Leveraging Visible Light Communication for Vehicle Unique Identification

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ABSTRACT

In current scenario only way to identification of vehicle is done by registration certificate (RC) book, chassis number and number plate. The challenge with current system is the RC book can only be verified by visible inspection and chassis no is already hidden which can't not seen easily.

In visible light communication technique, data can be transmitted in the form of light whose frequency is 10,000 times higher than RF frequency spectrum. By using VLC we can transmit vehicle identification no and chassis no through head light of vehicle.

Keywords: registration certificate book(RCbook)visible light communication(VLC) etc..

I. INTRODUCTION

1) Now a days wireless communication are in good fame, whether it is a matter of distance , speed, B.W., speed or cost wireless communication is widely used. There are different way of wireless communication which are distinguish by the EM spectrum along with the wavelength[F1]. Radio wave, Microwave, infrared, ultra violet, X-ray and gamma ray are differ by the wavelength in EM[F1] spectrum. If we check ancient history of communication we can acknowledge the use of visible light for communication purpose.

2) VLC establish by combination of light source and light detector whose objective is interchange of information.

3) Now a days most of the two-wheeler manufactured term AH0 as all time headlight on or auto headlight on system. As name suggest new motorcycle and scooters which are sold and register after April 1st 217 need to headlight on all time even during day. This is compliance tonotice issued by road and transport minister of India.

4)Intensity of headlight can be modulated and unique flickering can generate. This unique flickering unable to detect by human eye which leads, allotment of unique or digital identification to vehicle.

5) Essentially, the two-wheeler manufactures remove on/off switch seen on the right handle. This mean, new bike owner will not be able to switch off the headlight when the bike is turn on. So we can use headlight as source of light for all time.

6) Now a days headlight is made up of LEDS which has high switching characteristic is use to generate the unique code.

II. LED HEADLIGHT

LEDs are the most recent innovation in headlight technology. Instead of gas and filaments, LEDs rely on small diodes that produce light when electric current excites their electrons. They need an low amount of power to work but do produce a significant amount of heat on the diode. To keep the LED's cool, they require extra heat sinks, fans or copper ribbons. This makes the lights physically larger than a halogen light bulb. The small size of LEDs means they can be formed into almost any shape, and their light is naturally directional rather than diffuse, making them an excellent choice for headlights. LEDs are brighter, they put out a whiter light and they do last longer than halogen and Xenon/HID bulbs, becoming more and more popular. LEDs have an instant on ability, so you go immediately from darkness to full brightness.

According to BROSintl® automotive LED lighting, you'll notice several important differences in light produced by LEDs, xenon and halogen headlights. LEDs have the coolest color temperature at around 6,000 Kelvin, which makes them appear whiter than daylight. Xenon headlights come in at around 4,500 K, while halogens round out the list at a yellowish 3,200 K.

When it comes to reflection, LEDs offer better light return from road signs, while xenon lamps better illuminate the sides of the road. In part, this is because xenon lamps typically produce more light, measured in lumens, than LEDs.

Both LEDs and xenon provide a large pattern of light on the road, whereas halogens offer a small pool of yellow light directly in front of the vehicle. If you're buying a new car, LED headlights are going to be a premium option.

If you're looking for intense light and don't mind the glare, xenon may be the best choice. LEDs, meanwhile, offer great light, low power and long life, but often come with a bigger price investment at first, fewer replacement maintenance.

Why LEDs headlight better than Halogen, xenon/HID headlight?
There are several types of headlight present in market, out of LEDs are resent technology. Car driver may notice brighter and whiter car headlight on the road as the popularity of traditional halogen headlights continue to dim. Halogen still on rank as the most common headlight on market, but several alternative, including xenon –base and LEDs head light growing in popularity.

**Differentiation of LEDS with other headlight clear view(T1)**

Specification	LED	Halogen headlight	Pros	cons	Xenon/HID headlight
Material use		Tungsten Filament			Xenon material
Colour of light	White	Yellow	Yellow	Amber Yellow	Blue/ white light
Power consumption	Very low	Very high	Moderate	Moderate	Initially very high than halogen
Production of heat	Very less	Very large	moderate	Moderate	Less than halogen
Visibility	Higher visibility	Higher visibility	Good visibility	Poor visibility	High viibility

III. LITERATURE SURVEY

LDS headlight using in bike and car which gives more visibility and consume less power. If we take survey in market about other product we found that only product based on VLC can build the better efficient product. In wireless technology LED and photo detector act as intelligent sensor. Network (WSN), to monitor factors such as light intensity, color and control illumination by dimming. LEDs have observed higher edibility for intelligent lighting solutions, due to low energy consumption, color control from multi-chip LEDs, dimming and VLC. lots of systems have been build for combining VLC and intelligent lighting. As in home appliances VLC building better product and gives efficient response. Traffic management and providing digital identification to vehicle it's a big challenge giving tough job to several department. As we are also seeing traffic on road and use of two and four wheeler vehicle increased which leads problem to supervision and documentation of vehicle. To overcome this problem we can use VLC system.
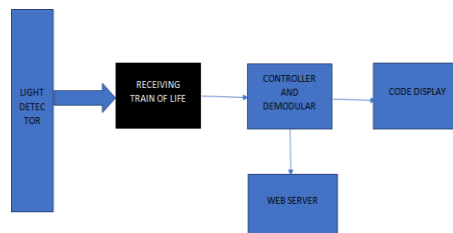
IV.   BLOCK DIAGRAM

- **Transmitter section**
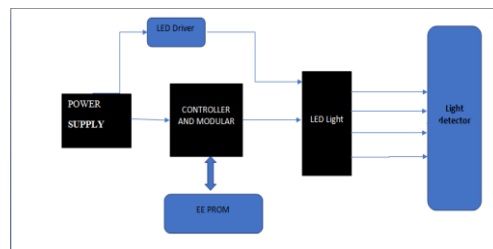
As block digram shows transmitter side, unique identification is to be assign by the microcontroller and control headlight through LED driver and light shows its unique identification.

Receiver section

As shown receiver side block diagram unique identification is to be detected by light detector and further get sense bye controller and demodulator which decode the code and show unique identification on display and web server.

V.   CONCLUSION

Improving digitalization process and enhancing wireless technology we build a system which help to give unique identification to vehicle. By using visible light communication we build the system which provide identification which can be detected by authorized system for future process. By using visible light communication headlight is build as light transmitter and code to transmitted itself through headlight

VI.   REFERENCES

[1] G. Pang, T. Kwan, C.-H. Chan, and H. Liu, \Led tra_c light as a communications device,"in IEEE/IEEJ/JSAI International Conference on Intelligent Transportation Systems, Tokyo, Japan, 1999, pp. 788{793.

[2] K. Kulhavy, \Home:ronja," RONJA, 2012. [Online]. Available: http://ronja.twibright. com/

[3] Y. Tanaka, S. Haruyama, and M. Nakagawa, \Wireless optical transmissions with white colored led for wireless home links," in 11th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC 2000), vol. 2, London, UK, 2000,pp. 1325{1329.

[4] VLCC, \Visible light communications consortium," 2007. [Online]. Available: http://www.vlcc.net/modules/xpage1/

[5] J. Grubor, S. Randel, K. D. Langer, and J.W. Walewski, \Broadband informa-tion broadcasting using led-based interior lighting," Journal of Lightwave Technology, vol. 26, no. 24, pp. 3883{3892, 2008.

[6] \Home gigabit access project," 2012. [Online]. Available: http://www.ict-omega.eu/

[7] Bourns College of Engineering, \Center for ubiquitous communication by light," 2012. [Online]. Available: http://www.uclight.ucr.edu/

[8] The Pennsylvania State University, \Center on optical wireless applications," 2012. [Online]. Available: http://cowa.psu.edu/

[9] Smart Lighting Engineering Research Center, \Synthesizing light for the bene_t of humanity," 2008. [Online]. Available: http://www.bu.edu/smartlighting/

[10] G. Povey, \D-light project hits target," 2011. [Online]. Available: http://visiblelightcomm.com/d-light-project-hits- target/

[11] University of Oxford, \Visible light communications," 2012. [Online]. Avail-able: http://www.eng.ox.ac.uk/communications/resear ch/optical-communications/current-projects-1/visible-light-communications