

ACCIDENT AVERTING SYSTEM - LITERATURE REVIEW

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ABSTRACT

Roads are the major means of transportation in India today. In the past twenty years, there has been a tremendous increase in the vehicle population. One of the increasing problems citizens face is worsened road conditions. With the increase in accident rates and poor road quality across the country, the good health of public roads is of utmost importance. Another serious problem that the country is facing includes death and injuries due to road accidents. The collision of an animal with the vehicle on the highway is one such big issue that leads to such road accidents. As road accidents prove to be the biggest threat to wildlife, the environmental impact is of increasing interest and concern. The study indicates that most research focuses on data analytics with relatively little on system completeness as well as developing a full-proof system. The systems designed previously need special kind of infrastructure. The results also indicate that more empirical research is needed to develop an understanding of the concept to come up with a unique solution. The paper describes a systematic literature review of peer-performed projects and reviews journal articles published from 2009 to 2018 on the pothole and wildlife detection.

Keywords: - Pothole, Real time tracking, Road injuries, Wildlife Collision

1. INTRODUCTION

India is the country that does not have proper maintenance of the road, over 95% of the people use road transportation. This growth of vehicles has led to several problems. Potholes are formed due to heavy rains and the movement of vehicles. To address the above-mentioned issues, a cost-effective solution is required that informs about the severity of potholes and helps the drivers to be safe. Previously proposed systems attempt to endorse drivers to avert the accidents caused due to potholes.

Across the nation, many highways and roads run across protected wildlife areas. In such cases, the wild animals will inevitably enter the highways. This very often leads to accidents resulting in wildlife loss and also human life. As of now, there are no autonomous systems to prevent accidents like these.

1.1 Pothole detection

A large number of existing studies in the broader literature have examined potholes using an accelerometer an ultrasonic sensor to prevent the collision. Previous researchers used a GPS tracking unit to determine the location of the vehicle and the data was sent to a central location. A localization system was further used to warn the driver about the road condition through an android app. A closer look at the literature, however, reveals several gaps and shortcomings. When the vehicle encounters multiple potholes, accelerometer deflects more frequently and GSM fails to track the location of the pothole. Also, it's up to government officials to take necessary actions.

Some authors have also suggested using a Wi-Fi-equipped system and access point. It was reported in the literature that the access point would broadcast packets over UDP, which will not require any connection setup phase. The mobile nodes send packets to the access points as feedback. The packet contains details such as its identification code, the location estimates and the validity of the potholes' information. When the packet reports that the pothole was not detected, the server can forward this information back to the access point. Some key questions and notions are still not discussed in the literature. The first few packets may be garbled. It relies on the assumption that for a high packet broadcast rate for the access point, the mobile node will receive packets successfully. A critical open question is whether the system would work if the Wi-Fi strength is less.

Accidents are pretty common on the roads as the cars move very close to each other, which can be prevented by assisting the driver by informing him that another vehicle is very close to him. In the case of Emergency help and accident cases, sending the real-time location to registered numbers can save lives. The safety of an automobile is highly important according to a recent report [1]. The report commissioned by the World Health Organization in its Global Status Study on Road Safety 2013, revealed that the leading cause of death for young people (15-29 age) globally is due to road traffic collisions. Even though various countries have initiated and taken steps to reduce road traffic collisions and accidents, the total number of crashes and traffic accidents remains as high as 1.24 million per year [2]. Road traffic accidents are expected to rise by almost 65% by the end of this year [3]. Due to road accidents, every year 1 out of 20,000 people lose their lives and 12 out of 70,000 individuals face serious injuries in India [4]. India is also known for the maximum number of road accidents across the globe [5]. According to the data given by the National Crime Records Bureau (NCRB), India, there were almost 118,239 people who lost their life due to road accidents in the year 2008 [6].

1.2 Wild Animal Detection

This section presents a review of recent literature on animal detection and collision avoidance. In the literature, the authors bring some information about the background of the problem. Cows and dogs are often found on Indian roads. The author used a computer vision technique to address the problem. Previous studies have almost exclusively focused on saving cows only which is the biggest shortcoming itself. Moreover, although research has illuminated animal detection, no study to date has examined animal behavior on roads. Some authors have driven further development to wildlife detection. The research suggests putting a detector circuit on both sides of the route to detect the entry of a wildlife animal which is about to cross the road. It further passes information to the control unit utilizing short-range communication and manages the traffic according to the signal received, by showing a red or stop signal in both directions. The author employed a traffic-signal-like methodology that prescribes to generate a warning signal to scare away the animal if it stays on the road for a longer time than expected. Previous studies have almost exclusively focused on avoiding an accident. There has been a great deal of confusion in the literature if it's ethical to save a wild animal by implementing an unethical process of creating a disturbance in their habitat.

Applications built on the detection of animals play a very vital role in providing solutions to various real-life problems [7]. The base for many applications is the detection of animals in the video or image. A recent study [8] shown that humans have to take the final call while driving if they can control their car to prevent collision with a response time of 150ms or not. The problem with the above approach is that human eyes get exhausted quickly and need rest, which is why this method isn't effective. Some scientific researchers [9] have proposed a methodology that requires the animals to take wait towards the camera for the trigger, including face detection. The trouble here is that the face detection requires animals to see into the camera, which isn't captured by the travel video. Animals can arrive from a scene from a variety of directions and in various sizes, poses, and colors.

4. CONCLUSIONS

Although studies have been conducted by many authors, this problem is not explored sufficiently. We argue that previous literature suffers from certain weaknesses: data monitoring, strength, and resistance of the system, type of vehicle used, wild animal detection, and understanding of their behavior. The unexpected findings signal the need

for additional studies to understand more about potholes and wildlife. There doesn't exist a combined system that would detect pothole as well as wildlife. As many questions remain unanswered, a new approach is needed. To address the questions outlined above, we report here using an array of the ultrasonic sensor, Arduino Uno and voice IC. We propose to design a system that can be attached to any vehicle regardless of the availability of Wi-Fi and advanced systems. This would investigate potholes excluding manual efforts and save precious wildlife.

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