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Study Smart Road with Glowing Lines

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Abstract: *The years we are experiencing are often identified as those of the Age of Smart Technologies. Smart is now a very popular term, with the meaning of clever, intelligent, sharp, quick on the uptake. Its extensive meaning can be grasped if we consider it as an acronym for Self-Monitoring Analysis and Reporting Technology to indicate the essential features of the innovative technologies that characterize today's society in its daily life.*

All the things are changed but highways are not changed. The "Smart Highway with glowing lines" is the concept to make highway roads smarter, safer, and more energy efficient for generating energy using solar energy. In the part of Smart Highways with Glowing Lines the road glow in the dark lines is installed, called Glowing Lines. These lines collect energy during the day and give light in the evening. Here the landscape becomes an experience of light and information. As a result, this increases visibility and safety. Smart highways and smart roads are terms for a number of different proposals to incorporate technologies into roads like Smart Road with Glowing Lines, for lighting road at Night Time. This innovative concept creates an entirely new mobility experience for drivers, cyclists and pedestrians. Ideas from this testing ground are increasingly becoming part of our everyday landscape.

Keywords: *Solar energy, Glowing Lines, self-awareness,*

I. INTRODUCTION

Nowadays smart is a very buzz term used with its meaning of "intelligent", "clever", "sharp", "quick on the uptake" to describe any kind of available technology with an high innovative contribution. Actually, the term "smart" can be viewed as the acronym for "Self-Monitoring Analysis and Reporting Technology", although this acronym was created in Computer Science to indicate systems for controlling the reliability of hard drives.

Thus, "smart technologies", including both physical and logical applications, identify solutions that are capable of automatically adapting to the context, to improve the management of several aspects of human life Disposal of plastic waste from various sources has been a matter of concern from a long period. These plastic waste can cause different types of pollution to the environment. Until now many of the plastic were just landfilled or buried and only a small part was recycled. This problem for human health has made the government to support some companies for building up the recycling industry of the waste plastic. One of the possible solutions for the use of waste plastic is through recycling process and to incorporate it into aggregate & bitumen for improvement of the quality of road constructions.

A state of the art of highways innovations we can find many definitions for the term "smart" highway", but the most general is that smart highways and smart roads are terms for a number of different technologies incorporated into roads. In a deeper way, it is an extensive concept for roads of tomorrow, looking at innovative ideas that apply the opportunities offered by new technologies in smart ways. A smart highway will allow for technological integration into current transportation roadways, including connected devices, to increase transport efficiency, drivers' and pedestrians' safety, clean energy consumption, and to promote sustainability.

II. AIM & OBJECTIVES

A. Aim

To Study Smart Road with Glowing Lines.

B. Objectives are as followed

- 1) To study smart highways, glowing lines of highway & road marking.
- 2) Comparison study of methods similar to highways with glowing line.
- 3) To study the glowing line paint, how to apply it & its budget.
- 4) To improve visibility and Safety of road By using Glowing Lines.

III. METHODOLOGY

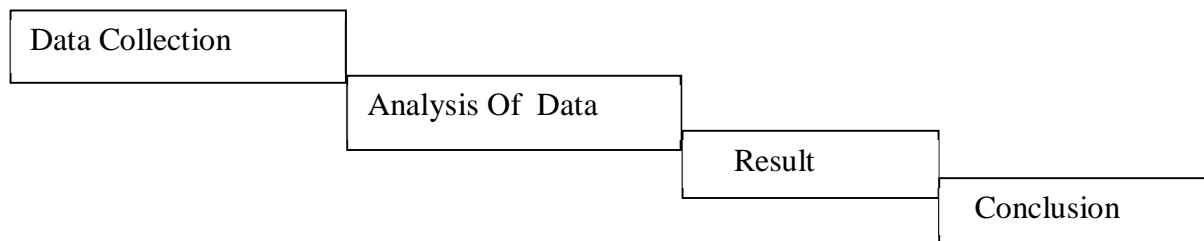
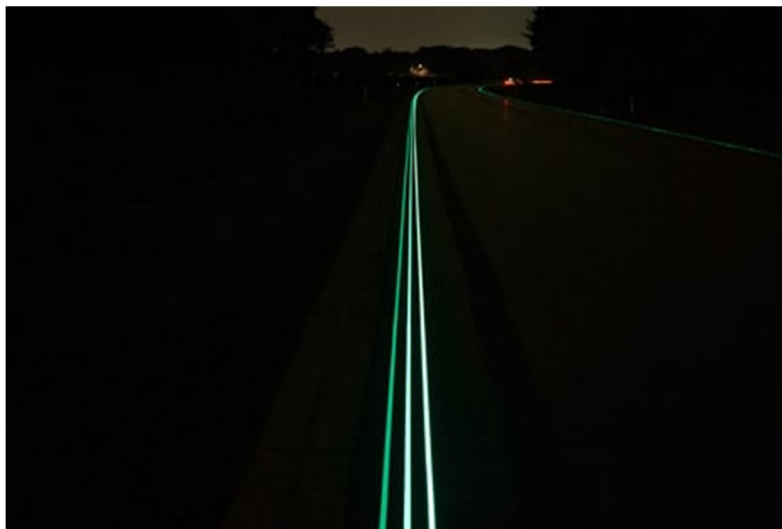


Fig.1 MEthodology chart.

The methodology adopted for gift study is completing study of road marking of glowing lines. elaborated study of different techniques like glowing lines road marking, it's paint & dispensed by analyzing price needed for specific methodology and so comparison, price and time needed. This study is predicated on roads & it's safety. The study target is to improve safety & visibility at night time. the sector study is split into components like – On Google website observation on smart roads to examine and observe Glowing Lines on road & it's luminous paint i.e., fluorescent paint, Phosphorescent paint, Radiolumnescent paint. Finding which is best luminous Paint, Budget & Best way of applying glowing lines paint. Study of similar methods of glowing lines on road marking & comparison study of glowing line road marking & ordinary road marking.



Smart highway and smart road are terms for several different ways technologies are incorporated into roads, for improving the operation of connected and autonomous vehicles (CAVs), for traffic lights and street lighting, and for monitoring the condition of the road, traffic levels and the speed of vehicles. The markings are made of a solar absorbing luminescent paint that charges all day in the sun and then glows for about eight hours once it gets dark.

Smart roads have AI-powered traffic-monitoring solutions that detect vehicles, pedestrians, and cyclists and enable safe riding practices. Smart devices installed in smart roads are also able to alert first responders immediately in case of a crash or crime. Multimodal sensors and edge computing help speed up the flow of traffic with real-time processing, reducing congestion and emissions. Smart road technology will help optimize traffic flow and improve safety. It can also help give citizens back nearly 60 hours per year. Smart Highway Market by Component (Hardware, Software, and Services), Deployment Model (On-Premise and Cloud), Technology (Intelligent Transportation Management System, Intelligent Management System, Communication System, Monitoring System, and Others): Global Opportunity Analysis and Industry Forecast.

Thermoplastic road marking paint is the most favoured material for road marking due to it being hard-wearing and reflective, making it ideal for high-traffic roads and highways. Phosphorescent paint is commonly called "glow-in-the-dark" paint. It is made from phosphors such as silver-activated zinc sulfide or doped strontium aluminate, and typically glows a pale green to greenish-blue color.

Digital Roads. Digital Roads will harness data, technology and connectivity to improve the way the Strategic Road Network (SRN) is designed, built, operated and used. This will enable safer journeys, faster delivery and an enhanced customer experience for all. Smart pavement is an exciting concept that could revolutionize the building, usage and funding of asphalt roads everywhere. To be specific, smart pavement refers to roadways that have been specifically engineered and built to support a wide range of 21st century IT-enabled features; making them “smart” in the process. Smart traffic lights use data from sensors, cameras, GPS, vehicles, cell phones and other devices to detect patterns of traffic and the volume of vehicles, pedestrians and bicyclists approaching an intersection.

A. 7 Innovative Road Repair and Maintenance Technologies

- 1) Smart Manhole Repairing
- 2) Stringless Curb&Gutter: The Power Curber 5700-C.
- 3) Electric Snow Melting System: Warmly Yours.
- 4) A Revolution in Building Roads: PlasticRoad.
- 5) Pothole Road Repair: ChipFill.
- 6) American Road Patch.
- 7) Installation of a Cable Duct Cover: Trigona.

B. The Netherlands

Glow in the dark road markings have been unveiled on a 500m stretch of highway in the Netherlands. The paint contains a "photoluminescing" powder that charges up in the daytime and slowly releases a green glow at night, doing away with the need for streetlights

IV. LITERATURE REVIEW

A. Studio Roosegaarde, Heijmans(2013)

The aim of this paper to the focus of innovation was on the road. Heijmans and Studio Roosegaarde tackle this on a large scale by innovating the road deck with designs such as ‘Glow in-the-dark Lining’, ‘Dynamic Paint’, ‘Interactive Light’ and ‘Electric Priority Lane’. Together they want to make the road sustainable and interactive through means of smart lighting, harvesting energy, and traffic signs that adapt to the road situation.

B. Vijay Laxmi Kalyani, Shailee Joshi, Vidhi Chaudhary (2015)

The paper showing that. Now, there is a need to make the highways a smart highway. A Smart highway is the need of present time because a lot of energy is required to illuminate the highway at night we can use Green energy and other supportive technologies like 5G, IoT, Cloud computing for faster data communication and rapid action taking as and when demanded, altogether there is a lot of scope on Indian highways specially to be converted into smart highway it has abundant sunlight so that the power can be collected into storage batteries and that could be used at night.

C. George Justin Sebastian, Randhawane Pratik Dilip, Murhe Abhinav Vasudeo (2017)

The paper is about changing the roads now no longer remain as a medium to travel from one place to another, we can now use it to charge electric cars and harness solar energy due to its large exposed surface area. There is also technology to keep portions of the roads well-lit with more energy efficient and environment friendly technology and methods. Hopefully there will be more upcoming technology to make our roads smarter and safer to travel.

D. Pardeep Kumar, Arun Kumar, Stephen Kajesweki (2016)

This paper offers the Innovative practices in the road construction sector requires the involvement of the public and private sector and all other stakeholders for innovation to be successful. There is a need to adopt new technology and new road construction materials as well as processes. There is need to take informed decisions for adopting innovative practices and evaluating the outcomes of each decision taken in terms of the investments and the risks as well as returns and ensuring the sustainability of the road development programs.

V. SCOPE OF PROJECT

- 1) The present study will focus basically on these following points:
To reduce the bitumen content by the addition of Waste plastic in bituminous mix.
- 2) The lifespan of the roads can be increased.
- 3) Eco-friendly in nature.

The laboratory investigations on the bituminous mix have been carried out as per the Indian Standards used for the road construction. The field application is out of the scope of work.

VI. RESULT & CONCLUSION

Glowing Lines apply on edges of road like,

- 1) Standard Width of Road marking Line = 100 mm This paint mark in the format of triple Lining i.e., 10mm line - 35mm space like wise up to 100mm .
- 2) Applying Thickness of paint = 1.6mm to 1.8mm
Budget: -
Near about 1.2 to 1.8 kg paint require for each square meter. The cost of luminous paint is 300/ kg
Its service life is near about 10 - 20 years Smart Road with Glowing Lines is best method for increased visibility and safety & Phosphorescent paint is best luminous paint.

A. From above study we concluded that,

- 1) Indian highways specially need to be converted into smart highways by using conventional energy for making our road safer and smarter.
- 2) The Phosphorescent paint is best for glow in the dark to increase visibility at night time.
- 3) The glowing line method is useful for road safety and reduce accident.
- 4) Its first design GLOWING LINES charges during day-time and glow at night for several hours to create an iconic highway experience and increase safety.

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