The TEAM behind DeepCars

CS-19149

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CGPA: 3.402

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CGPA: 3.15

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CGPA: 3.49

"Teaching Cars To Think For Themselves!"

BACKGROUND

❖ *People in this contemporary era try to save time.*

❖ *Traditional manual driving is associated with Human Errors, such as Impaired Driving, is a major cause of road accidents.*

❖ *These cars rely on Fossil Fuels, contribute to Environmental Pollution & Climate Change.*

So, Self-Driving Cars are a boon for humans in terms of Safety, Environment Concerns and Time Saving.

"Safer Roads, Smarter Cars!"

INTRODUCTION

Self-driving cars are seen as a solution to problems associated with traditional manual driving.

- ❖ **10x safer than Human driven cars.**

- ❖ **Have the potential to reduce accidents, improve traffic flow, and reduce carbon emissions.**

- ❖ **Reduce cancer as they decrease anxiety & driving stress.**

- ❖ **Understand and process the surrounding environment.**

TASK DIVISION

Muhammad Jan

- Implemented prototype of the Environment
- Implemented different natural aspects of the Agent.
- Implement Sensors
- Practicing to implement CNN, RL & RTC

1.

Faseeh U Rehman

- Modeled the Agent (Car).
- Designed & developed Realistic cars Traffic.
- Generated random colored cars.
- Practicing to implement CNN, RL & RTC
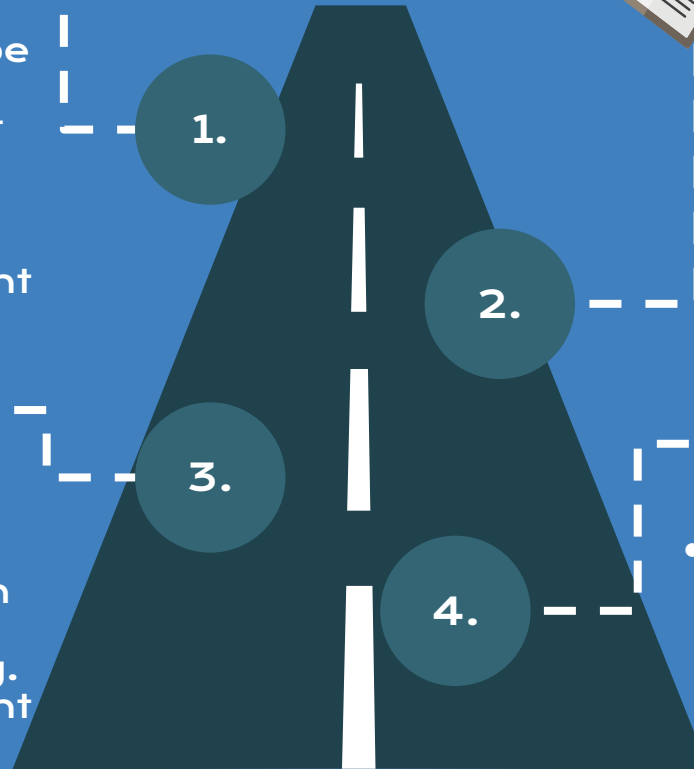
2.

Musfirah Fayyaz

- Traffic simulation of multiple cars.
- Developed traffic randomly coming from any lane.
- Worked on car drawing.
- Practicing to implement CNN, RL & RTC

3.

Muhammad Hammad

- Practicing to implement Convolutional Neural Network, Reinforcement Learning & Real Time Communication

4.

However, every team member has jointly planned & discussed everything and was present in every scheduled project meeting.

MOTIVATION

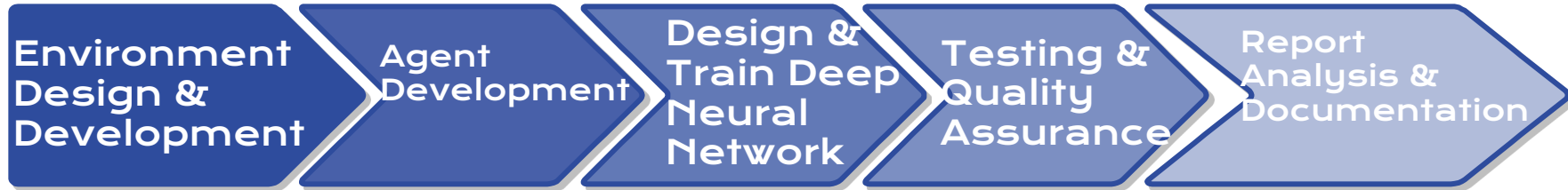*Transportation will no longer be a Hindrance for*

- ❖ *The disabled*
- ❖ *The elderly*
- ❖ *Even the kids*

Beneficial for;

Those who can't drive:
- *under age*
- *have no driving license*
- *those who can't go themselves*
- *health Issue*
- *who prefer not to drive*
- *too busy or lazy to drive the car*

Flow of the Project

Environment Design & Development

Agent Development

Design & Train Deep Neural Network

Testing & Quality Assurance

Report Analysis & Documentation

"Unleashing the power of machine learning on the roads!"

GANTT CHART

Name	Start Date	End Date	2022		2023		
			Q3	Q4	Q1	Q2	Q3
Start Research	Nov 18, 2022	Dec 02, 2022					
Environment Development	Dec 12, 2022	Jan 05, 2023					
Attributes of Environment	Jan 06, 2023	Jan 20, 2023					
Agent Development	Jan 23, 2023	Feb 06, 2023					
Mid Year Evaluation Documentation	Feb 13, 2023	Mar 02, 2023					
Neural Network Development	Mar 07, 2023	Apr 03, 2023					
Neural Network Optimization	Apr 04, 2023	May 01, 2023					
Testing and Quality Assurance	May 02, 2023	May 22, 2023					
Research Paper Writing	May 29, 2023	Jun 21, 2023					
Final Year Evaluation Documentation	Jun 22, 2023	Jul 20, 2023					

Milestone Achieved Summary Checklist

Project Name	DeepCars (Simulation of self-driving car using Deep Neural Network)
Project ID	30
Project Supervisor	Prof. Dr. Syed Abbas Ali
Project Team Members	Muhammad Hammad Muhmammad Jan Musfirah Fayyaz Faseeh U Rehman

Milestone Number	Milestone	Milestone Status
1	Research	COMPLETED
2	Environment Development	COMPLETED
3	Environment attributes Development	COMPLETED
4	Agent Development	COMPLETED
5	Mid-Year Evaluation Documentation	COMPLETED
6	Neural Network Training	NOT STARTED
7	Neural Network Optimization	NOT STARTED
8	Testing and Quality Assurance	NOT STARTED
9	Research Paper writing	NOT STARTED
10	Final-Year Documentation	NOT STARTED

PROS & CONS

CONS

- **Timely Updation Required**
- **Object Detection Problem**
- **Human intervention needed in shifting from slow lane**
- **Expensive Technology**

PROS

- **Steer itself**
- **Echo Friendly**
- **Saves Time**
- **Improve Mobility**

"Revolutionizing the way we move!"

CHARACTERISTICS OF AN AGENT

Agent will try to avoid the collision using sensor data.

Agent's Possible Actions	
01	Forward
02	Backward
03	Turn Left
04	Turn Right
05	Brake
06	Do Nothing

ENVIRONMENT CHARACTERISTICS
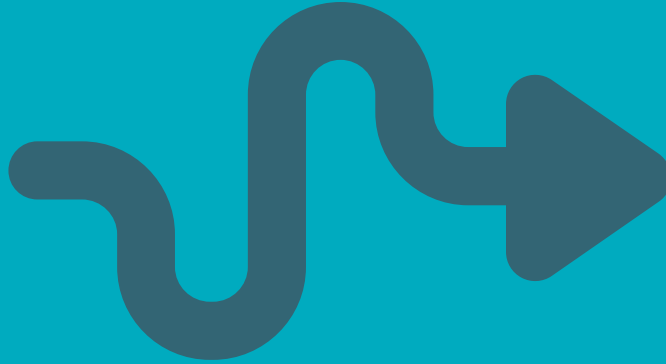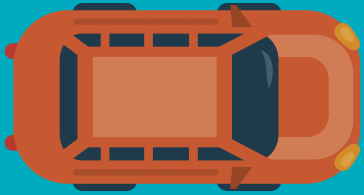
01 7 Lanes One Way Expressway

02 Traffic Vehicles

Future Enhancement

- Neural Network will be implemented for our Agent.

- Car's speedometer.

- Two-way express way might be implemented later.

- Different types of vehicles like fast-moving, slow-moving, big, small etc may be added.

"Where technology meets the Highway!"

Reinforcement Learning

IMPLEMENTATION

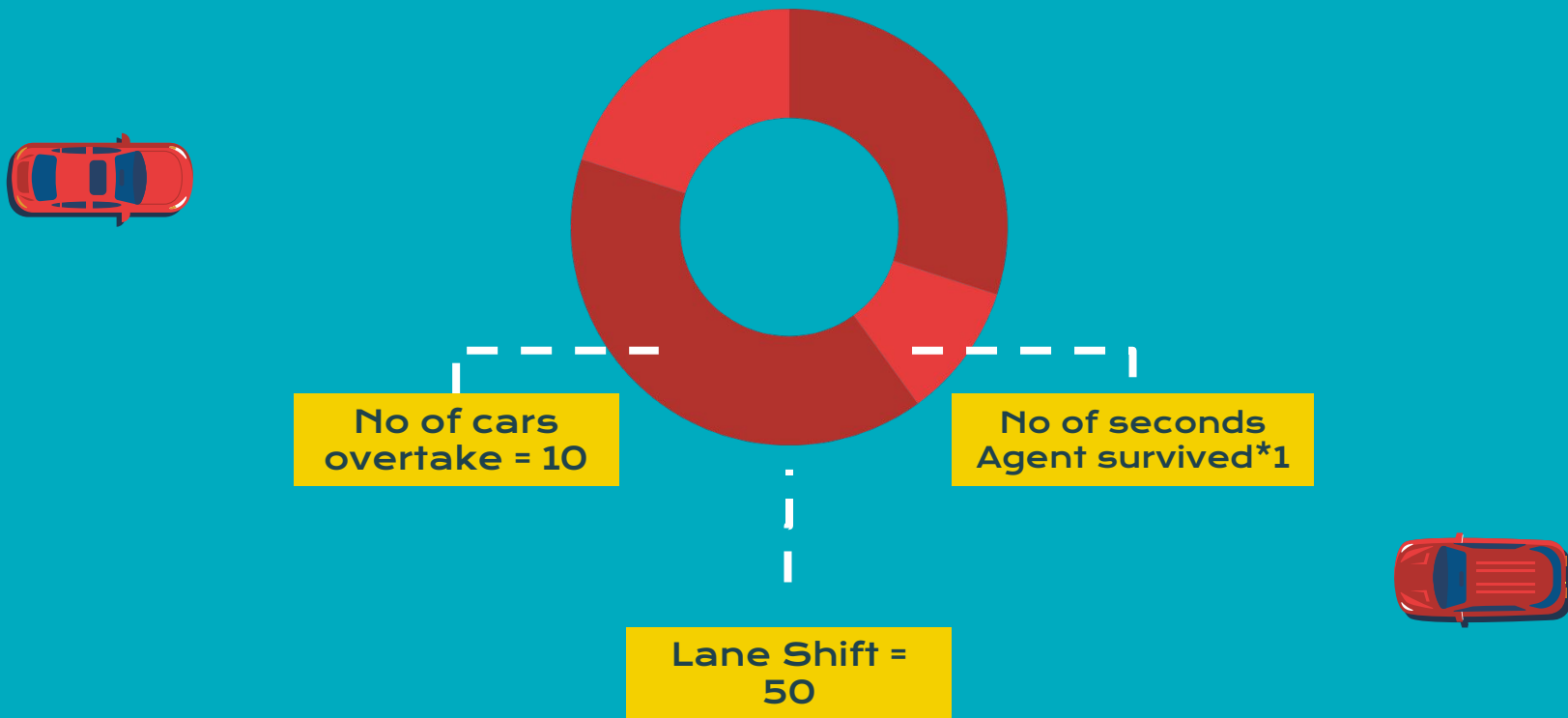We have decided to train a Convolutional Neural Network using Reinforcement Learning.

ALGORITHM

- Q-Learning will be used to train CNN.
- Implement double Q-learning to train the CNN.

REWARDING SCHEME

Through which agent will get to know about value of actions.

No of cars overtake = 10
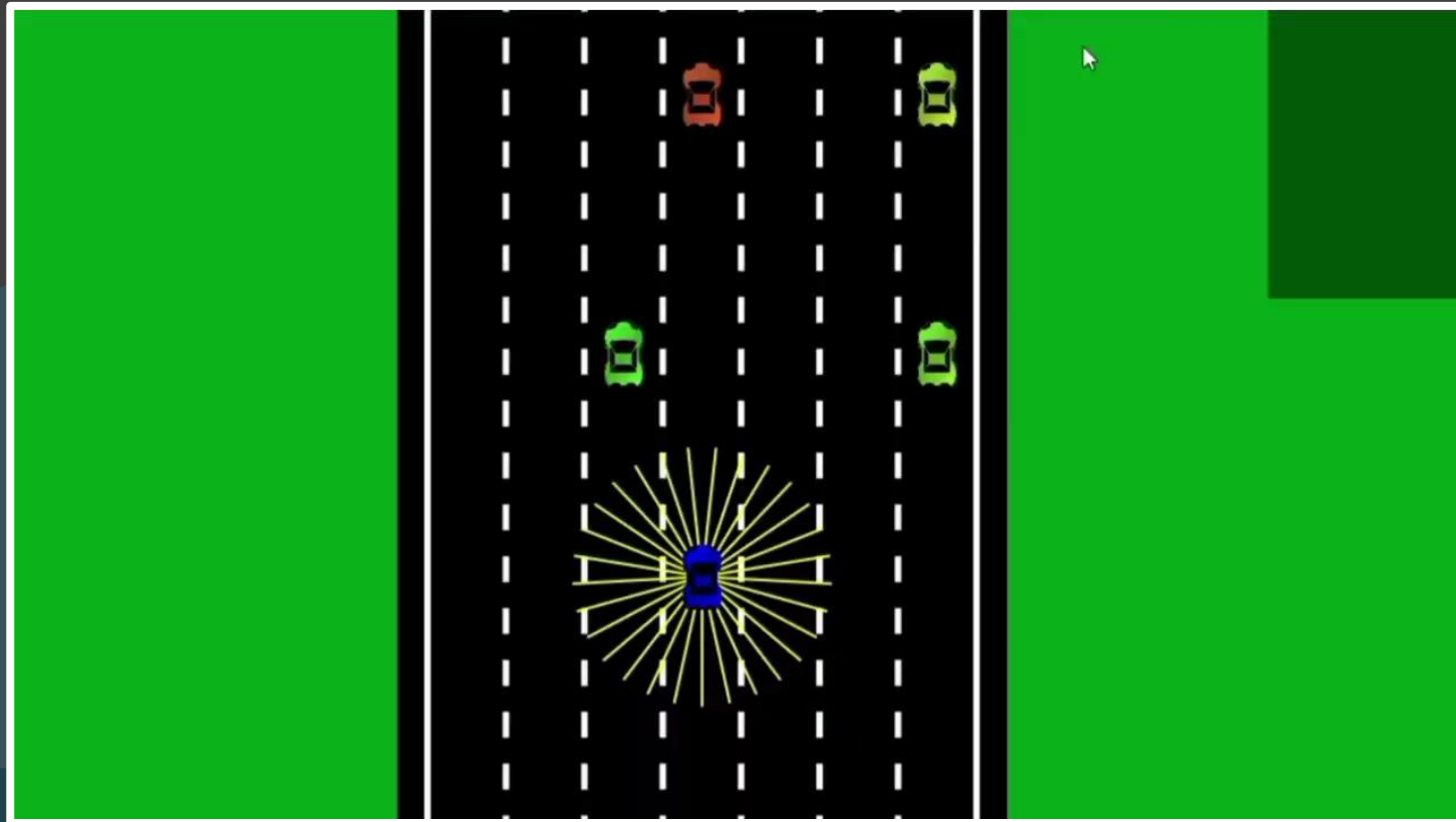
Lane Shift = 50

No of seconds Agent survived*1

CONCLUSION

❖ *The idea of self-driving cars has been around for decades, but recent advancements in technology have brought this idea closer to reality than ever before.*

❖ *This technology in general is becoming increasingly common and could revolutionize our transportation system.*
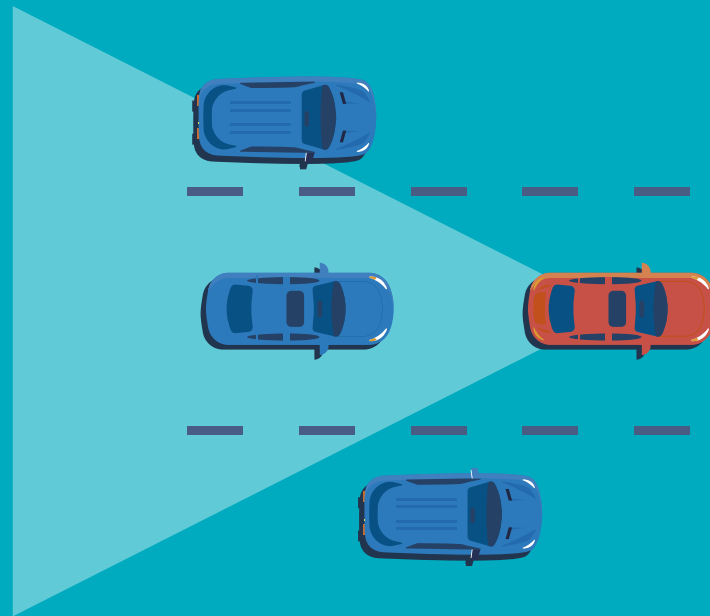
❖ *It has the potential to greatly benefit society.*

"The future of driving is autonomous!"