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Waste plastic reuse for repairing poth holes

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Abstract - Aim is to challenge major world issue: Repurposing millions of tons of waste plastic, saving millions in the cost ofroad repairs and strengthening our existing roads. Potential hazardous are pothole and plastic- uneven road surfaces increase the likelihood of road accidents, whereas plastic lying dormant in landfill sites is harmful to our environment. Both the issues when taken together lead to a single solution that we can use this waste plastic to work towards improving the safety of our roads whilst creating harder and tough roads that will stand the long time.

***Key Words*: pothole, waste plastic, sensor, Bitumen**

1. INTRODUCTION

India is one of the fastest developing countries as of today. India's road network is gigantic. Givingit a thought about the condition of the road. India is a home for the several bad roads. Be it the metropolitan's, the cities or villages. Potholed roads are the common sight across the rural & urban India. Especially during monsoons. Every year cores of rupees are spent by the road agencies in extensive pothole patch repair. Also, it takes lots of times, labors and human efforts to repairs potholes. [12] Potholes are mainly cause due to heavy vehicle, oil spills, heavy rain, poor quality of road construction etc. Water is the primary cause of potholes. it can be cause by diesel spillage mechanical damage vehicle rims, animal hooves on road surface in hot weather, poor road design over certain subgrades such as expensive, collapsible & dispersive soils. Environmental cracking can occur due to ultraviolet light from sun, heat oxidation or some other causes that leads to shrinkage of asphalt. [11] Potholes not only causes damage vehicle but also causes serious vehicle accidents, affects quality of driving, suspension of vehicle. The traffic congestion causes due to pothole may leads to wastage of fuel, and increasing air pollution, releasing CO (Carbon monoxide) and other pollutants by congested car account for environmental and health problem. [11] 2 nd major problem we all are facing is waste plastic. The generation of waste plastic is increases in large amount. The single use of items like shopping bags, wrappers of betel nuts, cold drink bottles & all the forms of plastic create significant environmental & economic problem. Plastic is scattered in everywhere of today's lifestyles & its disposal is a great problem.it is a non-biodegradable product due to which these materials pose environment pollution & problems like breast cancer, reproductive problems in human& animal & genital abnormalities. So for overcoming both of these problem we are making a machine which will helps to reduce the pot holes on the road as well as waste plastic scatter in our surrounding. Detecting pot holes by depth sensor & adding the waste plastic to the potholes on the road, times for the repairing potholes is decrease same the cost of producing material is reduce. Waste plastic is recycled effectively & the roads themselves will last longer - a win situation for all.This project will help society and government in following ways Solution of the plastic recycling which will promote more use of the recycled plastic this will help to solve the plastic pollution and bigger dumping yard problems Cities will have better roads which will benefit citizens with ease of travel and transport. Chances of the accidents due to potholes on the roads.

Literature Review:

Pothole detection:

AjitDanti, et al.

[1] Have proposed a model based on image processing approach. In this paper, Haugh transformation is given for the lane detection and clustering based algorithm is used for detection of potholes.

GanjanChaugh, et al.

Have develop a system in which a various road conditions are detected using smartphone sensor. In thissystem a set of sensors is installed in vehicles. These sensors detect the condition of roads and GPS system receiver is used to collect the data. This provides the methods for detecting the road anomalies such as potholes.

Lin and Liu

Have proposed a method for pothole detection based on the SVM, where SVM stands for Support Vector Machine. Texture measure based on the Histogram is extracted as the features of the image region and the non-linear support vector machine is built up to identify whether a target region is a pothole. Based on this, an algorithm for recognization of potholes of the pavement is proposed. The experimental result shows that the algorithm can achieve a high recognition rate.

Pothole repaire techniques:

Shivani singhDhriyanet al

conducted the study on Bitumen is replaced by bitumen emulsion for making of flexible pavement. Conventional method of road construction involves burning of bitumen that produces toxic gasses which degrade the environment. In winter region it is difficult to maintain the poring temperature of hot mix.
It conclude that Heating is not required when when bitumen emulsion is used for construction of road.

Cesare Oliviero Rossi et.al.

Conducted study on the performances of modified bitumen as a function of the concentrationof an added organosilane modifier was examined in terms of its consistency, adhesion properties. A quantitative evaluation of the modified bitumen's performance was carried out by a contact angle test and boiling test. The modification of the bitumen with the organosilane surfactant is visibly increases the adhesion properties of the bitumen. Moreover, contact angle tests were carried out and the results were compared with those obtained with the Boiling Test method. Concluded that the modifier guarantees excellent performance at 0.01 wt% loading, and almost complete resistance to water at 0.03 wt% loading.

Bhrugu Kotak et.al.

Conducted study on Failure in pavements takes place due to shearing, loading and deflection of materials. Generally, the pavement failure is done because the water get entry, the presence of water in pavement will ultimately result in pavement deterioration. If the pavement has cracked the water can easily enter which will lead to failure of pavement. The application of geo sheet in pothole repairing work gives durability to the work.

Use of plastic waste:

Amit Gawande

The quantum of the waste plastic in municipal solid waste (MSW) is increases because of increase in population, urbanization, development activities and changes in life style which leading widespread littering on the landscape. Thus, disposal of plastic waste is a menace and become a serious problem globally due to their non-biodegradability and unaesthetic view. Since these are not disposed scientifically & possibility to create ground and water pollution also make it hazardous to environment. This waste plastic partially replaced the conventional material for improving desired mechanical characteristics for particular road mix. In conventional road making process a bitumen is used as a binder. Such a bitumen can be modified with waste plastic pieces and bitumen mix is made which can be used as a top layer coat of flexible pavement.

Sunil J. Kulkarni

Minimization of waste plastic is important aspect of the modern growth and development initiatives. Plastic is used in various domestic as well as industrial applications Use of plastic bags and bottles is very common nowadays. The disposal of plastic waste is major problem because of non-biodegradable nature of plastic The plastic can be used as a feedstock for ethanol like products. It can be used for road construction and other construction activities.

Rishi Singh Chhabra (2014)

In highway infrastructure, a large number of originates materials and technologies have been invented to determine their suitability for the design, , construction and maintenance of the potholes. Plastics and rubbers are one of them. Also considering the environmental approach, due to excessive use of polythene in day to day business, the pollution to the environment is enormous. The use of plastics such as carry bags, cups, etc. is constantly increases day by day. Since the polytheneis not biodegradable, the need of the current hour is to use the waste polythene in some beneficial purposes. The use of these materials as a road construction proves eco-friendly, economical and use of plastic gives strength in the sub-base course of the pavement.

Problem statement:

Methodology

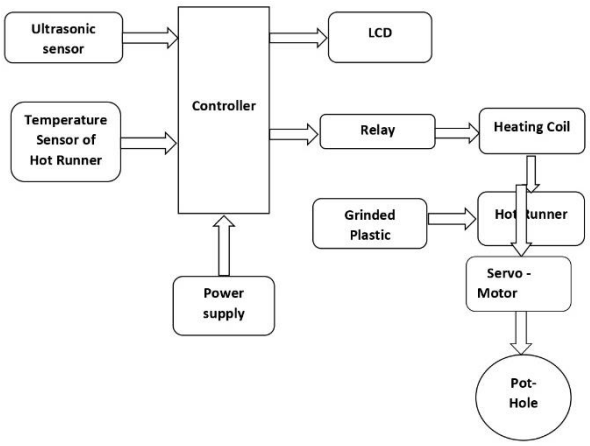
The waste plastic which is collected from various sources like apartments, schools and by civic workers, is put in a shredder. The shredded bits are then stored in bags for about a week to drain out the moisture from them A sensor can be used to detect the pothole. Then the shredded bits are melted in a melting pot and are made to pour in the potholes to fill the potholes Now once the potholes are filled with this melted plastic, an air blower is used to cool the melted plastic and harden it. Once it is hardened then the bitumen, asphalt like traditional road material mixture can be poured in small amount to form a layer on it.

This would eventually reduce the cost of filling potholes and reducing the waste plastic from scattering in the nearby surrounding which is hazardous for ecosystem. This type of filled potholes does not only withstand monsoon but also withstand the everyday wear and tear. Normallythe life of road is about three years but using plastic to fill potholes increases the life of roads. This is because the melting point of bitumen is 60-70 degrees whereas the melting point of plastic is about 130-140 degrees depending upon the type of plastic used.

Shredded plastics would be melted over low heat to avoid the emissions of gases which are harmful to the environment. These harmful gases are released only when the plastic is burned or heated to a very high temperature. Polystyrene is toxic when burned but when it softened it turns into excellent pothole filler.so by this project we want to makes environment.

SYSTEM DESIGN

Working methodology:



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NECESSITY

Plastic waste is a major environmental problem: Plastic waste is a significant environmental challenge that can take hundreds of years to decompose, leading to pollution and harm to wildlife. Reusing waste plastic for path hole detection can help to address this problem by reducing the amount of plastic waste that ends up in landfills or polluting the environment. Traditional road repair methods are not always effective: Traditional methods of road repair, such as patching and resurfacing, can be costly and time-consuming. They also may not address the underlying problem, leading to continued damage and the need for frequent repairs. By using waste plastic composite materials with embedded sensors for path hole detection, repairs can be made more quickly and effectively, resulting in safer roads and reduced maintenance costs.
Increased safety on the roads: Path holes can cause accidents and damage to vehicles, posing a safety risk to drivers, cyclists, and pedestrians.
By detecting path holes in real-time, repairs can be made quickly, reducing the risk of accidents and improving safety on the roads.
Sustainable development: Reusing waste plastic for path hole detection aligns with the broader goal of sustainable development. It promotes the efficient use of resources, reduces waste, and encourages innovation and creativity in finding new solutions to environmental challenges.
Overall, the necessity of waste plastic reuse for path hole detection lies in its potential to address environmental challenges, improve road safety, and promote sustainable development.

OBJECTIVE:

The primary objective of plastic roads is to reduce plastic waste, bags, bottles, etc. Not all plasticwaste is recycled, as even the recyclable waste is just too much to reuse 100%. But bituminous roads are continuously being built and can incorporate extremely large quantities of plastic waste. Saving in cost is a bonus The expected lifetime of the plastic road is two to three times as long as that of traditional road paving. The expected construction time of a new road will be reduced by approximately 70%.The plastic road is four times as light in weight compare to traditional road structures.The plastic road is 100% circular and is made from recycled plastic asmuch as possible.

The objective of reusing waste plastic for path hole detection is to address two issues at once: reducing plastic waste and improving road safety. The idea is to take waste plastic, such as used water bottles or packaging, and use it to create a composite material that can be added to asphalt or concrete to make it more durable and resistant to damage. This composite material can also be embedded with sensors to detect path holes and other road defects in real-time, allowing for quicker repairs and ultimately making roads safer for drivers and pedestrians. By reusing waste plastic for this purpose, we can reduce the amount of plastic waste that ends up in landfills or polluting the environment while also improving infrastructure and promoting Cost-effectiveness: Using waste plastic for path hole repair can be more cost-effective than traditional repair methods. Waste plastic is often readily available and inexpensive, making it a more affordable option for repairing roads.

Durability:

Waste plastic composite materials can provide greater durability and resistance to wear and tear than traditional asphalt or concrete. This can result in longer-lasting repairs and less

Frequent maintenance.

Specifications of the components:

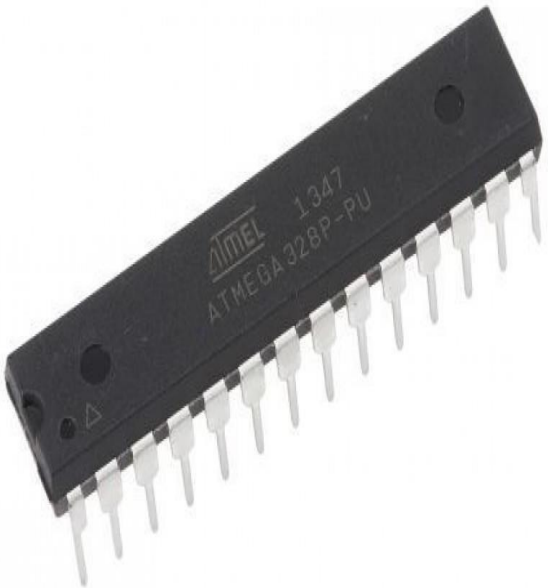
Heater Hot runner

Die Heater – PIN Type die heater

Diameter – 12MM

Microcontroller:

Atmega328P Datasheet



Ultrasonic sensor:

Temperature sensor:

GENERAL DESCRIPTION:

It is a general purpose chassis mounting mains transformer. Transformer has 240V primary windings and center tapped secondary winding. The transformer has flying colored insulated connecting leads(Approx. 100 mm long). The Transformer act as step down transformer reducing AC - 240V to AC - 12V. Power supplies for all kinds of project & circuit boards. Step down 230 V AC to 12V with a maximum of 1Amp current.

In AC circuits, AC voltage, current and waveform can be transformed with the help of Transformers. Transformer plays an important role in electronic equipment. AC and DC voltage in Power supply equipment are almost achieved by transformer's transformation and commutation.

PRODUCT DESCRIPTION:

A transformer is an electrical device that transfers electrical energy between two or more circuits through electromagnetic induction. Electromagnetic induction produces an electromotive force within a conductor which is exposed to time varying magnetic fields Transformers are used to increase or decrease the alternating voltages in electric power applications. It is a step down transformer in which the secondary winding is more than primary winding. Due to this windings it can able to step down the voltage. A Transformer changes electricity from high to low voltage or low to high voltage using two Properties of Electricity

Result:

Using waste plastic to repair potholes is a creative and environmentally friendly solution. The process involves melting waste plastic and mixing it with asphalt to create a stronger, more durable material that can fill potholes and prevent further damage to the road surface. The benefits of using waste plastic for pothole repair include reducing the amount of plastic waste that ends up in landfills or oceans, reducing the need for virgin materials in road construction, and creating a more durable road surface that requires less maintenance over time.

Several countries, including India, the UK, and the US, have already implemented waste plastic road projects and have reported positive results. However, it's worth noting that the effectiveness of this method may depend on the quality of the waste plastic used and the specificconditions of the road where it's applied.

The reuse of waste plastic for repairing potholes has been found to be a successful and innovativesolution in several parts of the world The process involves melting waste plastic, such as plastic bags, bottles, and packaging, and mixing it with bitumen to create a durable and sustainable mix that can be used to fill potholes.

The use of waste plastic in road construction has several advantages. Firstly, it is an environmentally friendly solution that helps to reduce the amount of plastic waste that ends up in landfills or oceans. Secondly, it is a cost-effective solution that can save money for municipalities and governments, as the use of waste plastic reduces the amount of bitumen needed.

Moreover, the use of waste plastic in road construction can result in smoother, more durable, and safer roads. The plastic-bitumen mix has been found to be more resistant to wear and tear, as well as to temperature changes, which can cause cracks and potholes. The plastic also helps to reduce the risk of accidents, as it makes the road surface less slippery. Overall, using waste plastic to repair potholes is a promising solution that can benefit both the environment and road infrastructure challenges.

Conclusion:

In this paper we have proposed model which will detect the pot hole on the road. And fill up this pot hole by using waste plastic asa filler material. Due to heavy vehicles running on roads and other environmental condition pot holes are generated which will cause hazardous problem. Also, the waste plastic cause environmental pollution and health problem to human and animals.pot hole filling vehicle detect pot hole on the road and fill up with waste plastic. This will helps to reduce both the major problems of pot hole as well as waste plastic. and makes the environment clean and healthy

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