LITTLE PLANETS

GAME DESIGN DOCUMENT

CMP401.2016-7.S1 - Feasibility Demo

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Word Key / Word Context

Player(s) - refers to both human and artificial intelligence in a game.
User(s) - refers to human only players

Introduction

This document will outline the fundamental game design planned for my honours game environment dubbed “Little Planets”. This game will play host to several Artificial Intelligent (AI) systems which the honours project will focus on, to get a better idea of the research project I will undertake I recommend reading my honours proposal first. This document will focus solely on the design of the environment that the AI will compete in.

Little Planets is a project that was begun during summer of 2016, hoped to finish by the end of the year; however, due to commitments to University projects and hard stops found in the development of the program the project was shelved and I had no plans on returning to the project any time soon. This was until my plans and backup plans for the environment to host my honours project fell through and I realised that Little Planets would be the perfect subject for the project considering its origin.

Game Concept & Features

Core Gameplay

The idea of Little Planets was inspired by several other real-time strategy games including: Auralux (War Drum Studios 2010), Little Stars for Little Wars 2 (MKG 2012) and the game that inspired most of the recent adaptations Galcon (Phil Hassey 2008). Similar to these games, Little Planets will have the player start in a “home” planet and will need to send units from that planet to other planets to conquer them, each planet has a number of units also protecting the planet so to conquer a planet you must overcome the units defending and have enough units to take the planet which will vary depending on the size of the planets ranging from very small to very large. Each planet also produces units after player conquers it and again the rate will depend on the size and upgrades of the planet. As with the previous games the players can select a percentage or amount of units to send to other planets and time it takes to reach another planet is dependant on the distance that planet is from the location the units are moving from. While moving towards another planet units can be intercepted and destroyed by units belonging to another player, the amount of units lost in a battle (either via interception or attacking a planet) is determined by how many are on each side; for example, 50 units

are intercepted by 35 units, all of the interceptor units will die and the original group will be left with 15 units. Units can be redirected mid flight but can only travel to other planets. The goal of the game will be to defeat all hostile players by conquering all of their planets.

Factions & Reputation

Mostly unlike the games previously mentioned, Little Stars will incorporate a whole new gameplay mechanic through the introduction of factions. Factions will be what represent each player during the game, a user will select their faction prior to the game starting out of a selection and although in the current concept of the game factions will not affect anything directly it will allow players to identify other players easier and may allow for a better representation of emotion (as this project will explore human-like AI). Although it has never been a "feature" of games like Galcon and Auralux, they also visually displayed the difference between players by different coloured planets; Little Planets will also feature each faction having a different colour associated with it but will also have unique portraits portraying the leader of the faction similar to how Sid Meiers Civilization V (Firaxis Games 2010) represents the different world factions, this may become animated but at this time it is hard to tell, and besides that the aim of this project is not to make it visually appealing although significant research has be conducted linking visual representation to heighten the experience opposed to simply telling the user that someone is unhappy, users generally prefer if they can see that someone is unhappy instead of being told via text. Each faction will hold a reputation similar to how Total War: Rome II (The Creative Assembly 2014) features reliably and trustworthiness views for each faction, reputation will be influenced by what the player of the faction does and reputation may be represented in a individual and global form, meaning a faction can be labelled "Untrustworthy" globally due to their general actions but each faction in the game may also hold individual views of the faction that influence whether they believe this faction is untrustworthy - this is a feature overlooked in some games and games that only include global reputations such as Total War: Rome II have received negative feedback on the feature; for example, say player 1 is friends with player 2 in the game; however, player 2 is a very weak ally and serves no advantage to player 1 and the only reason player 1 is not friends with player 3 is because of player 1's relation with player 2 - because player 3 dislikes player 2 but has no feeling towards player 1, aside from that player 1 is allies with an enemy. If player 1 were to betray player 2 in favor of becoming friends with player 3, regardless of if player 3 personally benefits and wanted this to happen player 1 will receive an "Untrustworthy" label and if player 3 were an AI with only global reputation to go on, it will deny requests from player 1 to become friends because of this newly acquired label. Reputations are local to the current game being played and are not carried other games; however, if multiplayer were incorporated into

the game users may hold grudges on other users so this is something to be considered on the AI side when developing.

Stat Tracking

The game will feature a form of in-game stat tracking, it is difficult to tell how this will be accomplished at this early stage as the stats have yet to be created and the most efficient way of storage is yet to be decided, but in this prototype concept's current form it is likely I will implement a dynamic array to keep track of lots of information at short intervals (such as every 5 or 10 seconds) as the game plays, with this information we will then be able to generate graphs similar to what is seen in Auralux when the game ends.

The Turing Test

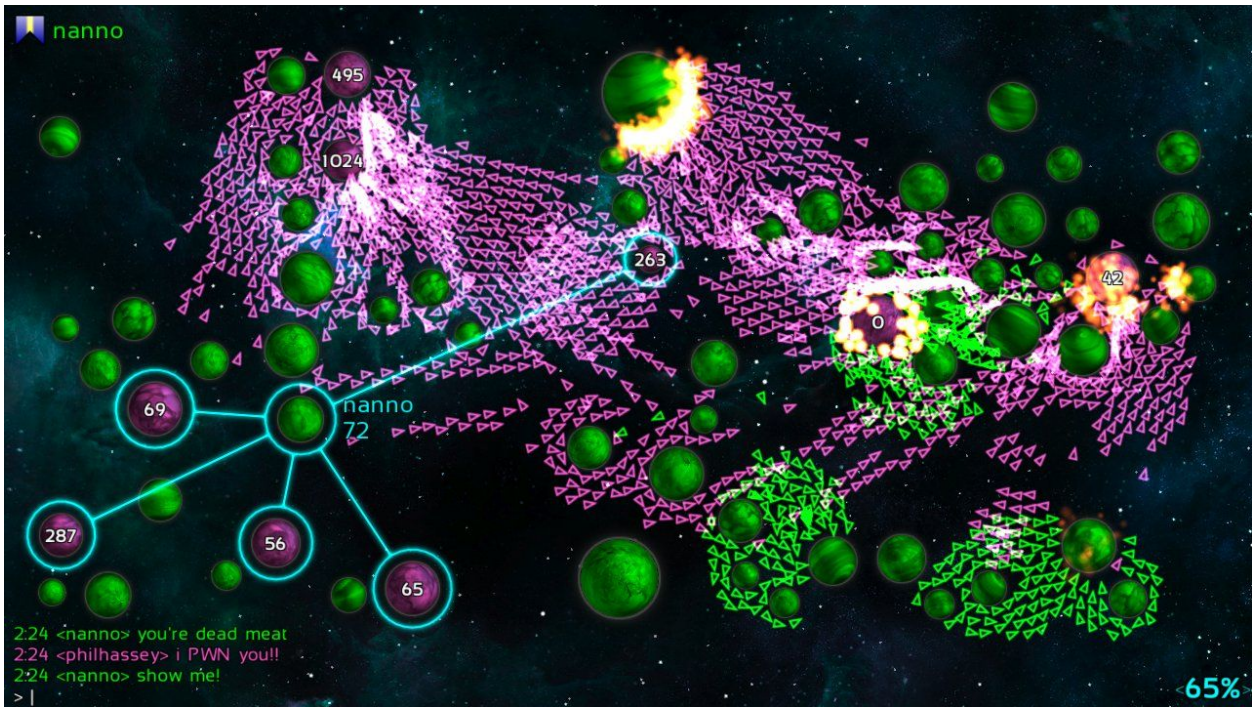
A new decision made in the game design and end project goal of this honours project will be the inclusion of a Turing Test (Alan Turing 1950) like simulation. This will appear to be a separate game mode, disguised as Multiplayer to the user. In this the game will simulate searching for a multiplayer match, joining a game with other players which the user will hopefully assume are human-players and play a regular game of Little Planets. This area of the game will be strictly supervised and recorded if it were to be included and may require the player playing several games before revealing that the players were in fact AI and not human. Feedback will then be collected, likely from within the game after revealing or in person as this mode is unlikely to be in any build available publicly as it would require strict trust to not have users spoil the experience for others. This mode may also included an actual human opponent and pose the question of which player was a human to the test subject. At this moment it is undecided whether the user will be actually against 1 human and other AIs or all AIs that are built to trick the user into thinking they are human, or if it will even be revealed to the test users that they are taking part in the Turing Test. Further research will need to be gathered and several factors considered before deciding on which route to go. It may also be likely that all of these will be tested if enough test subjects can be obtained.

It is important that this idea is kept confidential until results have been gathered so anyone reading this before the end of the honours project, it would be greatly appreciated if this information was not spread to ensure results are not corrupted by users pre-existing knowledge.

Research & Inspiration

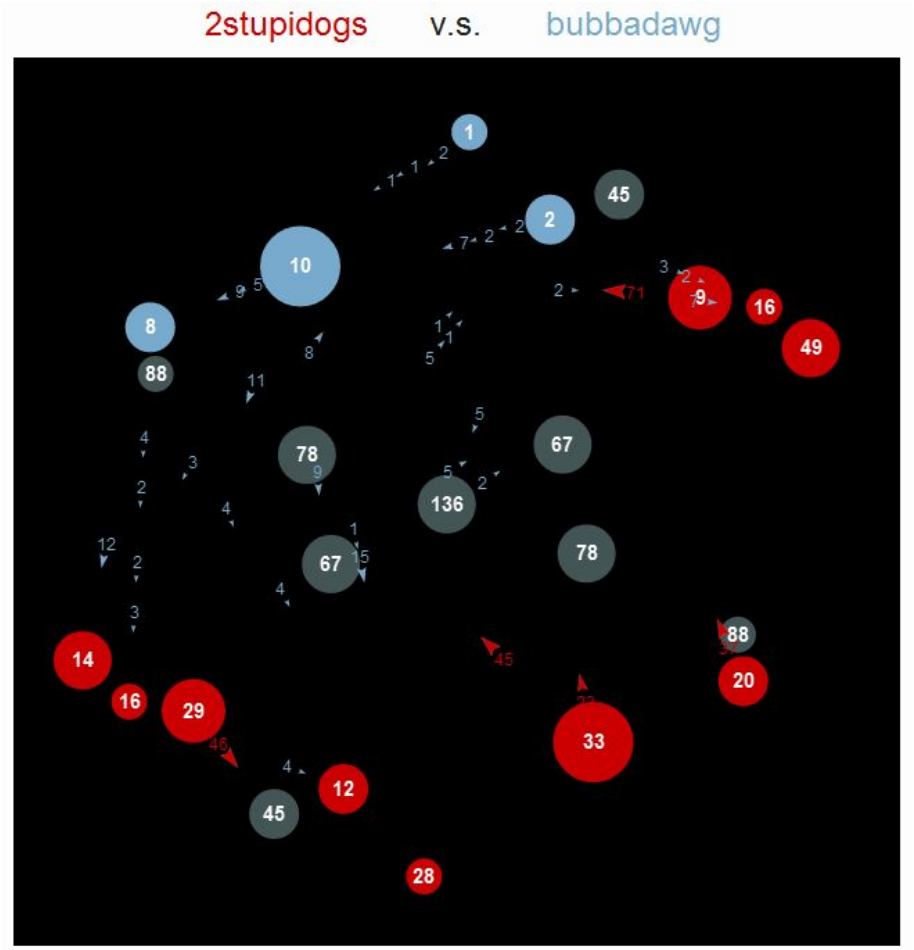
Galcon - Game Design Origin

Galcon (Phil Hassey 2008) is series of real-time strategy games for a variety of platforms; the most well known version being called simply Galcon developed by Phil Hassey in 2008 has spawned a massive collection of games featuring the same core game design of multiple players start with planet(s) and must sent ships to other planets to conquer them with an end goal of eliminating all planets owned by other players. Although Galcon's first appearance was in the form of a shareware for PC released in 1987 named "Galactic Conquest" (Phil Hassey 1987) a multiplayer conquest game inspired by the board game "Risk" (Parker Brothers 1959) and "Stellar Invasion" (Bearbyte Software 1985). This went on to become "Galcon Classic" (Phil Hassey 2006) released in 2006 for Ludum Dare an accelerated video game development competition where contestants are given two days to create a game - Phil Hassey went on from this competition to create the public release version of the game simply dubbed "Galcon". In 2009 Galcon and Phil Hassey won the IGF award for Innovation in Mobile Game Design. Several other iterations of Galcon have been created ending in release of Galcon 2 (2014) after a successful Kickstarer campaign in 2012.



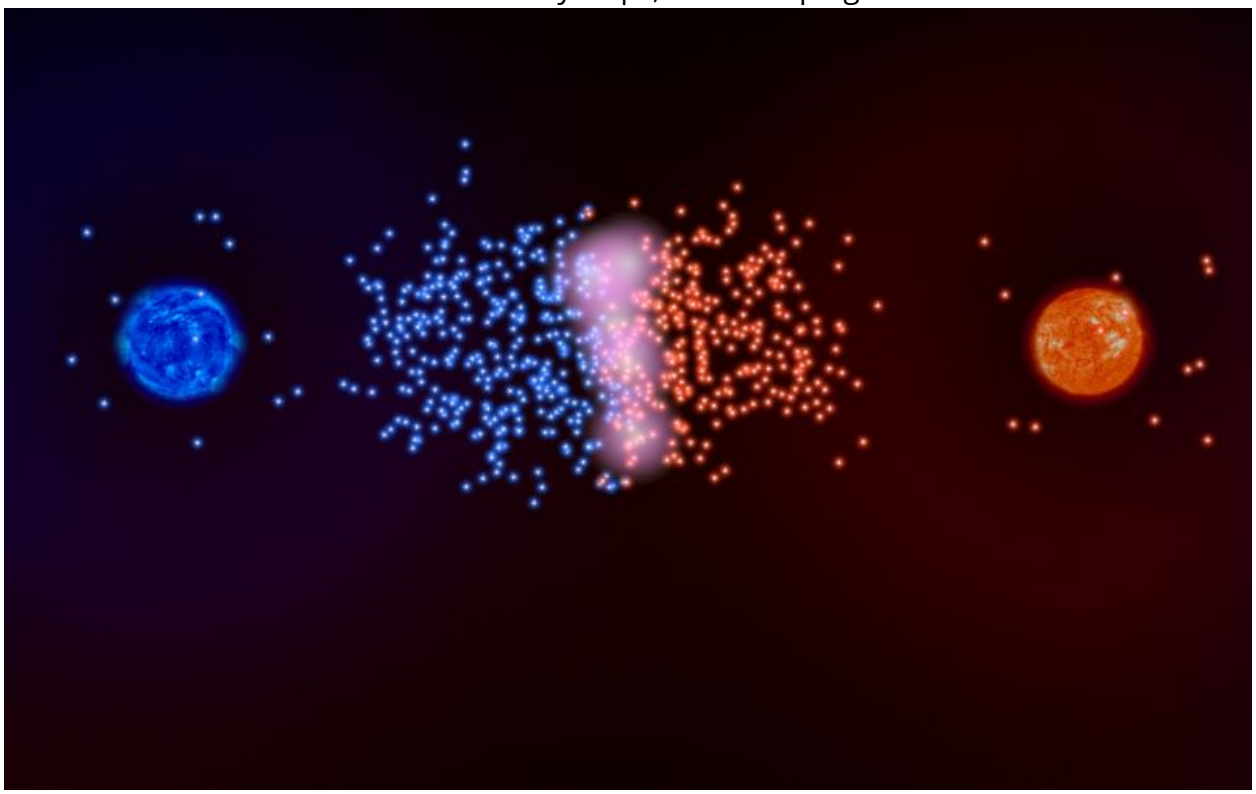
The Google AI Challenge

Starting as a local contest by the science club of the University of Waterloo, the AI Challenge challenged developers to write self-contained programs to play a game against other AIs made by other developers also taking part. In 2010 the contest caught Google's attention and became sponsored by the company allowing the competition to be extended internationally and open to the public instead of just the university. In Fall of 2010, the competition now dubbed "The Google AI Challenge" hosted a competition named "Planet Wars". Inspired by Galcon this challenge challenged developers to create an AI to win in a game of Planet Wars, which was essentially identical to Galcon in terms of game design but featured extremely simple graphics and instead of representing ships individually they were represented in groups (ie a ship would have a number 50 above it, representing that this group contained 50 ships). This challenge featured several thousand participants and not only gained popularity for its inspiration game Galcon, but brought even more awareness to this seemingly untouched style of game. Shortly after, the Google AI Challenge hosted one last event before quietly disappearing, limited original information is available for the contest as, excluding the most recent event, the rest of the site appears to have gone offline.



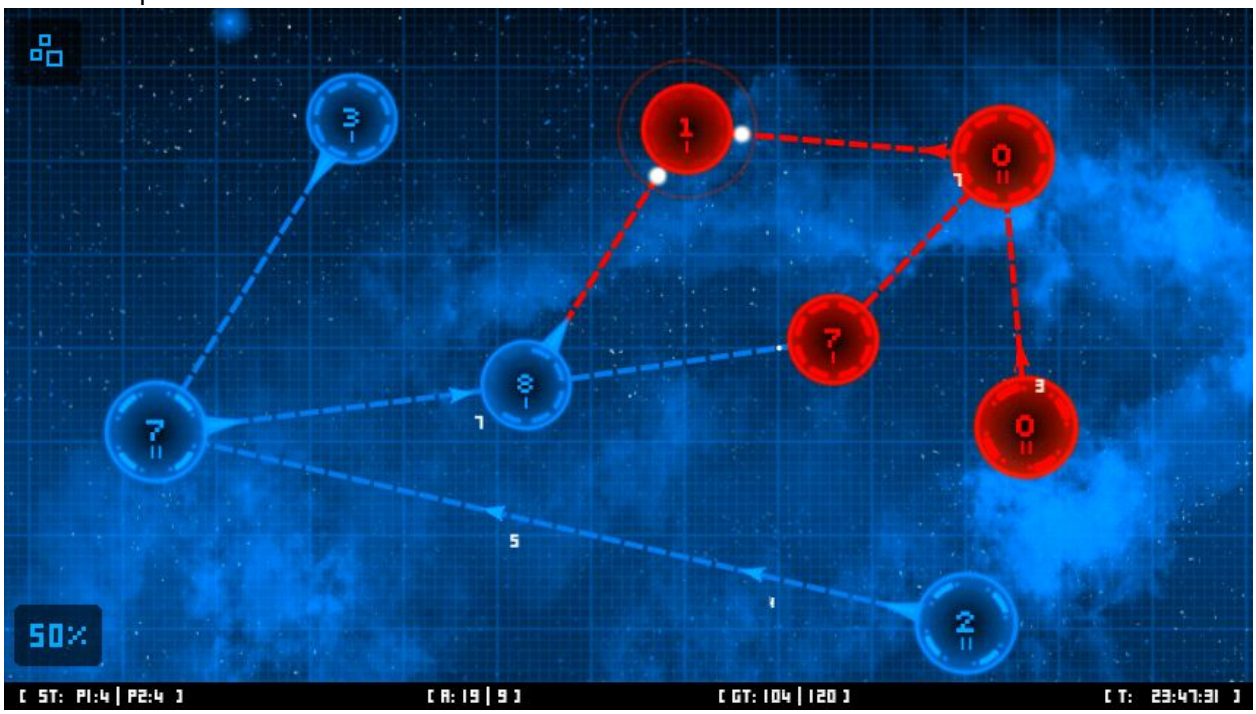
Auralux

Auralux (War Drum Studios 2010) is the first successful adaption of Galcon. Auralux is descripted as an “abstract, essentialized, and simplified real-time strategy game” which features small floating dots instead of large triangles (from Galcon) and focuses on maintaining a minimalistic graphics style while also moving in rhythem with ambient music, actions performed within the game create sounds which produce a melody, the game is created to both be a challenging and a relaxing, cerebral experience. The game has been downloaded on Android alone anywhere between 1 and 5 million times and has received extremely positive reviews across all platforms that it has been published to. The game’s developer Edward McNeill published a paper titled “A New Artificial Intelligence for Auralux” (Edward McNeill 2011) where he explores and develops a new more challenging AI for Auralux which he named “FlexibleAI”, he pitted several AIs against FlexibleAI using results to precisely optimize the AI. McNeills paper plays a vital role in the inspiration for my honours project and what I am aiming to create is essentially a more complicated version of his experiments using different AI techniques. Auralux recently had its sequel released named “Auralux: Constellations” available on iOS, Android and PC, this sequel explores many new gameplay mechanics such as adding bigger planets, obstacles and asteroid fields that destroy ships, while keeping the core rules the same.



Little Stars for Little Wars 2

Little Stars for Little Wars 2 (MKG 2012) is a game for Android mobile devices with very little documentation but again follows from the idea behind Galcon and the Google AI Challenge with a core gameplay change of instead of unlimited movement to any planets, planets are connected together and units may only travel down these connections. The game is far less popular than Auralux and Galcon claiming to have anywhere between 10,000 and 50,000 downloads on the Android marketplace. This is likely down to the game having a small paywall and the developer not promoting the game as much as Galcon or Auralux and only being available on one platform; however, its free demo version gathered between 100,000 and 500,000 downloads. This game features two AI, one much less smart than the other; although probably done deliberately. The game also features two different upgrade paths for planets, defensive and aggressive - each with their own pros and cons.



Programming

Classes

Below will list information current planned to be stored in classes in the game. It is very likely that more variables will be created but the information below unless the game design changes drastically due to limitations will be present in the end prototype. Also note that names are pseudo, it's highly likely names will be different in actual code.

Global

Type	Name	Description
enum	Faction	List of Factions
enum	PlanetType	List of Planet Types
int	SelectedPlanet	Stores the ID of the planet currently selected

Planet

Type	Name	Description
string	name	Name of Planet
int	level	Level of Planet
Global. Planet Type	type	Type of Planet
Global. Faction	owner	Faction that owns the Planet
Game Object	gameObject	The GameObject this planet belongs to

Faction

Type	Name	Description
string	name	Name of Faction
Color	color	Colour Belonging to Faction
int	planets	Number of Owned Planets
int	units_current	Number of Currently Alive Units
int	units_total	Total Number of Units Made

float	influence	Stores how influential the faction is (% based)
float	reputation	Stores the reputation of the faction (% based)
int	controller	What is controlling this faction, 0 = player, 1+ are the AIs to be developed for the game.

Modular Design

A great benefit of developing a game based on very simple core-gameplay mechanics is that additional features can be added in a modular fashion, meaning that if a game mechanic does not fit the style of game, or expands the scope this project too large they can be removed easily without affecting the game's other mechanics. For example, a feature that will most likely not be present in the game is Fog of War, this makes the scope of the project far too large as it currently stands; however, if implementation of this feature were to be a priority then implementation of it should prove easier than if the game was not modular. In addition to adding new features, the removal of unneeded or failed features will be easier and not corrupt the rest of the program adding a lot of unneeded work.

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