[Date]

12ShiroY

AI Home System Linked To Scalextric Track

OCR Computer Science Project

Table of Contents

[Analysis 1](#_Toc517781149)

[The Problem 1](#_Toc517781150)

[The Stakeholders 1](#_Toc517781151)

[Existing Solutions 1](#_Toc517781152)

[The Essential Features 1](#_Toc517781153)

[Potential Limitations 2](#_Toc517781154)

[Hardware and Software Requirements 2](#_Toc517781155)

[Success Criteria 2](#_Toc517781156)

[Design 4](#_Toc517781157)

[Decomposition 4](#_Toc517781158)

[Structure 4](#_Toc517781159)

[Algorithms 4](#_Toc517781160)

[Usability 4](#_Toc517781161)

[Variables, Data Structures and Classes 4](#_Toc517781162)

[Iterative Development 4](#_Toc517781163)

[Further Data 4](#_Toc517781164)

[Developing 4](#_Toc517781165)

[Iterative Developments 4](#_Toc517781166)

[Prototypes 4](#_Toc517781167)

[Structures 4](#_Toc517781168)

[Examples of Code (Annotated) 4](#_Toc517781169)

[Variable Names 4](#_Toc517781170)

[Validations 4](#_Toc517781171)

[Review 4](#_Toc517781172)

[Evaluation 4](#_Toc517781173)

[Success Criteria 4](#_Toc517781174)

[Development In Future 4](#_Toc517781175)

[Future Improvements 4](#_Toc517781176)

[Usability 4](#_Toc517781177)

[Bibliography 4](#_Toc517781178)

# Analysis

## The Problem

Above all preference, I would like to create an AI with the ability to beat a human in a race (Scalextric). I will achieve this via computer vision and human learning. The AI should be able to find the optimal current at each stage of the track in order to achieve the best possible time to finish a lap. I will do this by linking a Scalextric track to a self-made, Google AIY kit, using libraries and Google’s public code for the kit itself. The majority of the programming will be done on a raspberry pi using python as this is seen as the best language to code AI in. The AI will be able to locate its position on the track via computer vision. It will be able to do this due to an input from a top down camera, allowing it to understand the view of the whole track and its position upon it.

## The Stakeholders

Currently, my stake holders are people who are interested in Scalextric, who could play on their own and try to race against the AI however, in the future this could be implemented in the development of driverless cars. This could make life much easier and safer in the future as this could reduce the amount of car crashes every year due to lack of potential for human error while driving. The age range for this product is for ages between 6 and 18.

My main stakeholder is Tom Smith, who is a 15 year old male, with an interest in both computer science and Scalextric. The problem he faces is that he isn’t challenged by anyone else who plays against him, as he is significantly talented at Scalextric. He is extremely interested in having the opportunity to have an opponent which has significant potential to beat him. This would be better than any existing solutions as they do not have truly difficult AI’s with real potential of being a challenging opponent. The convenience of having a stakeholder like Tom is that he can provide very quick and accurate feedback frequently, allowing me to understand the possibility for improvement. This will allow me to build upon multiple prototypes and have a relevant member of the public to test my product from a separate view to me. This could allow me to make my hardware and/or software more ergonomic to the user.

## Existing Solutions

Real FX Racing have already implemented the idea of AI in toy racing cars in one of their latest products which similarly uses computer vision for the car to be able to drive by itself (<https://www.youtube.com/watch?v=I6qGNQfZiLE> ) . However, the idea that AI could be used to drive on a Scalextric track is much more complex as there is a higher skillset for one of these tracks than there is for something like a Real FX Racing track. The problem here is that they use closed source software which you cannot access even if you buy the product, meaning that I cannot see what makes their product the most efficient.

## The Essential Features

## Potential Limitations

## Hardware and Software Requirements

## Success Criteria

# Design

## Decomposition

## Structure

## Algorithms

## Usability

## Variables, Data Structures and Classes

## Iterative Development

## Further Data

# Developing

## Iterative Developments

## Prototypes

## Structures

## Examples of Code (Annotated)

## Variable Names

## Validations

## Review

# Evaluation

## Success Criteria

## Potential In Future

## Future Improvements

## Usability

# Bibliography