Project Introduction

Who We Are:

Our team is titled *CarBall AI* and we are a team of senior level undergraduate computer science students at the University of Missouri. We all share an interest in video games and wish to learn more about artificial intelligence. Our goal with this project is to explore various machine learning and artificial intelligence algorithms and become more knowledgeable in that area of computer science. To accomplish this we are challenging ourselves to create an artificial intelligence that can play the video game Rocket League at a highly skilled level, continually learning and improving its skills through training and experimentation.

Problem Definition:

Our group would like to tackle the challenge of creating an artificial intelligence that is capable of playing the video game Rocket League to an increasing skill level. We will measure its fitness with various in-game measurements such as scoring goals or positioning the ball closer to the goal.

Proposed Problem Resolution:

Our group plans to use AI to learn how to play Rocket League. We would like to use information like the ball location, car locations, and the point breakdown of a bot to be able to teach the AI how to improve and get better at the game.

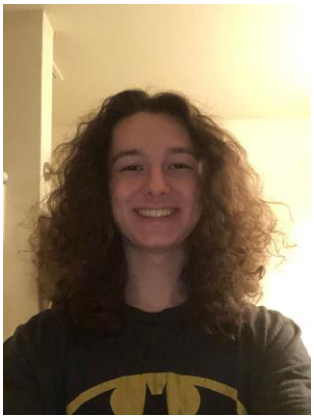
Team Information

Mission Statement:

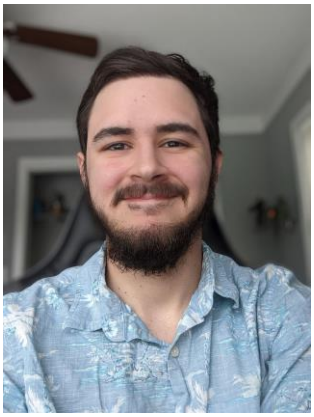
Our team is *CarBall AI* and our focus with this project is to develop our skills and knowledge in testing and selecting artificial intelligence algorithms. To accomplish this task we will challenge ourselves to build an artificial intelligence that can increasingly become more skilled at playing the game Rocket League. This project will involve analyzing various artificial intelligence algorithms and using those analysis to adjust training parameters.

Team Biographies:

Michael Branstetter



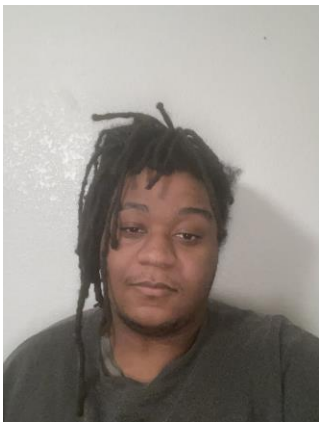
I am a computer science major minoring in math and I will be graduating May 2022. I'm interested in game development, so this project is a perfect fit. I don't have too much knowledge on AI or Rocket League, but I'm looking forward to learning about both in this project.



Benjamin Chilson

Hello, I am Ben Chilson. I am a 4th year student at the University of Missouri pursuing a degree in Computer Science with a minor in Information Technology. I have an interest in playing video games and have some experience playing Rocket League so I think this project would be a fun and interesting one to tackle. I will be interning with Garmin in the summer of 2022 and will graduate from Mizzou the following winter in December 2022. Following graduation, I wish to continue my career in computer science as a software engineer designing and implementing software solutions that will have a meaningful impact on people's lives.

Byron Doyal



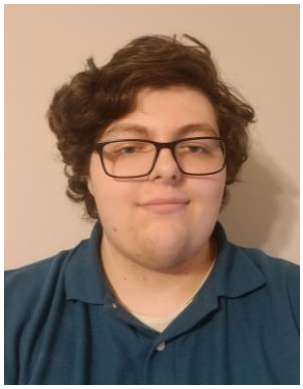
I am a senior computer science major who will be graduating in May 2022. I plan on pursuing a postgraduate degree the following semester after I graduate. This project was interesting to me because I was always interested in AI and this project gave me an opportunity to experiment with the technology.

Carson Rottinghaus

I am a senior computer science student graduating in 2022. My expertise is in full stack web, app, and game development. AI has always been an interest of mine and this project serves as an opportunity to broaden my experience in the field.

Spencer Wagner

I am a senior Computer Science major. I will be graduating this next Spring. My interests include AI and game development. I have an interest in Rocket League and have thought about the possibilities of AI such as neural networks with Rocket League.



Mentors

Gary McKenzie - Gary is our current capstone professor. He was chosen for our project because of his master's degree in computer science and his knowledge in supervised machine learning.

Yi Shang (pending) - Professor Shang teaches a class about artificial intelligence. He has published over 200 papers with topics including artificial intelligence and bioinformatics and has a technical focus in Artificial Intelligence and Bioinformatics.

Requirements Analysis

Hardware Requirements:

Rocket league minimum requirements
OS: Windows 7 (64 bit) or Newer (64 bit) Windows OS
Processor: 2.5 GHz Dual core
Memory: 4 GB RAM
Graphics: NVIDIA GeForce 760, AMD Radeon R7 270X, or better
DirectX: Version 11
Network: Broadband Internet connection
Storage: 40 GB available space

Functional Requirements:

- The bots will be controlled using Python
- Neural networks will be used to allow the AI to learn
- The bot will use in-game scoring systems to encourage/discourage behavior
- There will be several bots to compare performance. (Random Input, Drive straight at the ball, Artificial Neural Networks)
- A framework will pull game data to assist bots with ball/player location, scoring, and ball/player velocity
- The bot will only be able to learn on the standard maps

Non-Functional Requirements:

- The bot should be able to gather information and learn without completing a full match
- The bot's control should be relatively seamless and not have a delay from processing any information
- The ability to draw lines and give information to the humans watching to represent what the bot is thinking
- The bot should be able to learn without human supervision