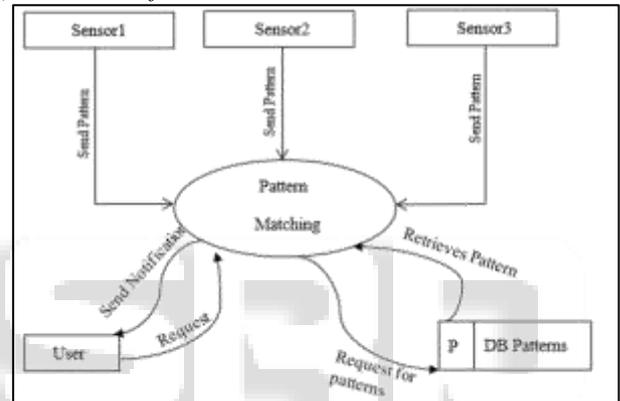


Fig. 4: Data Flow for Ultrasonic Sensor

The above diagram (Fig 4) shows representation of data flow diagram for the ultrasonic sensor module, in which there is detection of object based on ultrasonic waves.

4) *Data Flow for Electricity Monitoring*

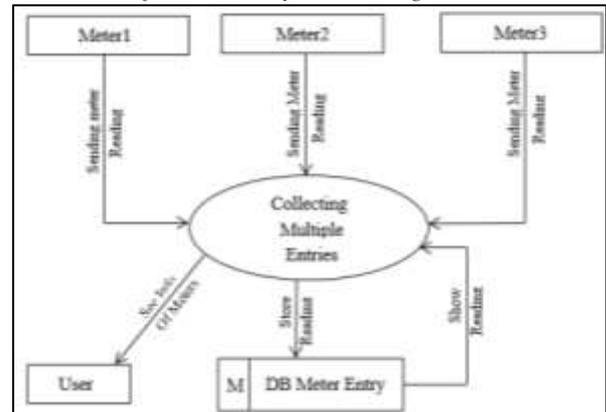


Fig. 5: Data Flow for Electricity Monitoring

The above diagram(Fig 5) shows representation of data flow diagram for the Electricity monitoring module, in which we shows measurement of units consumes and save results into the database.

5) *Data Flow for Live CCTV Footage Buffering*

The above diagram (Fig 6) shows representation of data flow diagram for the Live CCTV footage Buffering module, in which the live footage from the CCTV is displayed on android app.

IV. DIAGRAMS

A. *Data Flow Diagram*

1) *Data Flow for RFID*

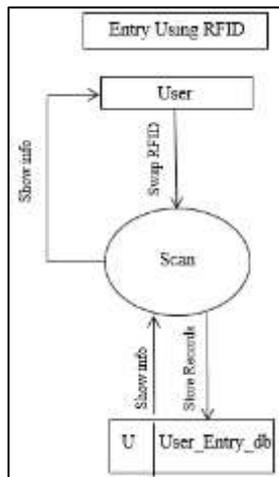


Fig. 2: Data Flow for RFID

The below diagram (Fig 2) shows representation of data flow diagram for the RFID module, in which the attendance of the



can detect CO-gas concentrations anywhere from 20 to 2000ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance.

**E. LPG Sensor MQ-6**

This is a simple-to-use liquefied petroleum gas (LPG) sensor, suitable for sensing LPG (composed of mostly propane and butane) concentrations in the air. The MQ-6 can detect gas concentrations anywhere from 200 to 10000ppm. This sensor has a high sensitivity and fast response time. The sensor's output is an analog resistance.

**F. Accelerometer Sensor ADXL335**

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of  $\pm 3$  g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration.

**G. Humidity Sensor**

This DFRobot DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

**H. Electricity Monitoring Sensor**

ACS712 current sensor operates from 5V and outputs analog voltage proportional to current measured on the sensing terminals. You can simply use a microcontroller ADC to read the values. Sensing terminal can even measure current for loads operating at high voltages like 230V AC mains while output sensed voltage is isolated from measuring part.

**I. Bluetooth Module**

HC-05 embedded Bluetooth serial communication module (can be short for Module) have two work modes: order-response work mode and automatic connection work mode. And there are three work roles (Master, Slave and Loopback) at the automatic connection work mode. When the module is at the automatic connection work mode, it will follow the default way set lastly to transmit the data automatically.

**J. Arduino**

The Mega 2560 is a microcontroller board based on the ATmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

**VI. RESULTS**

**A. Final Hardware**

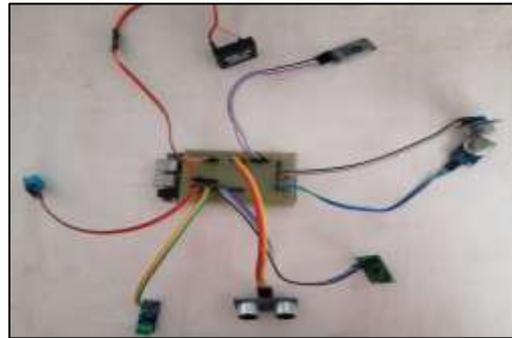


Fig. 11: Final Hardware

**B. RFID Tag Detection**

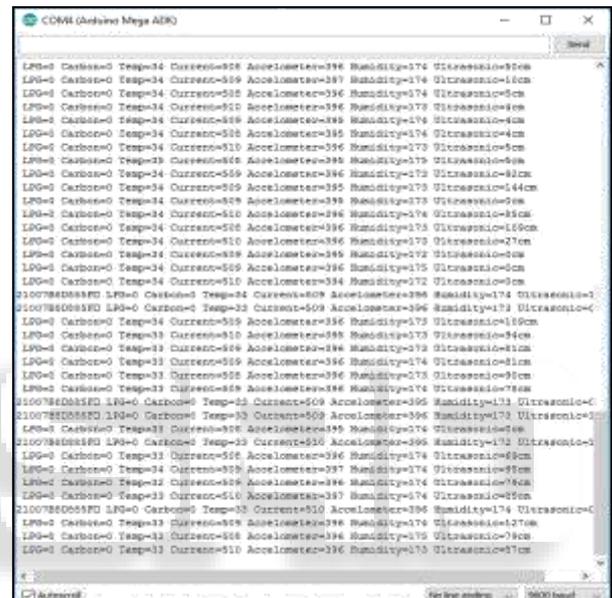


Fig. 12: RFID Tag

**C. Electricity Measurement**

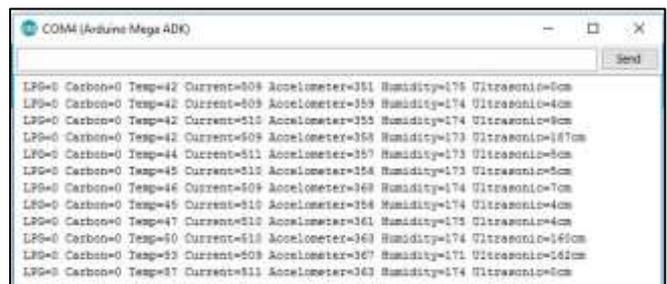


Fig. 13: Electricity Measurement

**D. Humidity Detection**

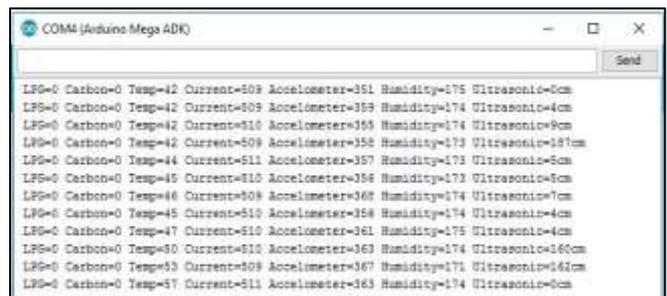


Fig. 14: Humidity Detection

E. LPG Gas Detection

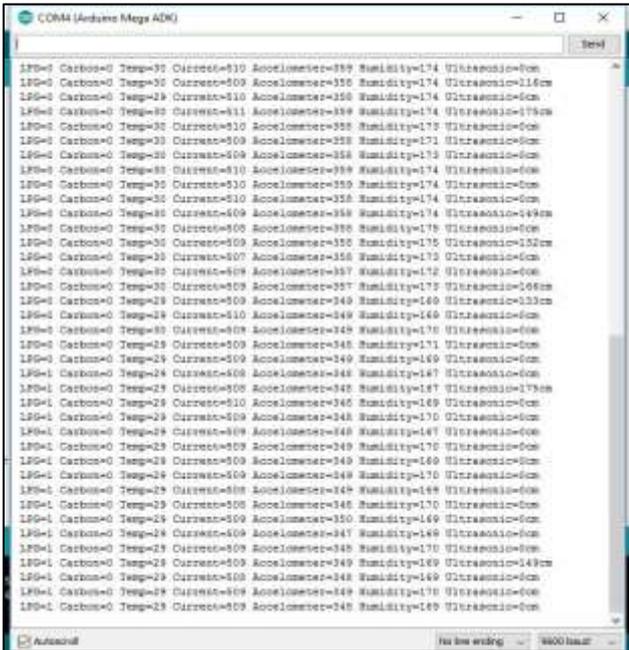


Fig. 15: LPG Gas Detection

F. Distance Measurement using Ultrasonic Sensor

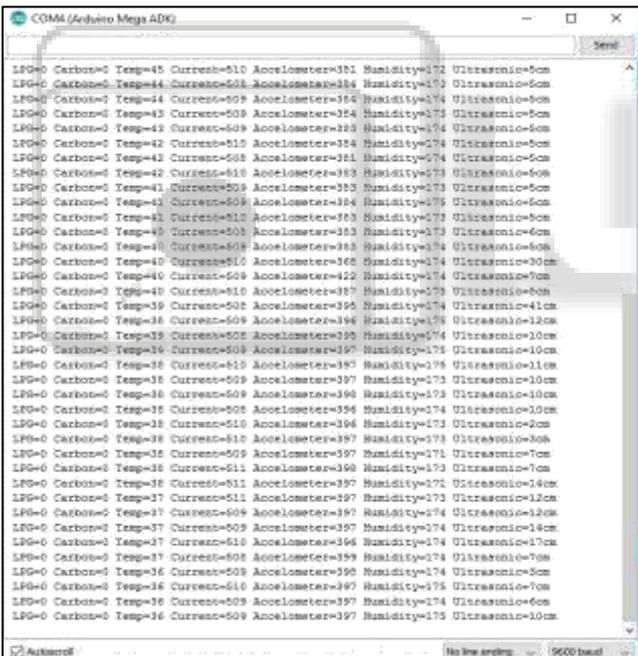


Fig. 16: Ultrasonic Sensor Reading

G. Temperature Detection

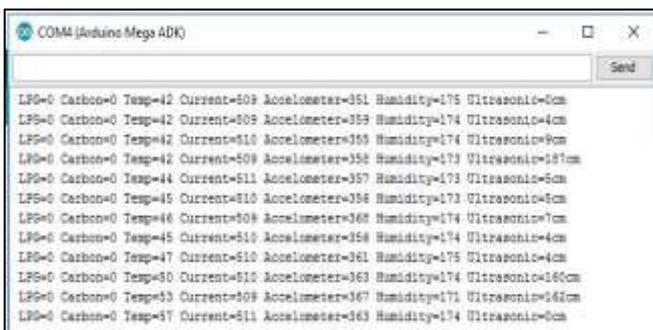


Fig. 17: Temperature Detection

H. Server Side Login Page

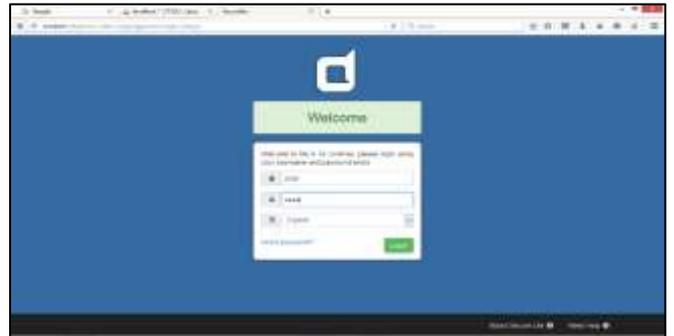


Fig. 18: Server Side Login Page

I. Server Side Maintenance Page

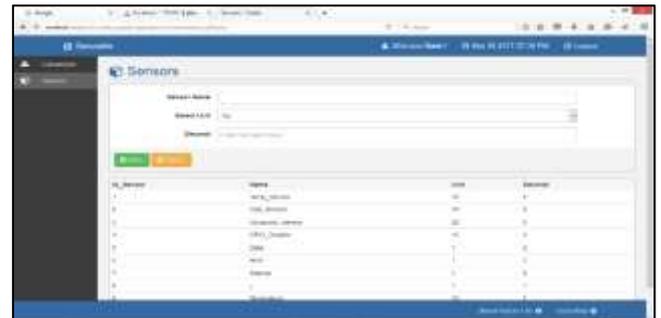


Fig. 19: Server Side Maintenance Page

J. Data on Android Phone using Bluetooth Terminal

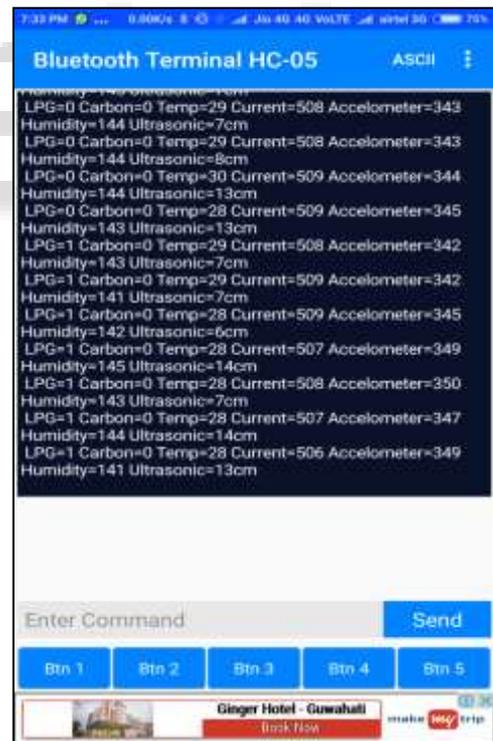


Fig. 17: Arduino Data on Android Phone

VII. COMPARISON

The above project is a combination of various products. The project gets a step ahead where the user gets one stop solutions instead of using numerous different products. Following are the pros which take it a step ahead of existing systems.

- 1) Unlike the existing systems where smoke is a single category where any type of smoke triggers an alarm, here we differentiate smoke into various categories like LPG Smoke, Carbon Monoxide smoke according to which an alarm is raised
- 2) The system gives a notification if the electricity unit usage is more than the average consumption which indeed helps in conserving electricity.
- 3) Using the location from the smart phones we can not only monitor the premises but we can also monitor personnel conducting the surveillance (e.g: watchman).
- 4) Entry using RFID tags overcomes the problem where when the biometric device is unable to detect the fingerprints in case the hands are dirty.
- 5) Using the ultrasonic sensor we can rely on a second source of detection (considering CCTV as primary source) where in any premises unauthorised access is denied.
- 6) Watching the CCTV feed on the go is possible unlike checking the CCTV hard drives regularly.
- 7) The system also tells about the humidity level in the atmosphere and notifies about the same in a timely manner.

#### VIII. FUTURE WORK

In future we will be working on the development & implementation of following modules-

- 1) We wish to introduce the HR management section along with surveillance and security section.
- 2) Along with HR Management section we will also develop a water PH level testing module where we will test the PH level of water.
- 3) An addition to the module of object detection via ultrasonic sensor can be done by adding fish eye lenses which cover the feed by 180° where if any object breaches the ultrasonic sensor the image of the object can be captured and using image processing techniques identification of the object can be done.

#### IX. CONCLUSION

Our project based on industrial surveillance is an effort to reduce human effort by providing industrial automation. The project helps the owner of the factory to supervise the people and monitor the activities happening in the factory in his absence. It not only helps the owner of the factory to monitor the activities in the factory but also helps monitor the people who do surveillance.

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