Li-Fi Based Indoor Car Parking System exploiting Visible Light Communication technology to dispense the driver's accurate information

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Abstract— In contrast with past, people own mostly four wheeler vehicles in smart cities, especially during peak hours. The difficulty routes from not knowing where the parking places are available at the given time, even if this is known; many vehicles may follow a small number of parking spaces which in turn leads to consequential traffic congestion. To evade from this scenario we assemble most of the parking to be indoor in smart cities. The prime reason behind indoor parking system is that, to reduce time and attainment taken to depart from one place to another for parking. This indoor parking system uses Li-Fi to help drivers getting the real time status information and also to guide directions. By providing meticulous on obtainable parking areas and services. Li-Fi Based Indoor Car Parking System exploiting Visible Light Communication (VLC) technology to dispense the drivers accurate information concerning the parking slots available through an alert message to the smart phone.

Keywords— VLC, GSM , LED (key words)

I. INTRODUCTION

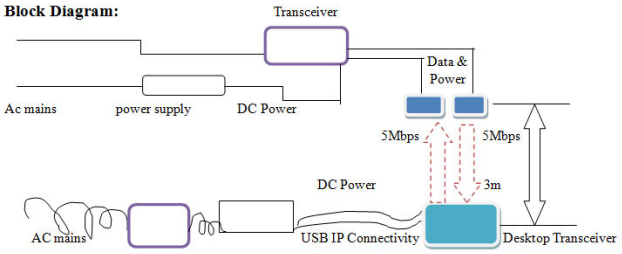
Light Fidelity (Li-Fi) is a bidirectional, high-speed and fully networked wireless communication technology similar to Wi-Fi. The term was coined by Harald Haas and is a form of visible light communication and a subset of optical wireless communications (OWC) and could be a complement to RF communication (Wi-Fi or cellular networks), or even a replacement in contexts of data broadcasting. It is wire and Ultra Violent visible-light communication or infrared and near-ultraviolet instead of radio frequency spectrum, part of optical wireless communications technology, which carries much more information and has been proposed as a solution to the RF-bandwidth limitations.

II. WORKING PRINCIPLE OF LIFI

A. How it Works

The working of Li-Fi is based on VLC, which uses visible light for data transmission. The visible light spectrum has wider range of hundreds of THz of free bandwidth, which is 10,000 times more than RF spectrum up to 30GHz. It uses LED to generate data stream which is connected to the internet or cellular system. As per the data stream the LED flickers at high rate which is not recognized by human eye.

III. BLOCK DIAGRAM OF LIFI



The flickering of LED is regulated by voltage regulator and level shifter circuit. At the receiver side of the system photo detector is used. This photo detector senses light and converts into the respected pulses. These pulses are then amplified and processed to achieve the original data stream. The distance achieved by system depends only on the potential of the light source, that is LED lamp. The one among the major advantage of Li-Fi is the merging of illumination with wireless communication provides a measurable reduction in both infrastructure complexity and energy consumption.

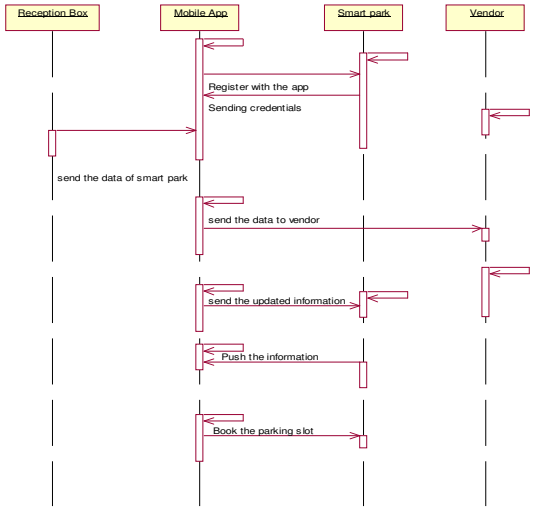
A. LIFI

- As LED is more commonly used source for room lighting, it is also used in Li-Fi as a data source more sophisticatedly and efficiently to generate data streams.
- As compare to the IR LED which generate a single data stream with 10-20 kbps speed, these LED's generates a thousands of data streams spreading all over the room where the light can reach with a very fast rate.
- The potential of these LED's can be increased by using some Luminaire Design Optimization techniques.

B. Light Emitting Diode

A light-emittingdiode (LED) is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated.[4]When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm^2) and integrated optical components may be used to shape the radiation pattern.

C. Sequence Diagram



- Firstly,the user have to download the app and register his details.
- By the usage of the mobile app we send the credentials to user.
- The Mobile App process the information and also shares this information with the vendors.
- On receiving the data from the Mobile application,vendors process the relevant information and pushes it back to the mobile application.
- The Mobile app displays the nearby available parking slots to the user with realtime information and location,hence the user can book the slot in advance.

D. Screenshots

1) In below there will be an screenshots that has been taken by which includes Fig.1 shows Car parking system overview Fig.2 shows the robotic car, Fig 3 shows the Lifi Android App for car parking.

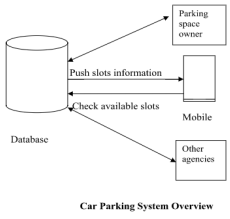


Fig.1. Car parking system overview

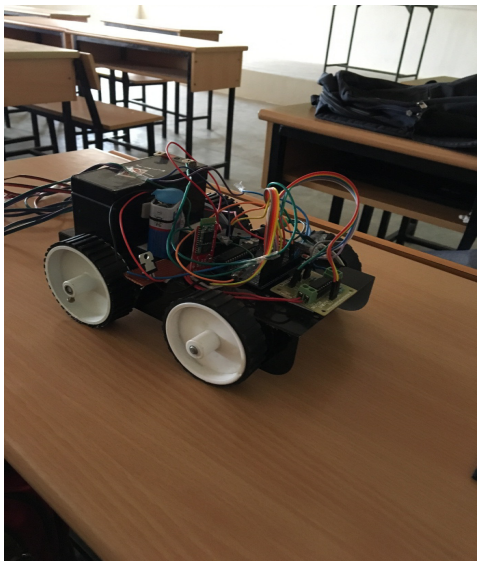


Fig. 2. Robotic car

Fig. 3. Lifi Android App for car Parking.

E. Existing System

In existing system they have implemented car parking system that can be done through GSM. Moreover, the efficiency of the system is very less.

F. Proposed system

To overcome this problem we implemented a Indoor car parking system through light fidelity. So that car parking will be efficient and light fidelity data rate can be very fast compared to Wi-Fi.

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