Smart City Applications in Environmental Different Fields

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Abstract— Objective of the paper is to get analyze the scientific studies by focusing on smart city concepts and sustainability to understand better. As cities grow and develop, the urban landscape undergoes a high degree of change. The proliferation of "Smart Cities" initiatives around the world is a part of the strategic response by governments to the challenges and opportunities of increasing urbanization and the rise of cities as the nexus of societal development. This JISA Thematic Series presents significant research contributions related to the design and development of Infrastructure, Services and Applications forthe Smart City and Urban context. In this smart city application unwanted noise can be controlled, harmful smokes can be avoided by introducing Smart smoke control system smart drainage cover, BRT bus gate controlling as well as electric bus charging is going to be available.

Keywords: Smart City, Sustainable City, Noise Control, Smart Smoke Control, Electric Bus Charging, BRT Bus Gate

I. INTRODUCTION

The pollution of air and sound is increasing abruptly. To bring it under control its monitoring is majorly recommended. To overcome this issue, we are introducing a system through which the level of sound and the existenceof the harmful gases in the surroundings can be detected.The growing pollution at such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present in the environment leaves a harmful effect to human health.

The major problem faced by the city in rainy season is the blockage of sewage pipeline. this is due to the plastic thrown by people in open drainage. to solve thisproblem we present simple logic of a smart drainage cover which opens whenever water is sensed and closed whenever there is no water present thus this system do not allow any plastic or physical material to be thrown is drainage

This paper presents an automatic system for controlling and dominating BRT gate based on RFID technology. The system begins with a RFID reader, which captures a tag for that vehicle which intends to enter the BRT lane, then sends the tag number to the controller. Tag number analyses performed to detect and recognize the vehicle, and matching the vehicle's number with the stored database of the permissible vehicles. Then, the controller sends a signal to the electro-mechanical part that controls gate to open and permits the vehicle to enter the lane in case of the vehicle's number matches any image in the database.

We also present smart IOT based pollution monitoring system for municipality to maintain and control the pollution level of particular area. In this we use co2 sensor and esp8266 through which data is maintained on cloud server.

In this project, a method of electric vehicles charging with the use of large truck/bus vehicles moving along national highways and provincial roads is proposed and described. The method relies on charging vehicles from trucks while moving either with plug in electric connection or by electromagnetic induction via loosely coupled coils. Open research challenges and several avenues or opportunities for future research on Electric VehiclesCharging are outlined. The proposed method overcomes the disadvantages of the so far known techniques.

II. LITERATURE SURVEY

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III. EXISTING SYSTEM

In existing system, some monitoring techniques are required to check the sound and air pollution The growing pollutionat such an alarming rate has started creating trouble for the living beings, may it be high decibels or toxic gases present

in the environment leaves a harmful, it takes a lot of human effort and also it does not give exact measure.

Secondly, some vehicles entered in the BRT bus lane to avoid traffic which causes accident and BRT buses faces problems. So in existing system CCTV cameras are used so that traffic police can stop other vehicles rather than BRT buses to enter the lane. But all time this does not work CCTV might get destroyed or malfunctioned may happens. Next the problem faced by the city in rainy season is the blockage of sewage pipeline, this is due to the plastic thrown by people in open drainage.

IV. PROPOSED SYSTEM

1) We are introducing a system through which the level of sound and the existence of the harmful gases in the surroundings can be detected. Smart IOT based pollution monitoring system for municipality to maintain and control the pollution level of particular area. In this we use co2 sensor and esp8266 through which data is maintained on cloud server.
2) To solve the problem of sewage drainage we present simple logic of a smart drainage cover which opens whenever water is sensed and closed whenever there is no water present thus this system do not allow anyplastic or physical material to be thrown is drainage.
3) This project presents an automatic system for controlling and dominating BRT gate based on RFID technology.
4) 4) In this project, a method of electric vehicles charging with the use of large truck/bus vehicles moving along national highways and provincial roads is proposed and described.

V. BLOCK DIAGRAM

Fig. 1: Block diagram of system

VI. HARDWARE AND SOFTWARE

A. HARDWARE

1) ATMEGA16 Controller

ATmega16 is an 8-bit high performance microcontroller of Atmel's Mega AVR family with low power consumption. Atmega16 is based on enhanced RISC (Reduced Instruction Set Computing, Know more about RISC and CISC Architecture) architecture with 131 powerful instructions. Most of the instructions execute in one machine cycle. Atmega16 can work on a maximum frequency of 16MHz.ATmega16 has 16 KB programmable flash memory, static RAM of 1 KB and EEPROM of 512 Bytes. The endurance cycle of flash memory and EEPROM is 10,000 and 100,000, respectively. ATmega16 is a 40 pin microcontroller. There are 32 I/O (input/output) lines which are divided into four 8-bit ports designated as PORTA, PORTB, PORTC and PORTD.ATmega16 has various in- built peripherals like USART, ADC, Analog Comparator, SPI, JTAG etc. Each I/O pin has an alternative task related to in-built peripherals.

2) RFID Reader

Radio Frequency Identification (RFID) Card Readers provide a low-cost solution to read passive RFID transponder tags up to 7 cm away. This RFID Card Reader can be used in a wide variety of hobbyist and commercial applications, including access control, automatic identification, robotics navigation, inventory tracking, payment systems, and car mobilization. The RFID card reader read the RFID tag in range and outputs unique identification code of the tag at baud rate of 9600. The data from RFID reader can be interfaced to be read bymicrocontroller or PC.

Fig 2: ATMEGA16 Pin Out

a) Information about Tag

Each transponder tag contains a unique identifier (one of 240, or 1,099,511,627,776 possible combinations) that isread by the RFID Card Reader and transmitted to the hostvia a simple serial interface. It means no two tags are same. Each tag has different value. This value is read by reader.

b) Communication

When the RFID Card Reader is active and a valid RFID transponder tag is placed within range of the activated reader, the unique ID will be transmitted as a 12-byte printable ASCII string serially to the host.

3) Coil

An electromagnetic coil is an electrical conductor such asa wire in the shape of a coil, spiral or helix. Electromagnetic coils are used in electrical engineering, in applications where electric currents interact with magnetic fields, in devices such as electric

motors, generators, inductors, electromagnets, transformers and sensor coils. Either an electric current is passed through the wire of the coil to generate a magnetic field, or conversely an external time-varying magnetic field through the interior of the coil generates an EMF (voltage) in the conductor.

A current through any conductor creates a circular magnetic field around the conductor due to Ampere's law. The advantage of using the coil shape is that it increases the strength of magnetic field produced by a given current. The magnetic fields generated by the separate turns of wire all pass through the center of the coil and add (superpose) to produce a strong field there. The more turns of wire, the stronger the field produced. Conversely, a changing external magnetic flux induces a voltage in a conductor such as a wire, due to Faraday's law of induction. The induced voltagecan be increased by winding the wire into a coil, because thefield lines intersect the circuit multiple times.

4) ESP8266 Wi-Fi module

The ESP8266 is a low-cost Wi-Fi microchip with full TCP/IP stack and microcontroller capability. The ESP8285is an ESP8266 with 1 MiB of built-in flash, allowing for single-chip devices capable of connecting to Wi-Fi.

5) LCD Monitor

Liquid crystal display (LCD) technology and connects to a computer. Laptops have used LCD screens almost exclusively, and the LCD monitor is the standard display screen for desktop computers.

6) Relay

A relay is an electrically operated switch. Many relays use an electromagnet to mechanically operate a switch, but other operating principles are also used, such as solid-state relays. Relays are used where it is necessary to control a circuit by a separate low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers: they repeated the signal coming in from one circuit and re-transmitted iton another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

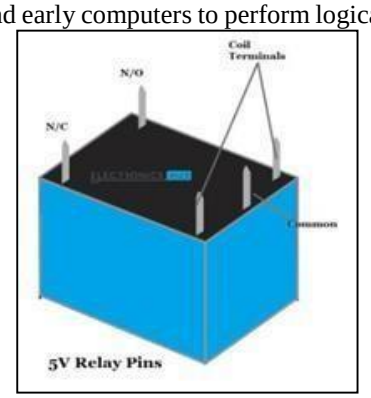

Fig. 3: Relay pin out

7) Power Supply

The basic step in the designing of any system is to design the power supply required for that system.

The steps involved in the designing of the power supply are as follows,

1) Determine the total current that the system sinks from the supply.
2) Determine the voltage rating required for the different components.

The bridge rectifier and capacitor i/p filter produce an unregulated DC voltage which is applied at the I/P of 7805.

The minimum dropout voltage is 2v for IC 7805, the voltage applied at the input terminal should be at least 7 volts.
C1 (1000 µf / 65v) is the filter capacitor.
C2, C4 (0.1uF ceramic),
C3 (220uF/25V electrolyte capacitor) is to be connected across the regulator to improve the transient response of the regulator.

Assuming the drop out voltage to be 2 volts, the minimum DV voltage across the
Capacitor C1 should be equal to 7volts (at least).

Fig. 4: Power supply unit

8) Battery

An electric battery is a device consisting of one or more electrochemical cells with external connections provided to power electrical devices such as flashlights, smartphones, and electric cars. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that when connected to an external circuit will flow and deliver energy to an external device. When a battery is connected to an external circuit, electrolytes are able to move as ions within, allowing the chemical reactions to be completed at the separate terminals and so deliver energy to the external circuit.

B. SOFTWARE

1) EAGLE SOFTWARE
2) AVR STUDIO
3) ARDUINO
4) ISP PROG
5) MATLAB

VII. RESULT

As a output of this project we are going to see a smart drainage cover which opens whenever water is sensed and closed whenever there is no water present thus this system do not allow any plastic or physical material to be thrown is drainage.

Next in Smart IOT based pollution monitoring system it will maintain and control the pollution level of particular area. In this co2 sensor and esp8266 will detect the smoke and noise nearby and it will maintain the data on cloud server.

In BRT lane only the vehicle with RFID tag is only be able to pass through the BRT lane.

The electric vehicles will charge through the electromagnetic coil placed in every stoppages.

At last in ThingSpeak platform we are able to see the IoT mechanism outputs programmed in MATLAB.

VIII. ADVANTAGES

- Reduces charging time
- Keeps BRT lane clear for ambulance
- Helpfull in maintaining pollution data
- Helps to clear flood water through sewage line without blockage

IX. CONCLUSION

Our proposal for various application for smart city reduces the burden of flood management, charging of public electric vehicle, maintaining and controlling of pollution on IOT, also keeping lane clear for BRT buses which increases attraction of people toward public transportation.

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