Simulation of accident recovery system using netlogo

D.Akshay Kumar and Arivuselvan
Software Engineering, VIT University, Vellore-632014.

ABSTRACT

India has the highest number of road accident casualties in the world. Out of 0.5 million accidents occurring every year around 0.2 million people lose their precious life. Most of the people die because of lack of proper first aid and immediate back up services. The information about the accident does not reach to ambulance service very soon after occurrence of the accident. To overcome this problem Accident Recovery System is simulated where a sensor is installed in the car which detects an accident and sends a message to the Administrator. Admin can immediately request for backup service and also alert the cars behind the accident location. Various sensors combined together gives us more faster and reliable detection of accidents on highways through autonomous units on the edge of the road (Road Support Units).The sensors in the car tend to detect any accident that has occurred to the car and send a message to the administrator with the help of Road Support Units which helps a car to be connected in the network. The simulation of the model is done with the help of NetLogo.

Introduction
NetLogo:

NetLogo is multi-agent programming environment which was developed in Java. It is specially designed for students and researchers to study the behavior of programmed agents in fluctuating environment. NetLogo comes with documentation and more than 300 sample models which demonstrate all the aspects of Environment.NetLogo has a graphical interface which is easy to adapt and interface builder which is makes it easy to run, alter and develop models. The built-in widgets like sliders, buttons, and drop-down menus supports runtime environment. Simulation speed and be altered during runtime also and the results can be captured in the form of a graph.
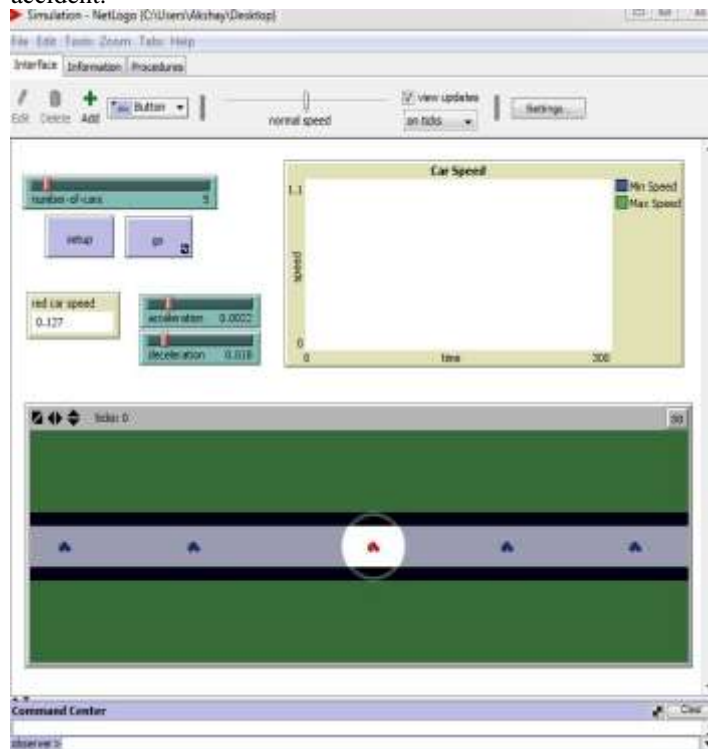
Related Work:

Andrew Lansdowne [1] explained about Simulation of Traffic using Agent Based Modeling. The agent software he used is NetLogo. He explained congestion, its causes and few congestion reducing schemes for high occupancy vehicle lanes in particular. He suggests that if vehicles share information the travel time reduces.

Josef Jiru [2] articulated the benefits of Autonomous Traffic Warning System which helps to send information to the drivers passing on the same lane where an accident has occurred, which warns the driver about the accident and its precise location.

Prabakar, Porkumaran, Samson Isaac and GunaSundari [3] suggested to use biomedical sensor and microcontroller based mobile technology. This system sends a Short Message Service to emergency care center number.The system sends heartbeat, body temperature and coma stage to the care center. A switch was also provided to stop sending warning messages if the damage is not severe after the accident.

Jianping Wu, Geqi Qi, Yiman Du proposed their work on feasible traffic simulation platform which deals with real time traffic flow data. Their system includes emergency system warning and route map integrated with WebGIS which act as additional features for the traffic simulation platform.

Accident recovery system has been simulated with a main motto of providing back up services to the victims of an accident.In this simulation we have the option to increase or decrease the traffic, set the speed. For an easy observational purpose a red car has been designed which meets with an accident if the speed is increased and the sytem detects the accident.

When is the system starts execution and if an accident occurs immediately the system detects the accident. Here the car under observation has met with an accident with a blue car.The system has detected the accident. An user message is simulated which shows that an accident has been detected.
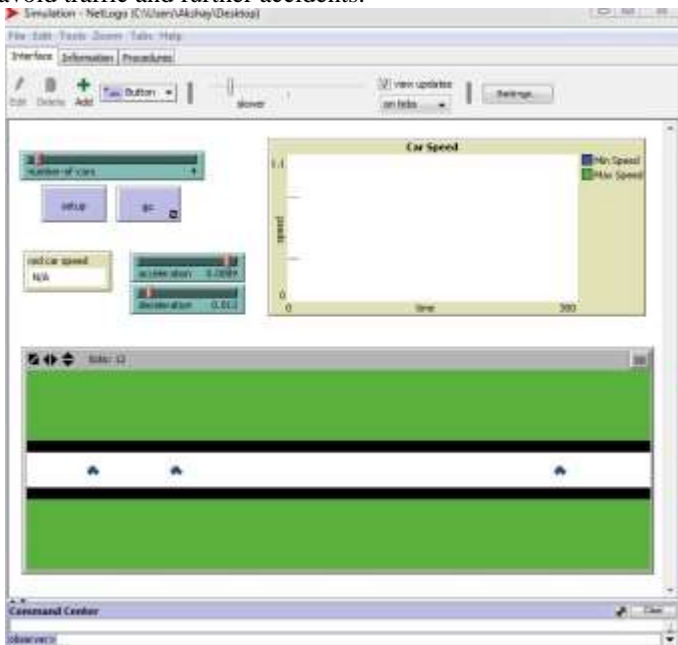
Tele:
E-mail addresses: dhupamakshay.kumar@gmail.com

Once the administered has been alerted about the accident, immediate ambulance service will be sent. Theroad cleared to avoid traffic and further accidents.

References:

1. Traffic Simulation using Agent Based Modelling
By Andrew Landson
2. Autonomous Traffic Warning System With Car-to-X Communication By Josef Jiru
3. An Enhanced Accident Detection and Victim Status Indicating System: Prototype By Prabakar,Pokumaran,Samson Isaac and GunaSundari
4. High Performance Traffic Flow Forecasting and Management Method: Traffic Simulation Platform By Jianping Wu, Geqi Qi, Yiman Du

Code:

```
globals [ sample-car ]
turtles-own [ speed  value ]
breed[cars car]
breed[trucks truck]
to setup
clear-all
ask patches [ set pcolor green ]
ask patches [ setup-road1 ]
ask patches [ setup-road2 ]
setup-cars
watch sample-car
end
to setup-road1  ;; patch procedure
if ( pycor< 2 ) and ( pycor> -2 ) [ set pcolor white ]
end
to setup-road2  ;; patch procedure
if ( pycor = 2 ) or ( pycor = -2) [ set pcolor black ]
end
to setup-cars
set-default-shape turtles "car"
crt number-of-cars [
set color blue
set value 0
setxy random-xcor 0
set heading  90
;;; set initial speed to be in range 0.1 to 1.0
set speed  0.1 + random-float .9
separate-cars
  ]
set sample-car one-of turtles
ask sample-car [ set color red ]
end
; this procedure is needed so when we click "Setup" we
; don't end up with any two cars on the same patch
to separate-cars  ;; turtle procedure
if any? other turtles-here
[ fd 1
    separate-cars ]
end
to go
;; if there is a car right ahead of you, match its speed then slow
down
ask turtles [
let car-ahead one-of turtles-on patch-ahead 1
if car-ahead != nobody
[ user-message("Accident has occurred" )
user-message("Administrator has received the warning message
and back up has been sent")
die
user-message("The medical team has reached the location and
taken care of the situation")
]fd speed ]
tick
plot-cars
end
to stop-car  ;; turtle procedure
set speed 0
end
to speed-up-car  ;; turtle procedure
set speed speed + acceleration
end
to plot-cars
set-current-plot "Car Speed"
set-current-plot-pen "Min Speed"
plot min [speed] of turtles
set-current-plot-pen "Max Speed"
plot max [speed] of turtles
end
```