International Journal of Scientific Research in Science, Engineering and Technology
Print ISSN: 2395-1990 | Online ISSN : 2394-4099 (www.ijsrset.com)
doi :https://doi.org/10.32628/IJSRSET

Reactive Machine A. I.

Mahesh Manohar Sirsat, Satdive Udita Rajesh, Sathe Pratiksha Anand
Department of Computer Engineering, Zeal College of Engineering & Research, Pune, Maharashtra, India

Article Info
Volume 9, Issue 1
Page Number :55-63

Publication Issue :
January-February-2022

Article History
Accepted :05 Feb 2022
Published: 20 Feb 2022

ABSTRACT

A platform for self-driving cars that can be utilised by students and researchers. Students can use the platform to learn about self-driving car technology and challenges, while researchers can use it to test and iterate through potential solutions to self-driving car problems. The platform is low-cost and small-scale, making it an appealing tool for both research and education. This platform implements the core technologies needed in autonomous vehicles, such as computer vision and object identification. We'll start with an overview of how self-driving cars work at a high level. Then we present the platform we've built, followed by a comparison of it to industry-standard self-driving automobiles. Finally, we address the research's future plans.

Keywords: Reactive Machine AI, Types of AI, Reactive Machine A.I., Self-Driving Cars are some of the terms used to describe reactive machine AI.

I. INTRODUCTION

1.1 Basic of Reactive Machine A.I.:

Artificial Intelligence is a technology that has completely altered the twenty-first century. Artificial Intelligence (AI) is a method of programming a computer, robot, or other object to think like a smart human.

Reactive Machine is a sort of artificial intelligence that is based on functionality. "Reactive Machine A.I." refers to machines that focus solely on current events and respond in the best feasible way within a short period of time.

A reactive machine is guided by the most fundamental AI principles and, as the name suggests, is solely capable of perceiving and reacting to the world around it. Because a reactive machine lacks memory, it cannot depend on previous experiences to guide real-time decision-making.

Reactive machines are designed to do only a restricted number of specialised tasks since they perceive the world directly. However, intentionally confining a reactive machine's viewpoint isn't a cost-cutting tactic; instead, it means that this type of AI will be more trustworthy and reliable — it will respond to stimuli in the same way every time.

1.2 Capablities of Reactive A.I.:

Deep Blue was built to play chess against a human opponent with the goal of defeating the human opponent. It was programmed to recognise a chess board and its pieces while also comprehending their functions. Deep Blue was able to forecast what plays it should make as well as what moves its opponent might make, enhancing its capacity to predict, select, and win. Deep Blue defeated Russian chess grandmaster Boris Spassky in a series of matches between 1996 and 1997. Deep Blue's unique skill of accurately and successfully playing chess matches highlights its reactive abilities. In a same vein, its reactive mentality implies that it has no idea of the past or future; it simply comprehends and acts on the world and components that exist right now.

II. LITERATURE SURVERY

Sensors, perception, planning, and control are the four subsystems that make up a self-driving car.

The autonomous car's position is determined using locaization. SLAM (Simultaneous Localization and Mapping), Kalman filters, and visual odemetry are some of the approaches utilised to assist in the localization of autonomous vehicles.

These techniques, when linked with GPS, can be used to build a map of a specific area that provides useful information about specific locations.

Reinforcement learning (RL) is a technology that could be useful in the development of self-driving cars on a large scale. Implementing this technique on small-scale self-driving car models will thus help to model autonomous vehicles more precisely. To find the optimum course of action for the car, RL requires a lot of trial and error. As a result, RL is computationally expensive and would necessitate the employment of powerful resources.

High Definition (HD) maps are used by autonomous vehicles as a dependable technique of locating the vehicle and traversing familiar locations. This type of map offers extremely precise information about the environment in which the car is driving.

III. DESIGN

Reactive Machine Model A.I. takes an input signal, fetches the current scenario, finds the best case from the projected programmized cases, and sends it as an output in a relatively short period of time.

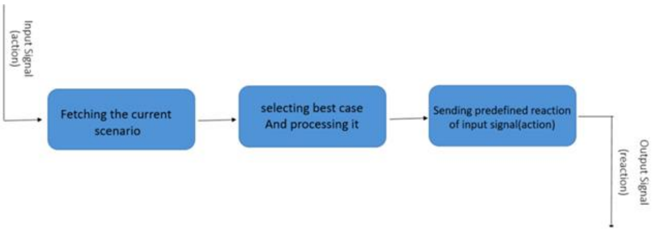

Fig1.Design of Reactive Machine

IV. ANALYTICAL / EXPERIMENTAL WORK

4.1 Visualizing:

Fig2.Overhead view of track

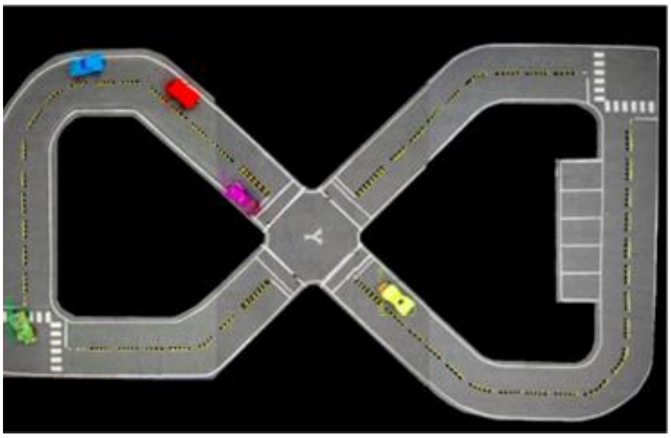

Fig3.Masked overhead view of track

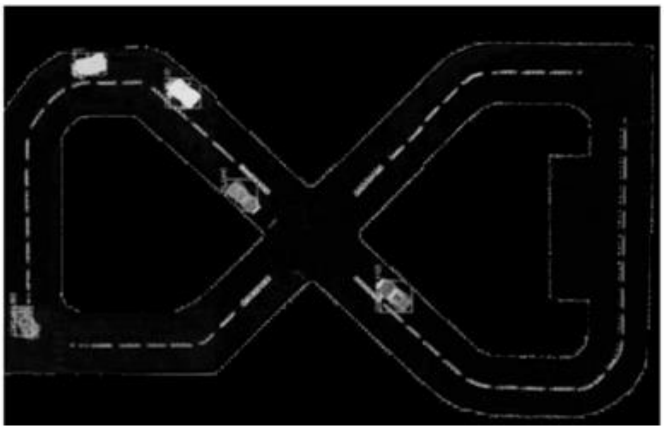

Fig.4 Saturation channel of overhead view of track

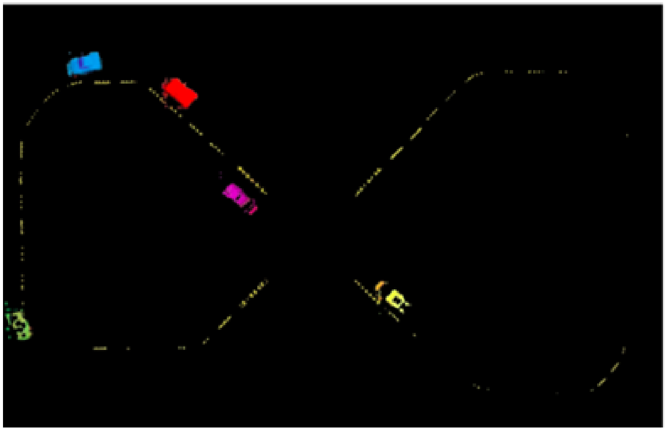

Fig 5.Binary overhead view of track

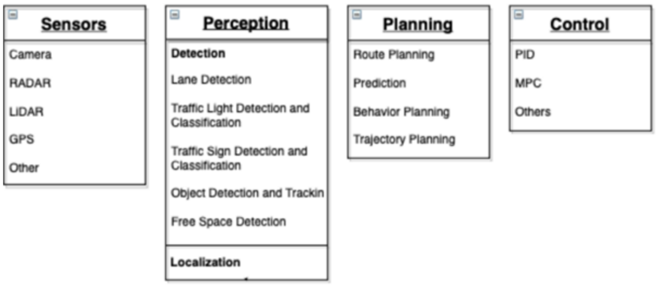

Fig6. Autonomous vehicle subsystem diagram

$$t_i \begin{bmatrix} x_i' \\ y_i' \\ 1 \end{bmatrix} = \mathbf{M} \cdot \begin{bmatrix} x_i \\ y_i \\ 1 \end{bmatrix} \qquad (1)$$

Equation (2) shows how to apply $\mathbf{M}$ on the whole frame. The resulting image is shown in Figure 10.

$$\mathbf{I}_{dst}(x, y) = \mathbf{I}_{src}\left(\frac{\begin{bmatrix}1 & 0 & 0\end{bmatrix}\mathbf{v}'}{\begin{bmatrix}0 & 0 & 1\end{bmatrix}\mathbf{v}'}, \frac{\begin{bmatrix}0 & 1 & 0\end{bmatrix}\mathbf{v}'}{\begin{bmatrix}0 & 0 & 1\end{bmatrix}\mathbf{v}'}\right) \qquad (2)$$

where

$$\mathbf{v}' = \mathbf{M}\begin{bmatrix} x \\ y \\ 1 \end{bmatrix}$$

$\mathbf{I}_{dst}$ is source image array
$\mathbf{I}_{src}$ is destination image array

4.2 Type of Automous System

4.2.1 Sensor: Cameras, radar, LiDAR, and ultrasonics are among the sensors used by industry leaders in self-driving vehicles. Furthermore, GPS is a common tool in self-driving cars. Our platform uses low-cost sensors because some of these sensors are now too expensive for a small-scale platform. A forward-facing camera gives RGB and depth information, whereas an IPS, as explained in section II.C., offers real-time vehicle positioning. These sensors accurately depict the real-world environment in which self-driving cars will operate.

4.2.2. Perception: The car's perception is how it interprets its surroundings. The detection and localization subsystems of the perception subsystem can be further separated.

1) Detection: Self-driving cars make sense of their immediate surroundings using data from numerous sensors. This includes the capacity to detect road lanes, classify traffic signs and traffic lights, and monitor moving objects like other cars and people. They must also be able to recognise open space, or space devoid of obstructions.
2) Localization: The autonomous car's position is determined using localization. SLAM (Simultaneous Localization and Mapping) [2], Kalman filters, and other approaches are utilised to help in the localization of autonomous vehicles.[3] and odometry by sight [4]. These techniques, when linked with GPS, can be used to build a map of a specific area that provides useful information about specific locations.

4.2.3. Preparation Autonomous vehicles plan a safe path to their destination after gathering data from their surroundings. Setting waypoints at a number of intermediate sites, with the final waypoint set to the destination, is part of this process. This was one of the strategies we implemented on our platform. To aid with path planning, we used the IPS to identify desired waypoints on the track. The automobile started piloting itself when the appropriate waypoints were set.

4.2.4. Control: Autonomous vehicles are supposed to manage the car in a safe and seamless manner using data from the preceding three subsystems. It must be established what angle of steering is required to reach a desired waypoint. Proportional-Integral-Derivative (PID) control is a typical type of control. This is a feedback control loop method that calculates an error value on a continual basis. The difference between a desired setpoint (SP) and a measured process variable is the error value (PV).

On the automobile platform, we use PID control in conjunction with an image-based visual servo approach to enable smooth car control and keep the car within the track's lanes. However, the car will not always be able to travel over visible road lines. When driving on a segment of road with no lane lines (such as a traffic signal intersection), the car still has to know where to go. We defined the requisite lanes as the desired SP to maintain the automobile travelling correctly in these situations. The measured PV can be found if the real-time position of a car is provided.

This measurement is performed using the IPS. Our map's lanes are all arcs, which is noteworthy. To compute the error, we can only utilise one Euclidean distance to the arc centre and one arc radius subtraction.

V. APPLICATIONS

1) Used in Spam Filters
2) Uses in Netflix Recommendation Engine
3) IBM's Deep Blue System
4) Google Alpha Go
5) Manufacturing Robots
6) Self-Driving Cars
7) Chat Bots
8) Anti-ballistic missile
9) Used in Designing Games
10) Used in Auomotive Industry
11) Used in Agriculture
12) Used in E-commerce
13) Used in education

VI. ADVANTAGES AND DISADVANTAGES

6.1 Advantages:

1) It is'reactive' in nature, reacting to the current situation
2) There is no human error
3) It is available 24 hours a day, 7 days a week
4) Reactive robots have high decision-making and reacting power
5) Faster Decisions
6) Assisting in Repetitive Jobs

6.2 Disadvantages:

1) Reactive machines don't keep track of memories or previous experiences.
2) Machines cannot build a bond with humans, which is an essential attribute when it comes to Team Management.
3) Machines cannot develop a bond with humans, which is an essential attribute when it comes to Team Management.
4) Machines can only accomplish pre-programmed tasks; anything else causes them to crash or produce irrelevant results.

VII. FUTURE SCOPE

7.1 Reactive A.I. in Science and Research: In the scientific community, AI is making significant progress. Artificial Intelligence (AI) is capable of handling massive amounts of data and processing it faster than human minds. This makes it ideal for research involving large amounts of data from multiple sources. In this discipline, AI is already making strides. 'Eve,' an AI-based robot, is an excellent example. It identified a toothpaste ingredient that can treat a severe disease like Malaria. Imagine a common material found in everyday items that can treat Malaria; it would undoubtedly be a huge breakthrough.

7.2 Reactive A.I. in Cyber Security: Another industry that benefits from AI is cybersecurity. The threat of hackers is getting more severe as businesses move their data to IT networks and the cloud.

7.3 Reactive A.I. in Data Analysis P: AI and machine learning may help a lot with data analysis. AI algorithms are capable of developing over time, and as a result, their accuracy and precision improve. Data analysts can use AI to assist them in handling and processing massive datasets. Without putting in a lot of effort, AI can spot patterns and insights that human eyes miss. Furthermore, it is more scalable and speedier at doing so. Google Analytics, for example, features Analytics Intelligence, which uses machine learning to assist webmasters in gaining insights about their websites more quickly.

7.4 Reactive A.I. in Transport: For decades, AI has been used in the transportation industry. Since 1912, aeroplanes have used autopilot to guide them through the air. A plane's trajectory is controlled by an autopilot system, although it isn't limited to planes. Autopilot is also used by ships and spacecraft to assist them stay on course.

7.5 Reactive A.I. in Home: In the guise of Smart Home Assistants, reactive AI has found a special place in people's homes. Amazon Echo and Google Home are popular smart home devices that allow you to complete a variety of activities with only your voice.

7.6 Reactive AI in Healthcare: This technology is also being used in the medical field because of its benefits. In a variety of ways, artificial intelligence is assisting medical researchers and practitioners. The Knight Career Institute and Intel, for example, have collaborated on a cancer cloud. This cloud uses information from cancer (and other) patients' medical records to assist doctors in making more accurate diagnoses. At present time, the most effective treatment for cancer is to prevent it from progressing to a later stage.

VIII. CONCLUSION & REFERENCES

Reactive Machine A.I. and technology are two aspects of life that never cease to fascinate and surprise us with new ideas, subjects, discoveries, products, and so on.

This is not the end of AI; there is yet more to come. Who knows what AI may be able to achieve for us in the future; perhaps an entire civilization of robots will emerge.

IX. REFERENCES

[1]. survey of constraint based scheduling systems using an artificial intelligence approach. Artificial.Intelligence in Engineering, 1991

[2]. A survey of constraint based scheduling systems using an artificial intelligence approach. Artificial.Intelligence in Engineering, 1991

[3]. SMITH, S.F. 1993, OPIS: A methodology and architecture for reactive scheduling in Fox M,Intelliegencent Scheduling,(Morgan Publishers)

[4]. MITCHELL, C.M. ,1988, Supervisory control: Human information processing in manufacturing systems, In Concise Encyclopedia of Information Processing in Systems and Organizations,(Pergamin Press, New York

[5]. Nell H ,1986, Blackboard systems, AI Magazine,3(2).160-171

[6]. G. Bresson, Z. Alsayed, L. Yu, and S. Glaser, "Simultaneous localization and mapping: A survey of current trends in autonomous driving," IEEE Transactions on Intelligent Vehicles, vol. 2, no. 3, pp. 194–220, Sep. 2017 tree algorithms," Computing, Information Systems, Development Informatics and Allied Research Journal, vol. 4, no. 1, pp. 17–28, 2013.

[7]. M. Hall, E. Frank, G. Holmes, B. Pfahringer, P. Reutemann, and I. H. Witten, "The weka data mining software: an update," ACM SIGKDD

explorations newsletter, vol. 11, no. 1, pp. 10–18, 2009.

[8]. D. Silver, "How the udacity self-driving car works," 2017