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EMBEDDED SOLUTIONS FOR EMERGING ISSUES IN CITY

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ABSTRACT

Nowadays, rapid growth in population has become one of the dominating and risk generating factor which has lead in improper utilization of resources, pollution and traffic congestion .This paper proposes and deals with optimum utilization of the resources in the city. The main objective of this paper is to analyze various problems and provide efficient and secure solution resulting in monitoring and controlling the parameters.

Keywords – Street light, Smart parking, Bank locker, Traffic congestion, Waste management, Hazardous gas , Water pollution, Wireless Camera, Microcontroller, RX/TX433, Keypad , LCD , GSM , IEEE802.15.4 , Sensors.

I. INTRODUCTION

The increase in the development of technology and the human race, we failed to take care about the surroundings in which we live in. Although our carelessness and irresponsibleness has jumbled the environment and thereby reducing the quality of the place we live. Thus the factor that has contributed in jumbling the environment of the city are Traffic congestion, inappropriate parking, leakage of hazardous gases, improper use of resources like water, inefficient use of street lights etc. The proposed systems for this dilemma are: (I) Efficient Street light control system, (II) Smart parking system, (III) Theft detection system, (IV) Intelligent traffic control system, (V) Pollution control system.

II. EFFICIENT STREET LIGHT CONTROL SYSTEM

2.1.Introduction

Automation, Power consumption and Cost Effectiveness are the important considerations in the present field of electronics and electrical related technologies. Industry of street lighting systems are growing rapidly and going to complex with rapid growth of industry and cities. To control and maintain complex street lighting system more economically, various street light control systems are developed. These systems are developed to control and reduce energy consumption of a town's public lighting system using different technologies.

2.2Objectives Of Proposed System

- Control switching of street light automatically according to Density.
  [Between the time interval 1.00 am -4.00 am].
- Switching of street lights.

➢ Alternate ON and OFF of the street light lamps.

[Between time interval 7.00 pm – 11.00 pm].

- Turning ON of street light with series fashion 1, 4, 7….so..on

  [Between time interval 11.00 pm -4.00 am].

- Detection of violence, rush etc.

  [Between times interval 1.00 am -4.00 am].

This proposed system utilizes the latest technology for the sources of light as LED Lamps instead of generally used street lamps such as High Pressure Sodium Lamps, etc. The LED technology is preferred as it offers several advantages over other traditional technologies like energy saving due to high current luminous efficiency, low maintenance cost, high color rendering index, rapid start up speed, long working life etc. This proposed system makes use of infrared sensor for vehicle and human detection. In the proposed work LDR circuit is used to provide actuating signal to the entire system after detection of darkness. The switching of street light happens automatically according to Density to develop flow based dynamic control statistics using infrared detection technology. This system also does alternate ON and OFF of the street light lamps by considering different time interval scenarios. This system also proposes violence detection. If violence is detected the message is transmitted to the monitoring unit using wireless communication protocol ZigBee.

2.3. Comparative Study Of Existing And Proposed System

Sr.No	Existing model	Proposed model
1.	More consumption of electricity.	No consumption of electricity due to use solar panel.
2.	Less energy efficient.	More energy efficient due to alternate switching based on timing interval.
3.	No detection of violence on road.	Detection of violence on road.

Table 1. Comparative study of existing and proposed system.

2.4 Result

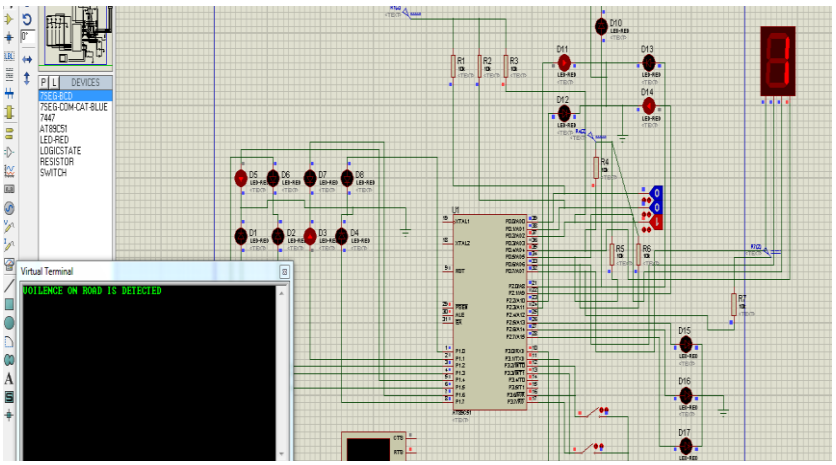

Fig.(a)Simulation of Efficient street light control system

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III. SMART PARKING

3.1 Introduction

In modern day, cost and time is the most common factors and effecting any human being whether it is individual of for a management. One of main issues of developing big parking space for office complexes, shopping complexes and other types of building that requires large parking space is to notify the visitors of occupied and non occupied parking space. Most of the visitors might spend up to 30 to 45 minutes just to find an empty parking space.

3.2 Proposed Model

In the proposed model we have taken two scenarios in two considerations

- Local parking for two and four wheeler.
- Authorized car parking.

Local car parking is designed for two wheeler and four wheeler. It is a system that could automatically count when the car entering the empty car space and thus blocking an infrared signal when the counter reaches its maximum value indicating that there is no empty car space.

3.3 Result

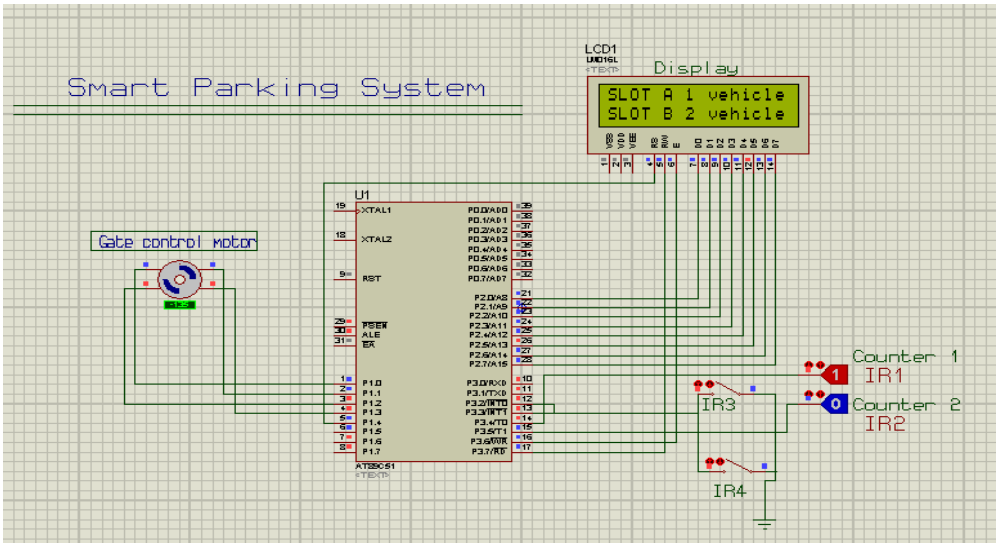

Fig. (b) Simulation of Local parking system.

In authorized car parking system image processing is done through Matlab. Through image processing automatic number plate recognition is done and access will be provided for authorized car in a parking lot where in access will be denied for unauthorized car.

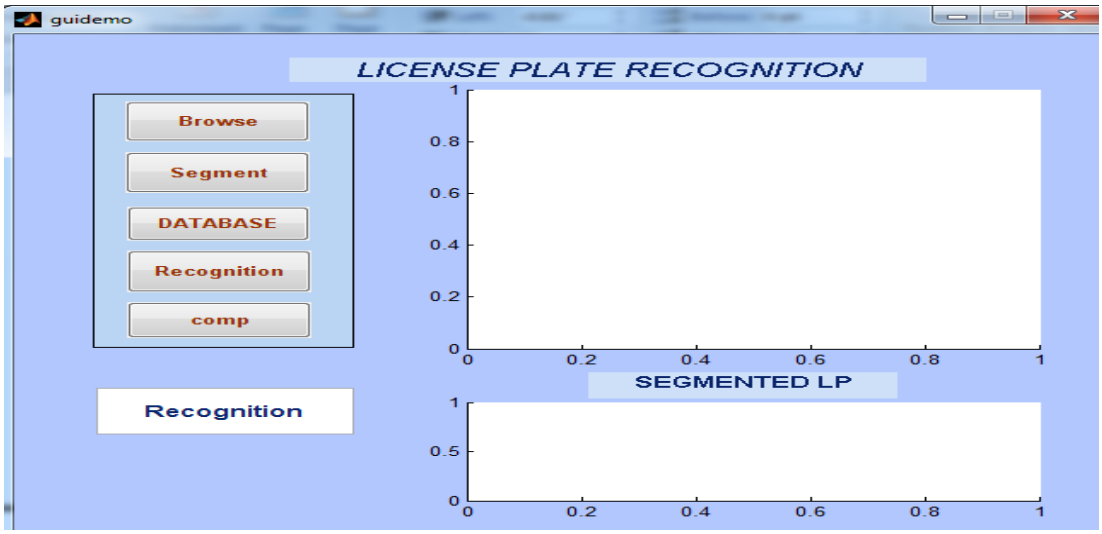

Fig.(c) Graphical User Interface for Authorized car parking system

The opening and closing of the gate in the proposed work is automatic whenever there is an empty parking space or the car is authorized to the respective parking systems, the opening of gate takes place. If the stated condition fails the gate remains to be close.

3.4 Comparative Study of Existing and Proposed System.

Sr.No	Existing model	Proposed model
1	Uses only counter based parking.	Uses counter based parking as well as Automatic number plate recognition through image processing.
2	Gate opening and closing is through manual interference.	Gate opening and closing is automatic.
3	Local parking.	Local parking includes separate provision for two wheeler and four wheeler parking as well as authorized parking.
4	Status of parking lot is not displayed.	Status of parking lot is displayed.

Table 2. Comparative study of existing and proposed system.

IV. THEFT DETECTION SYSTEM

4.1. Introduction

Bank security is important for a number of reasons; one of those reasons includes providing secure banking for clients and protecting the bank from fraudulent behavior. The main aim of this project is to design a security system that provide efficient way of security for banks, by means of an advanced door lock system. It is used in the fields where security and secrecy is the primary constraint. The main objective is to design digital code lock which is used to reduce manual interference to the maximum extent.

4.2. Proposed Model

In this proposed work, keypad is placed to enter the password by the users. Each user is having its unique password to get the access. The key pressed by the user will be send to the microcontroller, if the password is valid then microcontroller display the message welcome. The users are provided three chance to enter the password ,if the password entered fourth time is wrong access will be denied for the user and the door gets locked permanently and the message "Theft Detected" is transmitted to the monitoring unit also buzzer beeps for the alert purpose, along with this an actuating signal is provided by the microcontroller for video processing through the wireless camera.

Video processing is carried out by the software MATLAB. The camera is placed inside the locker room. In video processing the motion detection of the theft is captured ,the image is then send to monitoring unit securely through the process of stenography so far privacy is given the prime importance. This entire system maintains wireless communication among the system and monitoring unit and also controls terminal using ZigBee Wireless protocol.

4.3. Comparative Study of Existing and Proposed System

Sr.No	Existing Model	Proposed Model
1	Camera is used simply for monitoring.	Camera is used for Motion Detection of theft and record maintenance.
2	Power in efficiency (continuous use of camera)	Power efficiency. (Camera is not ON continuously).
3	Video processing is not done.	Video processing is done.
4	Only buzzer beeps upon detection of theft.	The door gets automatically locked as well as the buzzer beeps upon detection of theft.
5	Wireless communication protocol is not used.	Wireless communication protocol is used for remote monitoring.

Table 3. Comparative study of existing and proposed system.

4.4. Result

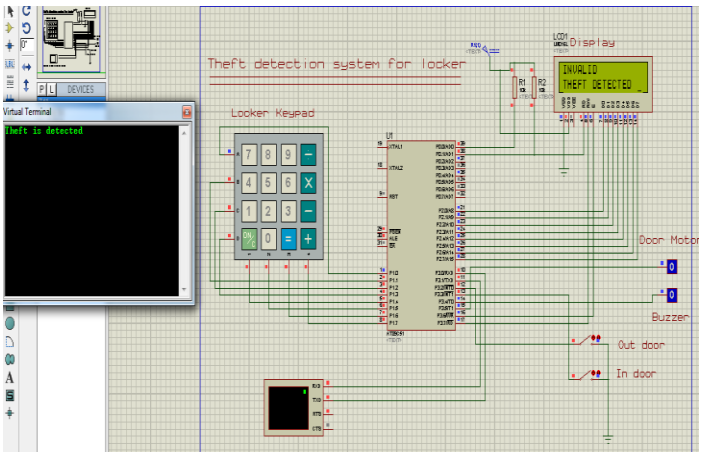

Fig.(d) Simulation of Theft detection system

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V. INTELLIGENT TRAFFIC CONTROL SYSTEM

5.1. Introduction

The occurrence of traffic congestion at the intersections in cities is one of major problem. The present traffic light controlling system could not sufficient to tackle the traffic congestion due to the lack of efficiency in the designing. The main design problems of present traffic light controller system are:

- Open loop system
  No feedback is taken of density of vehicle for the reduction of fixed time interval of traffic control signals.
- No mechanism provided for the occurrence of an emergency vehicle like
  Ambulance and Fire Brigade.

5.2 Proposed Model

In the proposed model the name intelligence has been given because it takes the feedback of the vehicle density and also provides the service for the Ambulance and Fire brigade depending upon the service requested by the driver. The Infrared sensors detect traffic present at signal, and provide it as input to the microcontroller and then time period is decided through programming and this time is given to traffic control signal i.e. red, green, orange light signal glows accordingly.

The communication between microcontroller and emergency vehicle is established using RF link i.e. RX/TX433 which uses ASK modulation. As we have divided the whole system in four ways North, South, East and West depending on the request given by emergency vehicle service will be provided by turning on particular green signal.

5.3. Comparative Study Of Existing And Proposed System

Sr.No	Existing model	Proposed Model
1.	Density of vehicle is not consider.	Density of vehicle not consider.
2.	Service to the emergency vehicle is given through GSM technology.	Service to the emergency vehicle is given through RF link(RX/TX433).
3.	More time consuming.	Less time consuming.
4.	Expensive.	Less expensive.

Table 4. Comparative study of existing and proposed system.

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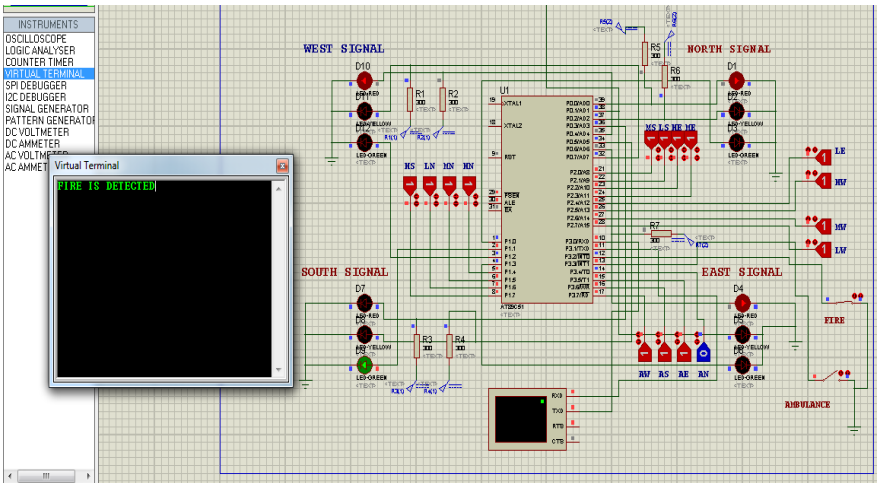
5.4. Results



Fig(e) Simulation for Intelligent traffic control system.

VI. POLLUTION CONTROL SYSTEM

6.1 Introduction

Pollution control is the process of reducing or eliminating the release of pollutants in to the environment. Thus pollution occurs due to improper waste management, emission of hazardous and toxic gases and pollutants present in the water.

6.2 Proposed Model

The proposed model is classified in to four system :

- Waste management system.
- Hazardous gas detection system.
- Water purity check system.

6.2.1 Waste Management System

In waste management system pot composting method is carried out wherein the organic waste is dumped in to the pot having the lid and it is air tightened. The door magnetic sensor is used in order to provide security to the pot so that the pot lid is not opened and there is no contact with the oxygen. Hence waste management system helps in reducing the infertility of the soil and hence the unwanted waste is reused.

6.2.2 Hazardous Gas Detection System

Safety plays a major role in today's world and it is essential that good safety systems are to be implemented in places of work and education. This work modifies the existing safety model installed in industries and this system also be used in homes and offices. The main objective of the work is designing microcontroller based toxic gas detecting and alerting system. The hazardous gases like LPG ,butane and propane were sensed by MQ135sensor. If these gases exceed the normal level then an alarm is generated immediately and also an alert message (SMS) is sent to the authorized person through the GSM and GPS is used to find the location. The advantage of this automated detection and alerting system over the manual method is that it offers quick response time and accurate detection of an emergency and in turn leading faster diffusion of the critical situation.

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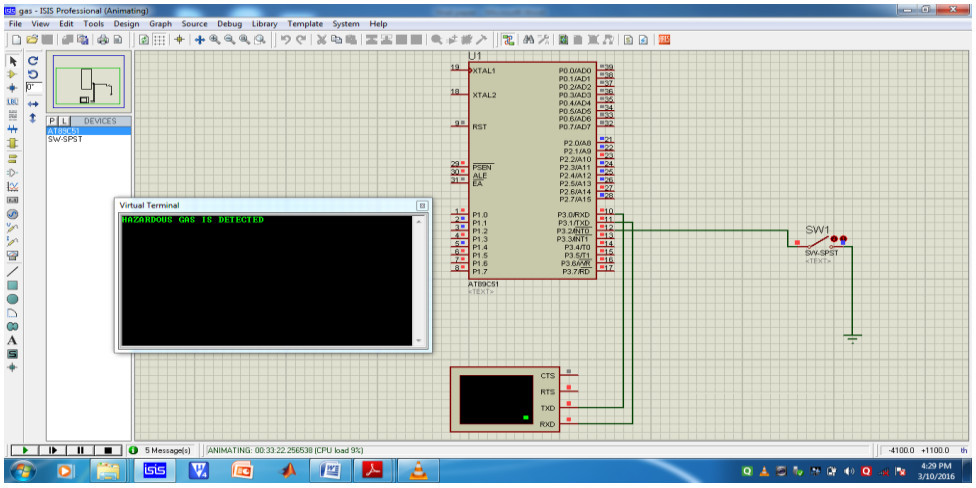
6.2.2.1 Result



Fig(f) Simulation for Hazardous gas detection system

6.2.3 Water Purity Check System

More than one billion people lack access to safe drinking water in the world. Providing a way to measure automatically water quality will help tackle this problem. This system presents the design of a water quality check system. The sensor node used in checking the water quality is Waspmote smart. Waspmote smart water platform is a unique sensor node that measures the water quality parameters like dissolved oxygen ,turbidity , salinity ,and dissolved ions (Br-,Ag+/S2,Ca2+,NO3-,Cl-,Pb2+,Cu2+). If the water quality is degraded then an alert message indicating polluted water is transmitted by the sensor node itself since it is having inbuilt ZigBee.

VII. CONCLUSION

An embedded system for emerging issues in the city has been implemented where in issues like inefficient use of power , traffic congestion ,threat and theft, pollution are been resolved. The implementation results providing a better life reducing human efforts , wastage of time , efficient use of power and providing a secure , safe , healthy and clean environment .

Fig (g) Image of implemented design.

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VII. FUTURE SCOPE

The future scope of the proposed system is to implementation additional embedded innovations like accident detection , monitoring and controlling of different of pollution , providing E-Governance facilities and connecting people and government through IOT .

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