Imagine Cup

Project Blueprint Challenge

Games

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| **Team Name** | UnrealCup |
| **Country** | Germany |
| **Project Name** | UnrealCup |

First prototype

# Concept

Our project “UnrealCup” is quite a different approach on Football games. Instead of controlling your team directly, you can give each player a certain pattern which describes how the player will act. Like in real football there will be 11 players competing in 2 teams against each other. All common football rules will be considered and the players will be punished if they break the rules. The game will feature a 3d playing field and animated players. The movement of the ball will be computed by using the game engine’s physic engine. The game will be available for PC and Xbox One.

There will be 3 approaches for creating your own player intelligence:

## Macro recording

If you never encountered any programming this is the first approach for you. In this editor you can move you players yourself and record patterns for certain situations. This way you can control how your players will behave, without knowing logic happens in the background.

After you created a recording you can use it in the graphical editor. If it is not good enough you can enhance it even further by directly editing the file.

## Graphical Editor

If you already have a grasp how logic in programming languages work you can use a graphical editor to define your own logic. In this editor you can create your logic by dragging predefined parts together. This way you can create complex decision trees or loops without actually code a single line.

This approach is best suited for users which already have a glue how logic programming works, but not capable of coding their own logic. Since this Editor is all about drag and drop a version for windows tablets would be possible.

## Coding

This approach is for all the hardcore users out there, who might feel limited by the previously mentioned tools. You can create your own logic files by editing the outcome of the previous tools or even create it from scratch. For this purpose you have to use the scripting language “LUA”, in which predefined actions like “move” or “turn” can be triggered. All possible actions will be documented.

The game main focus is not to create a casual game, but to create a game which helps the players to learn something about logic and programming in a fun way.

# Target Audience

Our Audience is separated into two groups. The first group is made up of students from high schools or universities. This group will be our main Audience. Teachers can use UnrealCup as part of their lessons for example as introduction to show how simple logic affects the behavior of the football players. The students can also compete against each other and therefore will be encouraged to improve their skills even further. For an example of this audience you can look at the persona “John Smartman”.

The second target group are more of a gamer who likes to play strategy games. This group won’t be as big as the earlier mentioned group. But this group is made out of people who want to create the perfect team, which competes only with the best. This group features people roughly in their mid-20s who are willing to spend a lot of time to create the best team they can. They won’t stop by using the graphical editor to make their team, but they will use all possibilities available, even if they have to learn something new. An example of this group is “Jack Hardcore”, who is mentioned in the personas chapter.

# Personas

## John Smartman

A typical user for our project is John Smartman, he is a 16 year old sixth former at a German school. He likes to work with computers and he even tried to write some computer program before. So he decided to go to a special school with Computer Science as main course. In one of his first Computer Science courses his teacher wants so explain the logic of computer programs. For this purpose the teacher used UnrealCup to show the principals of computer logic. He explains how the decisions of the robots are defined by logic in their AI. John was so fascinated by this and downloaded UnrealCup to his own computer and took a better look at it. After a few days playing with the editor he began to program his own AI. After working with UnrealCup he got really fascinated by software development and decided to study Computer Science.

## Jack Hardcore

The second typical person is Jack Hardcore, he is quite the opposite of John. He is a 20 year old student and likes to play games. He is a perfectionist in his games, he does not quit before he gets the best solution for a problem or win the game with the highest possible score. After he discovered UnrealCup he tries to create a very good AI in the editor but he does not win against all the competition. So he needs to get a better AI. The only possibility is to program it on his own. So he learns how to do that. As he worked on the AI he begins to like to program software. So he tries to write his own little game. That is how he became an independent game developer.

# Game Mechanics

## The simulator

The main part of the Game will be the simulator. The simulator will load the specified teams and let them compete against each other. To make sure everything is fair, the simulator will checks the common soccer rules[[1]](#footnote-1).

## The editor

* Fußball Regeln
  + Unreal Engine
* 2 Teams
  + Logik Spielerweise in LUA Skript
  + Aufstellung via XML
* Grafische Ausgabe und Physik Unreal Engine
* Im Simulationsmodus kann ein Spieler ausgewählt werden und Makros aufgezeichnet warden oder eine KI über z.B. Deep Learneing, Neuronale Netze trainieren.
* Editor
  + Basierend auf HTML/JS
  + Grafisch!
  + Drag and drop

# Top User Stories

## AI-Editor

As a user of the UnrealCup program, I want to have the possibility to create an AI-team without having to learn a programming language. The creation of the team should be simple and easy to understand.

We plan to fulfill this requirement by implementing the drag-and-drop editor or the macro recorder that were mentioned in chapter <TODO>. Those software components allow users who are unexperienced with programming and logic to create their own AI.

## A serious simulation

I want the game to realistically simulate a football game. This includes a good graphic as well as actual football rules.

By using the unreal engine, the graphic and the physics of the game will look pretty realistic, and one of our main goals is to implement the football rules in detail.

## Great AI-players

I want to create brilliant AI teams. I don’t like to be restricted to the possibilities given by some editors.

We will make it possible for experienced users to program their own AI by making the LUA-interface accessible for the users.

## Competitive Gameplay

I want to challenge my friends and play against their AI-team. Also, I’d like to be able to receive other AI-players and adapt them so they fit into my team.

The files that store the intelligence of the team can easily be traded and used in your own game. This way, the user is able to challenge other teams with his own AI or change an existing AI to match his desires.

# Competition

## RoboCup

The main competitor to our game is called RoboCup. RoboCup offers the possibility to create AI-Teams on 2D or 3D basis.  
Many users might experience difficulties getting into this technology, because the RoboCup-program requires a lot more programming experience than our game.

Our tool tackles this problem by providing a graphical editor which reduces the required experience by a lot.

Another problem of the RoboCup-Software is that it can only be used on a PC, and it is created to run under Linux, yet it is possible to install the game on windows with increased effort.

The game we are planning will be playable on Windows and Xbox, the graphical editor could be used on Windows Tablets.

Another advantage of our program is the newer Engine that enhances the graphic and physics of the game.

## FIFA / PES

Our game doesn’t address the same targets as football games like FIFA or PES, yet those games might share a small target group with our program.

The main difference is that our game is not an active game, the AI is created before the match simulation starts.  
This leads to the conclusion, that classical football games are no real competitor for our project.

# Business Model

With “UnrealCup” we plan to establish a new platform to help people get started with programming and understanding artificial intelligence.  
Therefore we want to distribute “UnrealCup” for free. This helps to spread the platform among educational institutions like universities or schools. These educational institutions can use “UnrealCup” in their lessons to draw the pupils’ attention to the field of artificial intelligence. This part of computer science is already very important and will in future be even more important and gives new ways in solving problems which seem unsolvable from today’s point of view. “UnrealCup” provides a playful way of getting in touch with artificial intelligence.  
Also students and other people will have the possibility to use “UnrealCup” to play and develop artificial intelligence.

But developing “UnrealCup” and supporting the platform in future also requires money. Therefore we plan to display advertisements on the banners around the soccer field and show short video clips during the half-time break. The advertisements are included into the game environment and by this way they do not disturb the gameplay in a negative way. By placing these advertisements we can earn the money that is necessary for the development and future support.  
In addition to the advertisements we plan a marketplace in which the user can buy items like better animations or new skins for the players. All these items are optional and do not affect the gameplay itself. They only enhance the game in an optical way.

# Core Technologies

## Unreal Engine 4

One of our core technologies is Unreal Engine 4: The engine allows us to create a game with real physics experience and attractive graphics without coding everything from scratch.  
As a framework Unreal Engine 4 already provides physics calculations for game objects and their interactions. It also provides lots of basic functions which can be altered or expanded to suit the needs of “UnrealCup”.  
By using Unreal Engine 4 “UnrealCup” gets platform independent and can be used on a windows or linux computer or MAC and also on the Xbox One. In the future Unreal Engine 4 will also be supported by mobile platforms as Windows Phone or Android.  
The whole simulation will be developed using Unreal Engine 4. For more flexibility the players’ intelligence is programmed in LUA scripts. Therefore we have to include an interface between the Unreal Engine and the LUA scripting.

## LUA Scripting

LUA scripts are used to program the intelligence for the players. Every player has its own script containing logic that allows individual behavior for each player and position in the field.  
Reasons for using LUA script are that LUA script is platform independent and as a scripting language it provides flexibility in programming the player’s intelligence because there is no need for compiling the scripts. Also LUA script can be extended with special functions to control the player in the simulation and functions that deliver information from the simulation into the script. Another benefit from LUA script is that there are no license problems.

## HTML/Java Script

For editing the player’s intelligence we will use HTML and Java Script. The editor will provide multiple options for editing the player’s intelligence.  
With HTML and Java Script platform independence is guaranteed.

1. http://www.fifa.com/mm/document/footballdevelopment/refereeing/02/36/01/11/27\_06\_2014\_new--lawsofthegameweben\_neutral.pdf [↑](#footnote-ref-1)