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BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **SMART TRAFFIC CONTROL SYSTEM FOR AMBULANCE**

SESI PENGAJIAN: **2019/20 Semester 1**

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DECLARATION

I hereby, declared this report entitled “Smart Traffic Control System For Ambulance” is the results of my own research except as cited in references.

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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Electronics) (Hons.). The member of the supervisory is as follow:

……

(RAEIHAH BINTI MOHD ZAIN)

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

SMART TRAFFIC CONTROL SYSTEM FOR AMBULANCE

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor's Degree in Electronics Engineering Technology (Industrial Electronics) with Honours.

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ABSTRAK

Sistem lampu jalan yang mengandungi gangguan dalam beberapa cara dengan pergerakan kenderaan kecemasan ke kawasan kecemasan. Lampu merah menjadikan kenderaan kecemasan sukar bergerak, keadaan semakin teruk apabila kenderaan kecemasan perlu menunggu sehingga kenderaan lain diganti di persimpangan dengan pencahayaan. Di samping itu, kenderaan kecemasan yang terdedah kepada kemalangan ketika kenderaan lain gagal mengelak daripada melanggar kenderaan kecemasan. Dengan sistem kawalan cahaya lalu lintas ini berdasarkan kekerapan radio semua masalah yang disebabkan oleh kenderaan kecemasan boleh diselesaikan. Transceiver Frekuensi Radio adalah campuran pemancar dan penerima dalam satu pakej. Kekerapan radio adalah satu bentuk transmisi elektromagnetik yang digunakan dalam komunikasi tanpa wayar. Isyarat RF mudah dijana, antara 3kHz hingga 300GHz. Ini digunakan dalam komunikasi tanpa wayar kerana harta mereka menembusi objek dan bergerak jarak jauh. RF pada masa kini mudah didapati dan lebih mudah digunakan. Mencari pengganti mikrokontroler dengan Arduino telah membuat beberapa perubahan drastik yang membuat pengaturcaraannya lebih mudah. Arduino menjadikannya lebih mudah untuk memahami litar dan pengaturcaraan. Makalah ini menggunakan modul RF Transceiver dan Arduino untuk sistem kawalan trafik pintar untuk ambulans.

ABSTRACT

A road light system that is covered interferes in some way with emergency movement of vehicles to the emergency area. Because red light makes it difficult to move emergency vehicles, the situation got even worse when emergency vehicles have to wait until another vehicle is replaced at intersections with lighting. In addition, road accident-prone emergency vehicles when other vehicles fail to pass into vehicles. With this traffic light control system based on radio frequency, all problems caused by emergency vehicles can be solved**.** Radio Frequency Transceiver is a blend of a transmitter and a receiver in a single package. Radio frequency is a form of electromagnetic transmission used in wireless communication. RF signals are easily generated, ranging 3kHz to 300GHz. These are used in wireless communication because of their property to penetrate through objects and travel long distances. RF Transceiver nowadays are easily available and easier to use. Seeking to replace microcontrollers with arduino has made a few drastic changes which make its programming a lot easier. Arduino makes it much easier to understand the circuit and programming. This paper uses the RF Transceiver and Arduino module for smart traffic control system for ambulance.

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A great deal of guidance and help was required for the success and final result of this project from many, and I am delighted to have this completed throughout the entire project. All I did is because of such supervision and help, and I wouldn't forget to thank them.

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Table of Content

CONTENT **PAGE**

DECLARATION

APPROVAL

ABSTRAK……..i

ABSTRACT……ii

ACKNOWLEDGEMENT…….iii

LIST OF TABLE……..vi

LIST OF FIGURE…….vii

CHAPTER 1: INTRODUCTION……...1

1.0 Introduction…….....1

1.1 Project Background……...1

1.2 Problem Statement……2

1.3 Objective……...2

1.4 Scope…….2

1.5 Result expectation…….3

CHAPTER 2 : LITERATURE REVIEW……..4

2.0 Introduction……...4

2.1 Related Research of Smart Traffic Control System For Ambulance……4

2.1.1 Traffic Lights System Based on RFID for Autonomous Driving Vehicle…….4

2.1.2 Smart Traffic Management System……..5

2.1.3 Intelligent street lamp energy saving system based on ZigBee …….7

2.1.4 RFID Based Security System Using Arduino Module…….8

2.1.5 Li-Fi technology in Traffic light……...9

2.1.6 Smart Traffic Light Control System……...11

2.1.7 Smart Control of Traffic Light System using Image Processing……13
2.1.8 ZigBee-based Intelligent Street Lighting System……...14
2.1.9 Smart Traffic Lights Switching and Traffic Density Calculation using Video Processing……16
2.1.10 A Smart Traffic Solution for High Priority Vehicles……..17
2.2 Comparison between Past Related Projects……19

CHAPTER 3 : METHODOLOGY……..26
3.0 Introduction…….26
3.1 Methodology Process……..26
3.2 Software of The Project……..27
3.2.1 Arduino Software IDE……27
3.3 Hardware of The Project…….28
3.3.1 Arduino Uno……28
3.3.2 RF Transceiver Module……..32
3.4 Project Flow Chart……..34
3.5 Block diagram of the project……...35

CHAPTER 4 : RESULT AND DISCUSSION……36
4.0 Introduction…….36
4.1 Project design……..36
4.1.1 Hardware analysis…….……..36
4.1.1.1 Remote Circuit for Ambulance……...36
4.1.1.2 Circuit for Traffic Light……..39
4.1.2 Software analysis……41
4.1.2.1 Remote Circuit for Ambulance……...41
4.1.2.2 Circuit for Traffic light……43
4.2 Result……...48
4.3 Data Analysis……..51

CHAPTER 5 : CONCLUSION AND RECOMMENDATION……54

5.0 Introduction.……54

5.1 Conclusion……...54

5.2 Recommendation…….55

Reference…….56

Appendix

LIST OF TABLES

Table 2.1: Comparison Between Project (1 and 2)

Table 2.2: Comparison Between Project (3 and 4)

Table 2.3: Comparison Between Project (5 and 6)

Table 2.4: Comparison Between Project (7 and 8)

Table 2.5: Comparison Between Project (9 and 10)

Table 4.1.3: Connection between RF Transceiver (transmitter) and Arduino Uno

Table 4.1.6: Connection between RF Transceiver (receiver) pin out to Arduino Uno

Table 4.5: Environment factors and response of RF Transceiver to react

Table 4.6: Types of area and response of the RF Transceiver

Table 4.7: Range and response of RF Transceiver

LIST OF FIGURES

Figure 2.1.1: Recognition of traffic signals

Figure 2.1.2: System architecture

Figure 2.1.3: Overall schematic system diagram layout

Figure 2.1.4: Block diagram

Figure 2.1.5: Block diagram of Li-Fi technique

Figure 2.1.6: Traffic light

Figure 2.1.7: Block diagram of propose system

Figure 2.1.8: Street traffic control scheme flow chart

Figure 2.1.9: Cameras installed on red light

Figure 2.1.10: Flowchart of the proposed model

Figure 3.1: Arduino Software IDE

Figure 3.2: Arduino Uno

Figure 3.3: Arduino Uno features

Figure 3.4: Arduino Uno Pinout

Figure 3.5: HC-12 RF Transceiver Module

Figure 3.6: RF Transceiver block diagram

Figure 3.7: Flow chart of the project

Figure 3.8: Block diagram of the project

Figure 4.1.1: Remote circuit for ambulance

Figure 4.1.2: Connection of remote circuit in Fritzing software

Figure 4.1.4: Traffic light circuit

Figure 4.1.5: Connection of traffic light circuit in Fritzing software.

Figure 4.1.7: Declaration of push button pins

Figure 4.1.8: Initialize the digital pin as input

Figure 4.1.9: Serial communication

Figure 4.1.10: Send a unique code to the RF receiver

Figure 4.1.11: Define the pins (TX and RX) on Arduino Uno

Figure 4.1.12: Coding to declare the variable as a pointer

Figure 4.1.13: Returns the number of milliseconds passed

Figure 4.1.14: Exchange messages with the serial monitor

Figure 4.1.15: Input and output configuration

Figure 4.1.16: Traffic light sequence before ambulance detection

Figure 4.1.17: Traffic light sequence when ambulance at junction 1

Figure 4.1.18: Traffic light sequence when ambulance at junction 2

Figure 4.1.19: Traffic light sequence when ambulance at junction 3

Figure 4.2: Green light at junction 1 of the traffic light system

Figure 4.3: Green light at junction 2 of the traffic light system

Figure 4.4: Green light at junction 3 of the traffic light system

Figure 4.8: Range and response of RF Transceiver

CHAPTER 1
INTRODUCTION

1.0 Introduction

This section will describe guidance for preparing the entire content of the report, including project background, statement of problems, goals, scope and expected project outcomes. In this section, each section will be further described.

1.1 Project Background

Traffic light has been developed to avoid an accident at the main road intersection. At each intersection there, system traffic light somehow complicates emergency vehicle movement to move smoothly into the emergency area. This can cause more serious accidents when vehicles from other directions are moving rapidly and at the same time an emergency vehicle needs to move quickly in need of another vehicle in front of it.

This project's main purpose is to provide wireless control system for remote control of traffic light on emergency cars such as ambulance, police vehicle and fire truck. Built traffic light system is designed to avoid traffic accidents from occurring at other traffic light intersections, traffic disruption may result in more serious accidents. However, in order to overcome this situation, the radio frequency Transceiver system must be used to control traffic light when emergency vehicles such as an ambulance approaching a traffic light junction.

1.2 Problem Statement

Traffic light system that is somehow covered interferes with emergency vehicle movement to an emergency area. This is because red light makes it hard to transfer emergency cars, the condition deteriorated even more when emergency cars were forced to wait for another car at the junctions with the light. Furthermore, when other vehicles do not give way to emergency vehicles, emergency vehicles are prone to road accidents. With this radio frequency-based traffic light control system, all problems with emergency vehicles can be solved.

1.3 Objective

This project has three main goals, for example:

a) To prevent traffic light accidents involving emergency vehicles such as ambulance.
b) Develop an urgent lighting scheme when an emergency car passes the traffic signal intersection.
c) To analyze the capability of RF Transceiver module to transmit and receive data signals in certain area and situation.

1.4 Scope

This system focuses primarily on emergency vehicle traffic light. The scope of the work is when both RF Transceiver are in the range of connection, the emergency vehicles send a unique code using RF Transceiver act as a transmitter to trigger the anaother RF Transceiver which act as a receiver. Then, the receiver will send the data to the Arduino to control the traffic light according to the path ambulance was through.

The scope of the work to be done:

a) Create a traffic light simulation circuit with FRITZING software to design electronic circuits.
b) Use Proteus software to develop PCB circuits.
c) Make the connection testing circuit.
d) Build a traffic light system hardware prototype.

1.5 Result Expectation

At the end of this initiative, the objective of evaluating and applying the wireless radio frequency (RF) signal in the traffic light control scheme for urgent cars was indicated previously. In order to trigger an emergency, this project must be able to send traffic light junction information. After that, based on the lane emergency vehicles placed, the traffic light will turn green. The result must then be the design and development of electronic circuits for wireless control of the signal lighting system. This is shown by prototype. This system must function properly so that emergency vehicles and other vehicles can be avoided at a junction of traffic light. Finally, this scheme can be used as an urgent mode in the traffic light control scheme

CHAPTER 2
LITERATURE REVIEW

2.0 Introduction

This section basically contains several articles, journals and conferences, devoted in a brief summary and those related to the project to be undertaken. This study focuses on the smart traffic light control system for ambulance and what is the method used to this project.

2.1 Related Research of Smart Traffic Control System for Ambulance

2.1.1 Traffic Lights System Based on RFID for Autonomous Driving Vehicle

This paper proposes a method to recognize light traffic. In general, the technique was focused on radio frequency recognition technique. The scheme consists of two basic parts, the autonomous driving vehicle and the traffic lights controller. The transmission module between the traffic light regulator and the vehicle is used to appeal and receive information and vice versa for each block. The suggested scheme can readily be implemented for complicated highways, as every track can be independently monitored. As the vehicle ID is forwarded to the traffic light scheme, adaptive traffic light monitoring can also be incorporated for each track congestion. It is also possible to add special urgency for emergency vehicles. In addition, it is also possible to identify Stolen car recognition simply. Also designed and implemented was a system for the recognition of road marks. The test findings have shown that the technique suggested was extremely efficient for traffic lamps and street sign detection devices. [1]

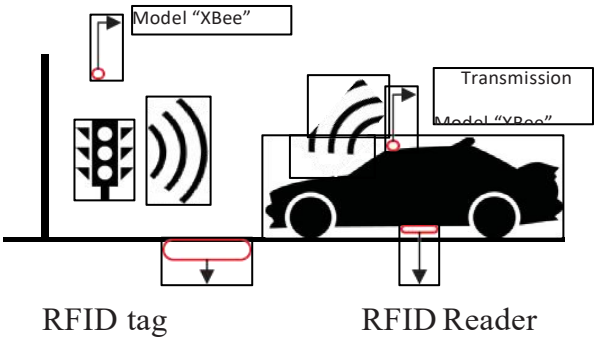

Figure 2.1.1: Recognition of traffic signals

2.1.2 Smart Traffic Management System

The suggested research emphasizes the use of RFID in the Smart Traffic Management System to exclude disadvantages such as heavy implementation expenses, dependence on environmental conditions, etc. The suggested scheme is intended to efficiently handle traffic congestion. It is also economical in comparison with the current system. A radio frequency identifying scheme (RFID) includes a RFID controller and a RFID tag. The RFID control is an interrogator for RFID. This questioner is used for interaction with RFID tags. The RFID controller has received the signals and data of the interrogator. Message intervention is used to guide instructions and information posts of the control components. The RFID module has a controller core. The core of the controller heeds to the questioners as well as depends on the configuration. The core of the controller be able to either accomplish read / write processes on the RFID tag or perform operations at the same time. A serial interface can be used to build a dual radio phone that allows internal GSM / GPRS systems to communicate. RFID tags are wireless equipment used to assign the information to recognize and monitor items using the electromagnetic radio frequent field. Together, RFID tags are active and passive. The active RFID is connected while the passive RFID is

not connected. In order to work, passive RFID must rely on external source. Tag information can be kept in a non-volatile storage. Tag consists of a radio frequency source and receiver. a unique number of series can be recorded for each tag. It is possible to install each vehicle with an RFID tag. All car data, like the car number, would be stored on this RFID tag. RFID labels can only be used for identifying every car and helping the rider to obtain certain traffic message. The current signalling system can be connected to the RFID control. Each signal may have data about each car going by as outlined in Figure 2.1.2. Thus, if a car moves through a signal, the sign can prevent traffic congestions from the amount of cars that pass through it. The red and green edge value of each signal should be recorded. The timer can now be controlled animatedly depending on how often the vehicles pass through a signal per second. Each signal controller should be kept with a minimum frequency vehicles ' value that pass through the sign. Once this minimum frequency has been obtained the device must add a control to the red signal. This means the signal is animated. [2]

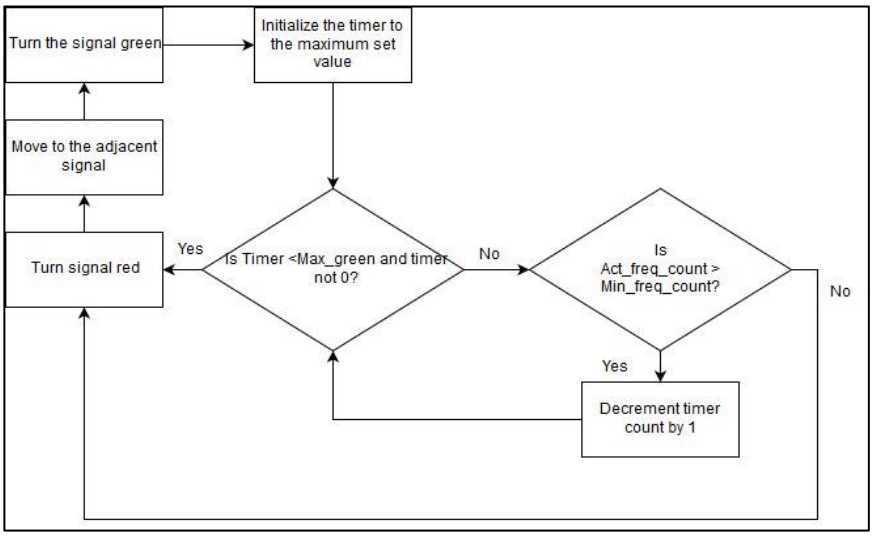

Figure 2.1.2: System architecture

2.1.3 Intelligent street lamp energy saving system based on ZigBee

This paper intended a ZigBee network smart street lamp controller. It uses the Doppler sensor to get the rapidity of the vehicle and pedestrian and to regulate the light change. This article also suggests an independent node respite algorithm centered on node exchange for the occurrence of certain road lamps during wireless interaction. Mat lab simulation verifies the result. By controlling and regulating LED lights, manpower and energy are both safeguarded and saved. In the case of wireless ZigBee control there are some isolated street lamps which, although ZigBee does not need a complex channel power line atmosphere or great operating and maintenance costs in connection with the network construction, cannot efficiently enter the network owing to restricted network circumstances. The increase of an isolated road light can contribute to lamps off a whole road or road. Not only have all these issues caused serious waste of resources on the road, they also present a significant safety danger. Intelligent road light control scheme, as shown in Figure 2.1.3, comprises of surveillance core, distant GPRS information transmission, and lights-controlled ZigBee network. The GPRS unit can transmit any unit information gathered from the ZigBee network to the remote control centre via the GPRS network, but can also submit control orders from the remote control unit transferred by the ZigBee unit or unit to ZigBee routing devices. In this document, ZigBee nodes which regulate light job include ZigBee (ZC) coordinate nodes, ZigBee (ZR) routing nodes, and ZigBee (ZED) end devices. The ZC links to the PC via GPRS network, primarily organizes the ZigBee network and produces control signals to enable executives to evaluate the position of each road in the surveillance centre. ZR gathers information as a smart road lighting control terminal and concurrently moves information to ZC between surrounding nodes. [3]

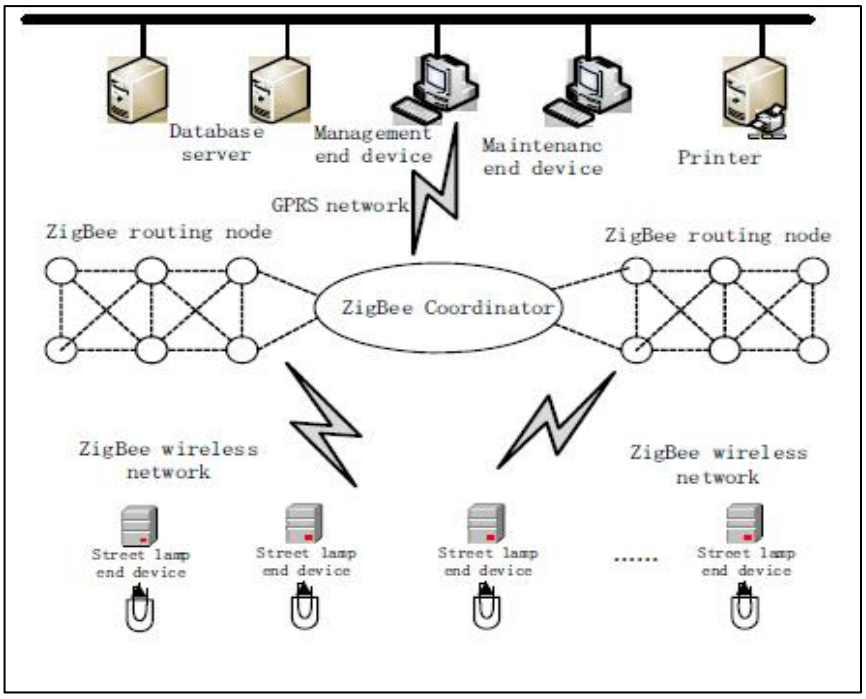

Figure 2.1.3: Overall schematic system diagram layout

2.1.4 RFID BASED SECURITY SYSTEM USING ARDUINO MODULE

This article offers information on technology for radio frequency detection (RFID). RFID tags were originally produced to eventually substitute barcodes in various chains. Their benefits are that they can be read wirelessly and without line of vision, contain more information than barcodes and are more robust. As the article explains the latest technique, include the frequency ranges used and the necessary norms. However, as RFID tags became more prevalent privacy became restless. The document outlines likely attacks against one's privacy and discusses contradictory steps as well. The RFID innovation has not stopped at the tagging level. Since the use of RFID tags is so broad, there is considerable interest in reducing the cost of RFID tag manufacturing. It turns out that marks can be a possible solution to traditional manufacturing. When the RFID tag is put on the RFID chip as it reads the information and sends its code to the device through the printer that accesses the console and gets information with shop code. If the protocol is the same

then the information can be used and accessed by the safety mechanism. Change the tag ID in Access Control to the ID you observed previously and link the Arduino panel to the PC, upload the outline to the panel. After access command, the data is displayed on the LCD and if the data is incorrect, the alarm will begin to ring. If uploading works well, you'll see the LED shine. This implies that the device is ready to read the label. Now put the tag close to the RFID viewer. If the tag identification matches the code ID, the door opens for five seconds. After five seconds, it ends manually. LED brightness shows the door is open. Cautionary LED shine implies you use the incorrect label. [4]

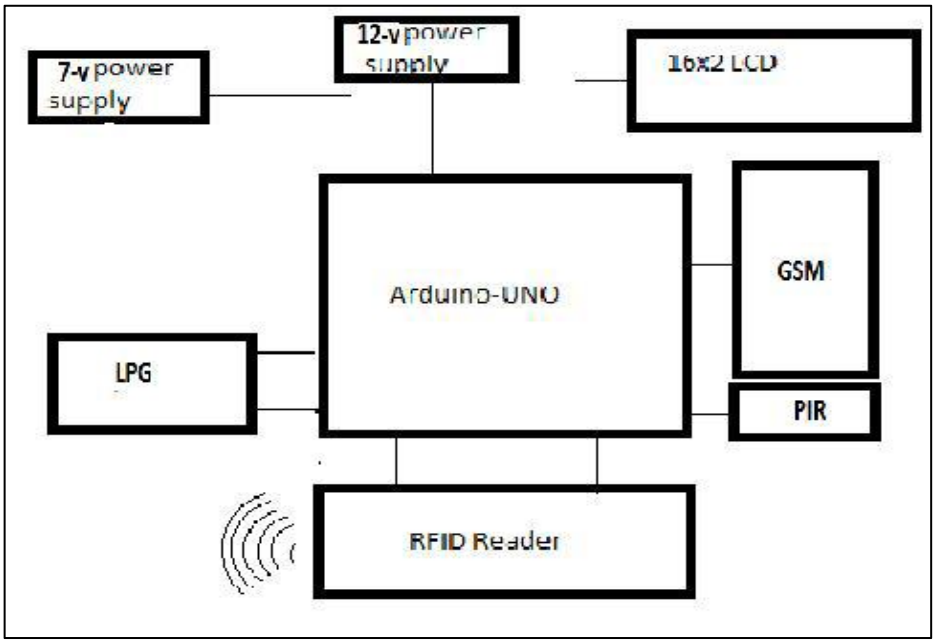

Figure 2.1.4: Block diagram

2.1.5 Li-Fi technology in Traffic light

The flaws of Wi-Fi expertise have given the idea to the concept of Li-Fi (Light Fidelity) technology. Li-Fi can be described as Wi-Fi relying on light. This technique primarily provides the objective of transferring information using elevated effectiveness, durability and reliability retrofitting

of LED bulbs The proposed document seeks to use Wi-Fi technology and enable cars to communicate with the traffic light scheme in order to arrange the cars and therefore alter the indications rather than through a predefined order or manual order method. The suggested Li-Fi technique to allow the information transfer between traffic lamps and the lights of ambulance sirens and fire exhausts to be made available as a urgency will allow us to have an improved traffic switch scheme with uninterrupted transport facilities for ambulances.

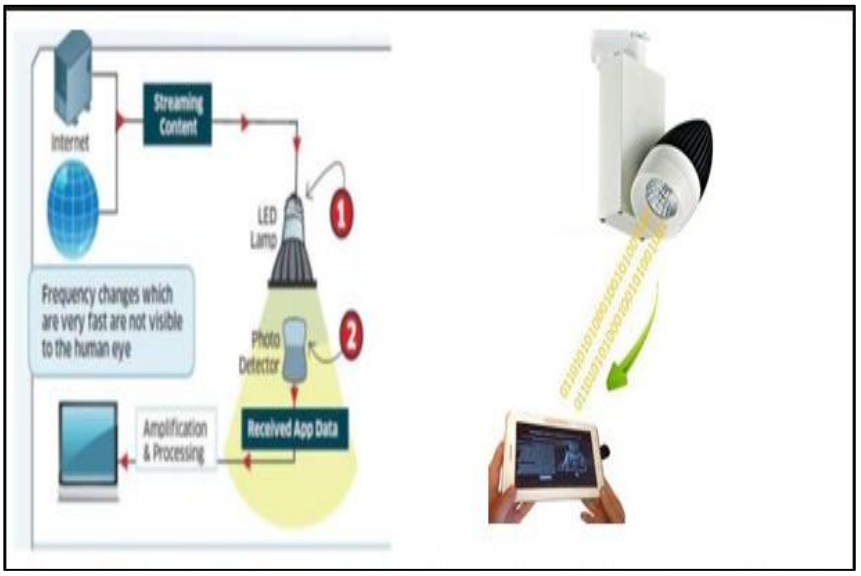

Figure 2.1.5: Block diagram of Li-Fi technique

The first diagram explains how the light sensors mounted in all kinds of linked appliances, such as phones, tablets, desktops, take the binary information to any application. Matter specialists obviously claim that light pulses are unseen without injury to human senses. In addition, slightly lamp or torch can become a point of contact. We can comprehend Li-Fi work by getting an LED in one side and a sensor in the other. When the LED is ON, the picture sensor records a binary 1, otherwise it is a binary 0. Flash the LED sufficient times and create a message from Ones and Zeroes. Using distinct color LEDs will have greater information levels can lead to megabits per second, this can be performed at greater levels than the human eye can