



# Automated Self Learning Bus Simulation

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## Abstract

Machine learning is gaining importance in areas where systems need to accurately learn and adapt to new patterns with minimal human intervention. One such area is the rise of autonomous cars, with many big car manufacturers trying to improve their self-driving automobiles such as Tesla, Ford and Audi. The speed of development in this area is turning the idea of self-driving automobiles into reality, with the hope of eradicating non autonomous cars in cities which would drastically reduce car accidents and traffic, this also helps cars run more efficient lessening their effect on environment.

## Introduction

Over the last few years, media have been fascinated by autonomous vehicles and their implications in our lives. On the other hand, the main question is how autonomous vehicles will operate as fleets and what are their impact on public transportation as one of the main advantages of public transportation is the ability to move a large number of people with much fewer number of vehicles to solve congestion issues and pollution challenges.

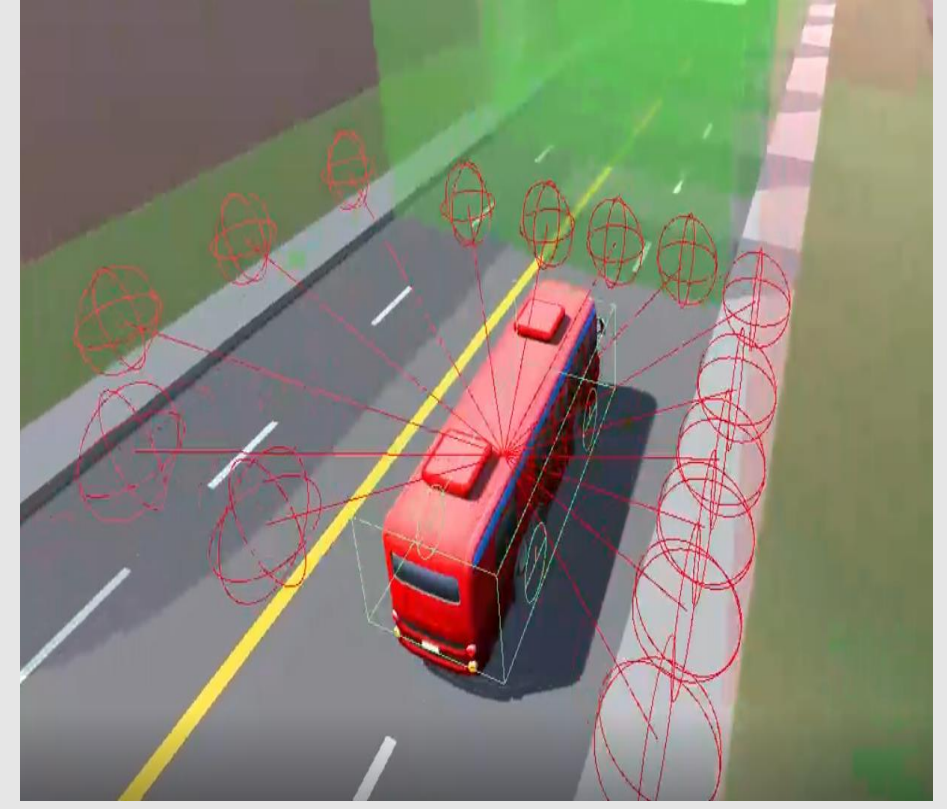
In this project we simulated how an automated bus may be used in a city enviroment and how machine learning algorithms can be used to make the bus learn and adapt to city conditions.

## Solution

Fully automated buses are expected to improve the competitiveness of public transportation services by eliminating the cost and performance constraints of human drivers and significantly reducing traffic accidents, thereby potentially revolutionizing the existing public transportation system. In an environment where centralized information is not available, multi-agent control systems are important and require agents to collaborate with other agents because they may not contain all the data or resources needed to achieve the goal.

Self-driving buses must learn to travel effectively in cities in order to integrate into the public transportation system. This can be achieved through reinforcement learning with intelligent agents. In this study, we will simulate the problem of automatic bus fleet control, which is a hard task for the agents due to random arrivals and incomplete observations of the environment. In response to this problem, we will be using a multi-agent reinforcement learning method

Our goal is to make a public bus driven by artificial intelligence that can reach all the bus stops in a 3D city on time and pick up and drop off passengers.

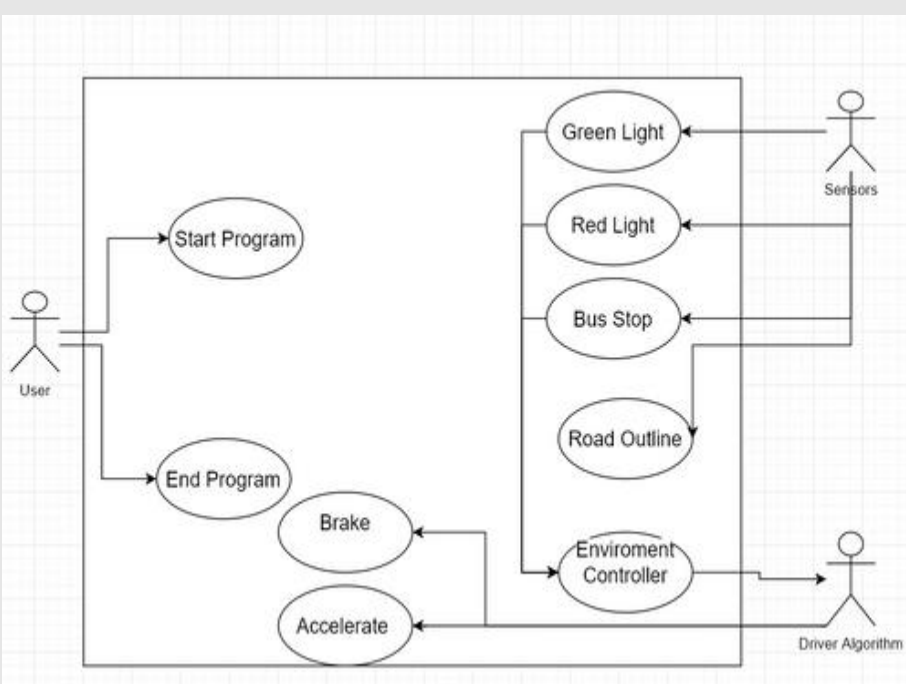


## Results & Conclusion

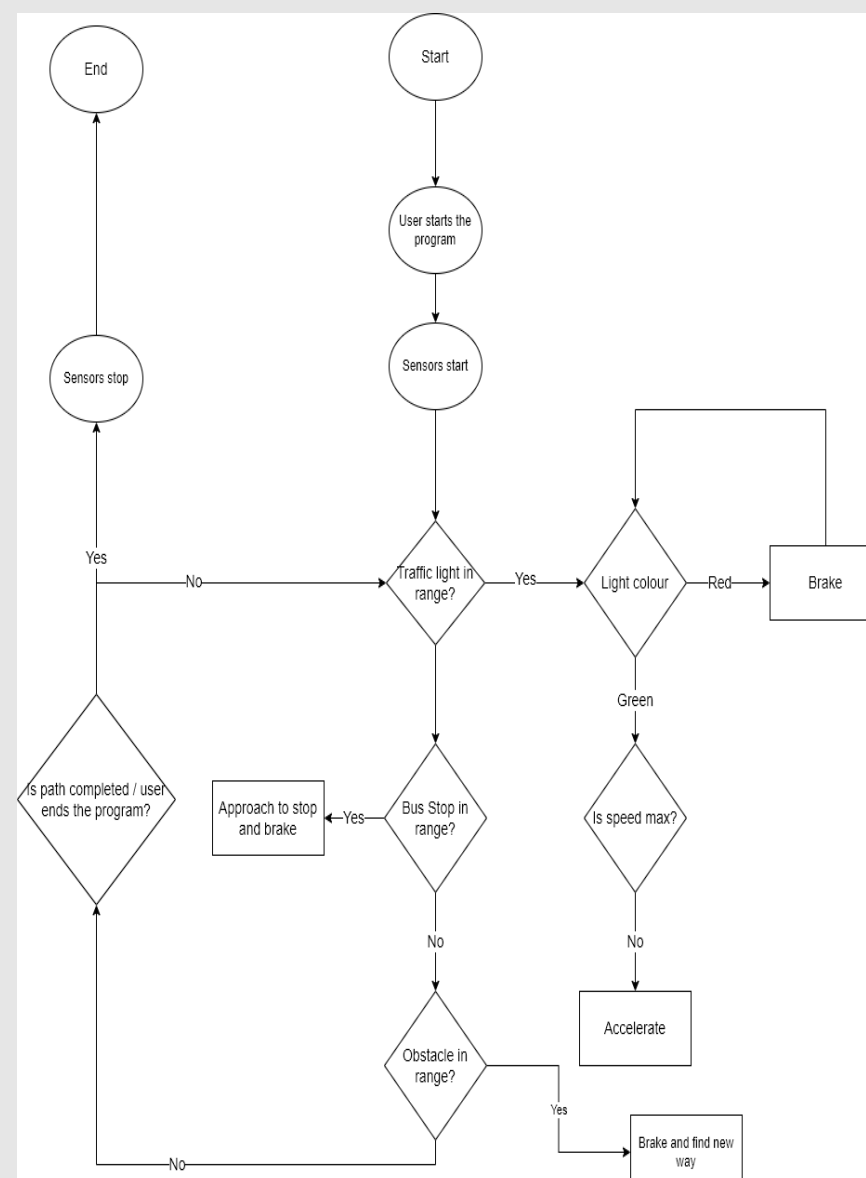
We coded the Automated Self Learning Bus Simulation system this term, according to our theoretical research and report last term.

The bus in the coded simulation environment can find its direction by processing the road and environmental factors with the sensors on it. The bus, which provides autonomous driving with lane tracking, uses path finding algorithms to find its way. In this way, it successfully provides variable inter-stop autonomous driving.

## Data flow Diagram



## Solution



## Acknowledgement

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