**Outline Proposal V1.01**

**for**

***Development of an android augmented reality application that explores the lunar surface***

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| **Date** | 22/09/2020 |
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## Abstract

My final year project that I am proposing is an android augmented reality app that allows the user to experience what it is like to be on the lunar surface, highlighting features like Apollo landings, famous craters and drones landings. The user chooses a point on the AR moon and will be able to visually see what the surface of the Moon would be in their specific location. This project should be entertaining while being able to have an educational benefit giving the user an insight into what it would like to stand on the surface on the Moon.

## Project Description

### Part A

* The areas that I will based my literature review will be on :
  + Detail understanding of the Lunar surface
    - Map of the surface: Names of location
    - Important places of interest: All Apollo moon landings, drones,
  + 3D modelling
    - Moon: globe to be presented to the user
    - Topography
    - Landmarks
    - Be able to interact with the model, showing markers
    - Should I use a static or 3D Earth(globe)
    - How do I create a 3D model
  + Implementation of android applications
    - Running on an android phone - OnePlus 7pro will be testing phone
    - What the best IDE is: Unity/ Android studio and why
  + Augmented reality
    - What is the best AR API to use: ARCore/Vuforia/ARToolkit
      * marker-based or location-based.
    - GPS support (geolocation)
    - SLAM support (Simultaneous Localization and Mapping)
    - Spatial awareness
    - Floor mapping
  + Create use cases to aid the creation of classes and libraries
  + Document valuable resources
* The technologies I will be utilizing will be:
  + Java/Kotlin
  + Android Studio/Unity- Android development
  + ARCore/ Vuforia - Augemented reality
  + Firebase – Google database
  + Blender – 3d models
  + Github
  + Git
  + AWS
  + MySQL + MySQL Workbench
  + Text-to-speech
* The rationale for me to undertake this project :
  + I have not developed any android app nor with the AR(augmented reality) feature build in.
  + Astronomy and technology are two interests that I have and would love to be able to intregrate them together for this project
  + I have not found an application that offers the same representation that I am offering
* What applications, websites are currently available that offer something similar
  + Making sure that this project will be unique`
* I will be utilizing resources made public by NASA, They can provide me with historic facts as well as images and topography of the lunar surface.

### Part B

* I plan on having weekly meetings with my supervisor giving an outline of the status of the project. We will talk about what I have currently done and what I will do in the coming week. I aim to use this time professionally and effectively as the project lifecycle is not long. I aim to use the knowledge that I have gained from my group project as well as my internship to be able to tackle this development to the best of my ability. There will be many challenges on the way but if I continue to stay focused and contribute valid work this project can be done.
* My plan for the development stage is to have ready a list of requirements and use cases. From the documentation, I should be able to code so I need to have strong documentation in place: UML, analysis and design class diagrams, use cases, sequence, and flowgraphs.
* Once I have the code build out I will need to clean the code up and make sure every function is commented and follows the SOLID principles that I learned in the third year. I am to have an early prototype ready so I can do some user testing and to receive feedback, abiding with the rules of agile development.
* Android app using Augemented reality.
* Stand alone application but will be link with a database/server pulling data. (images, facts, text, 3d models)
* I plan on integrating my anroid app with a sql database either locally on the device or online
* Open app -> scan for the floor -> place 3d moon -> show popular landmarks -> User clicks on the moon on a landmark -> shows facts, images, visualization of the lunar surface will be an open
* Requirements are from ;
  + Writing use cases + scenarios
  + Defining conditions of satisfaction
  + Creating workflow diagrams
  + The use of wireframes and visual designs
    - Show the layout and design of the application
    - Show the style and placement of erros and notifications
    - Annote any conditional or dynamic elements of the UI
  + Defining nonfunctional requirements
    - Security protocols
    - Backup and redundancy systems
    - Expanding future functionality
  + Creating test tables and test scenarios
  + brainstorming
  + flowchart
  + analysis and design class diagrams
  + establish project goals and objectives
  + document every requirements elicitation activity
  + talk with users
  + talking notes from every supervisor meeting
  + agknowlege that I cant be 100%
* The data would be:
  + 3d model instance with points of interest on it
  + Histortical facts
  + local or online database : Firebase
* Project would be a simulation of the moon but will have factural knowledge displayed to the user.
* The software approach that I will be doing will be agile spiral approach. This will allow me to be able to, review, design, develop and test (repeat).
* I plan on living SCRUM lifestyle the best that I can by :
  + Doing my best with what I have
  + Permanent feedback
  + Clearly defined short- term goals
  + Sprints
  + Self reporting on daily work progress
* Software:
  + Android IDE platform
  + Augmented Reality API
  + 3D modelling for objects
  + Database
  + GitHub
  + Pipeline from Github to Server
* Hardware:
  + Android phone
  + HoloLens (optional)
* Here is a high-level list of potential areas of interest.
  + Requirements
    - What are the functional and non-functional requirements
    - What are the limitations
    - What can the user do
    - What can the user see
    - How can you create a map of the unknown surface
    - Any technical restrictions
    - Who would be the target audience
    - When would it be release
    - How to move the character
    - How to scale the Moon
  + Documentation
    - Class diagram/ Design diagram
    - Sequence diagram
    - Flowchart
    - UML diagram
    - Database
    - Prototyping
    - A quick project to test if it is working
  + Testing
    - Functional testing
    - Code review
    - Unit testing
    - Single user performance testing
    - Structure testing
  + Development
    - Successful build and release of the app
    - Further Testing
    - Testing the app on the phone
  + Implementation
    - Putting this app on an android phone.
  + Demonstration
    - Showing the final project to L.I.T