

APPLICATION OF DEEP LEARNING FOR ADVANCED TRAFFIC LIGHT CONTROLLER WITH ANIMAL DETECTION USING ESP32 CAMERA MODULE

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ABSTRACT

We can see many animals like cows, Buffaloes, dogs, cats, etc on road. The safety and security of animals as well as drivers is at stake due to them. This leads to accidents on a large scale. The existing traffic system does not provide the measures for security of humans as well as animals. It is necessary to make advancements in existing traffic light system to avoid these accidents. For this purpose, we have used the ESP32 camera module, this module is trained with images of various animals to detect the animal in the four-way traffic system. The ESP32 camera module is connected to four-way traffic system. The four-way traffic system is operated with the help of Arduino Uno. The traffic system is both timer based and sensor based, the timer based is open loop controller similarly the sensor based is closed loop controller. The timer-based approach can be applied when the traffic density is quite low and the sensor-based approach is used for controlling the increasing density of traffic.

Keywords: traffic system, ESP32 camera module, Arduino, traffic light controller

INTRODUCTION

Today we can see that there are lot of accidents on the roads, especially at night time or during peak time. These accidents mainly lead to the collision of vehicle and animals. Thus, the safety and security of animals as well as humans is the basic need of today's traffic system. Thus, setting up a smart traffic light system that will help to overcome this difficulty is necessary. The safety of vehicles is important aspect for controlling accident levels. According to the reports of various organizations like World health Organization (WHO), National Crime Records Bureau (NCRB), have stated that main reason for death of various people is due to traffic accidents. Society of prevention of cruelty to animals have stated that the count of animals that suffered due to traffic accidents is 270. Increasing number of road accidents has thrown light to the absence of smart traffic system. The deaths of animals and the injuries caused to humans are increasing day-by-day. Thus, to avoid it there is no automatic system to identify such accidents. Also, the existing system is manual system which is mostly a difficult job. Through the above data it is understood that it is quite necessary to make advancements in current traffic system to make it more advanced as environment friendly. The increasing vehicle on road has led to increase in pollution such as – noise pollution, air pollution. Thus, using this approach to make amendments will lead to more conservation of fuel and thus save fuel.

PROBLEM STATEMENT

We have identified the problem of increasing traffic density. Traffic Density is the fundamental problem in most of the cities leading to increase in traffic tension and causing loss of fuel as well as time. The existing traffic systems follow only specified time delay and not density. Thus, it operates continuously without considering the density of vehicles on the road.

METHODOLOGY

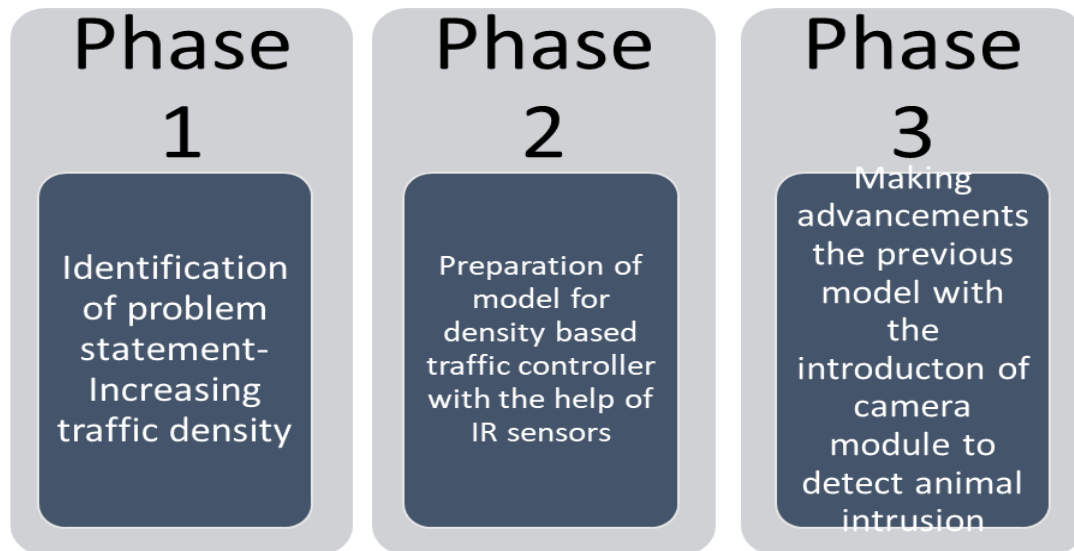


Fig 1

The certain reports of WHO have claimed that the major cause of deaths of student class is mostly due to negligence of safety measurements on road and over speeding resulting into clashes with the animal life.[2]. According to NCRB the number of people who lost their lives due to traffic accidents is increasing [3]. The method for the above approach is that the use of sensors and timers with the switching of toggle switch. In peak hours we apply IR based approach in which IR sensors detect the vehicle and corresponding signal turns green, while others remain red. The other signal turns green until and unless the IR sensor corresponding to it detects the vehicle. In non-peak hours the timer-based approach is used. The twelve LEDs are used to indicate the four- way signal which comprises of four red, four yellow and four green. The Arduino Uno is programmed to get therequired output. The IR sensors are used on the system to detect the density of vehicles. The programmed Arduino takes the input from IR sensors and gives the output through LEDs. The data collection for future phaseis done.

DATA COLLECTION



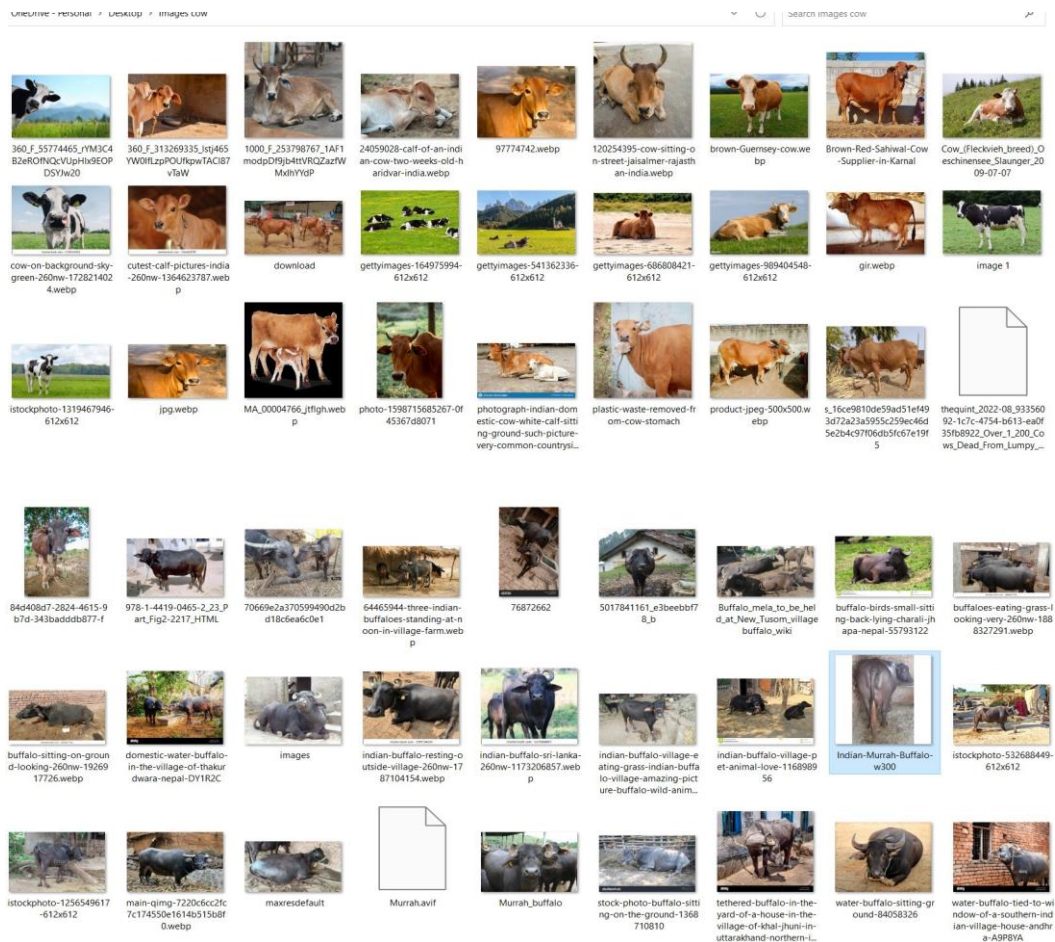


Fig 2

The data is collected for animal detection which is required in the further stage. The images are collected from various sources to create datasets. This datasets will be then used for training and testion and used to detect animal intrusion in any area or the traffic system.

CODE FOR WORKING

```
Serial.println("1"); low();

// Make RED LED LOW and make Green HIGH for 5
secondsdigitalWrite(signal1[0], LOW);

digitalWrite(signal1[2], HIGH);

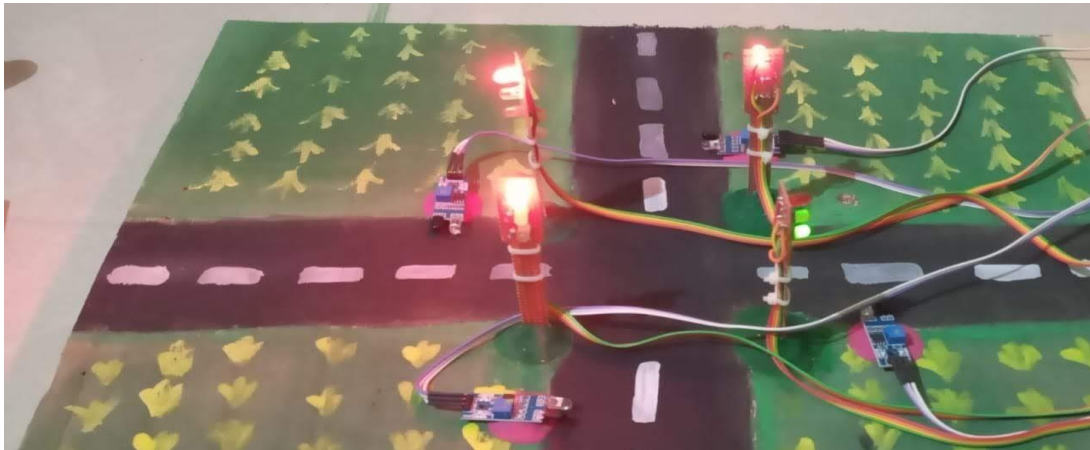
delay(redDelay);

// if there are vehicels at other signals
if(IRValue2<475 || IRValue3<475 ||
IRValue4<475)
{
    // Make Green LED LOW and make yellow LED HIGH for 2
secondsdigitalWrite(signal1[2], LOW);

digitalWrite(signal1[1], HIGH);

delay(yellowDelay);
```

RESULT



The working of IR sensors along with the traffic lights is the obtained result.

FUTURE SCOPE

The use of ESP32 camera module can be used to make advancements in traffic light. The current system comprises of the density-based approach. The new system can also be used for setting up alarm system to alert the drivers regarding the intrusion of animals. The display system can also help to alert the driver about the accidental conditions on road. The main drawback is that the system does not give clear and accurate results for certain cases at such time the measures must be taken to give appropriate results. At the same time the animal detection can be used for the various small as well as large scale areas such as farms.

CONCLUSION

An effective traffic system can help to overcome the difficulties faced by the existing traffic system. The traffic system consists of sensors and camera module which will help to gain the controlled output for the traffic system. The defined model can give the approximate output as the false recognition can cause damage. Thus, the need of this model is to execute it with large number of systems.

REFERENCES

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