UNIVERSITY OF LIVERPOOL

School of Engineering

EG-PDM-Project

ENGG660

Handout

CONCEPTUALISATION DESIGN AND DEVELOPMENT OF A MOBILE VR SIMULATOR BASE

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INTRODUCTION:

Racing/ driving games are one of the most played categories of games and with increase in sophistication of programming, games can emulate real world driving experiences. To support the virtual experiences several hardware is developed to make the simulation more realistic. One of them is the cockpit that emulates the sitting position in a racing car. As the use of cockpits are becoming more and more common in VR Racing, it opens the market for products that can improve the cockpit experience

A VR simulator base is a mobile platform that can support a VR simulator specifically driving simulators like the Formula Playseat. The platform is designed with standard fitment for playseat users around the globe, who want to be able move their simulators readily from one place to another.

Product Description:

The Product is a type of accessary for current playseat users that can easily support not just playseat but most Cockpits. The product is essential for Playseat users as the cockpit in playseat is not very wide and has complete metal body this leads to few major concerns.

Problems-

- The narrow body is at high risk to topple by the driver's unbalanced movement.
- If the metal body is left directly on floor this might cause damage to both the cockpit and the floor underneath.
- Most Playseat platforms are sturdy, but it is hard to move them.
- None of the playseat base are modular hence provide very few functions.

Solutions-

- Design a base that can prevent the frame from toppling by increasing the surface area.
- The base will provide the frame with sturdiness while being able to be mobile.
- Necessary slots and mounts to make the base modular so it can provide more than basic functions.

Design Development:

It is a journey that consists of multiple steps with each step having its significance that contributes to development of the final product.

Journey so far:

Product Feasibility:

In this stage necessary research is done to properly identify and define the product that is to be made. It involves various steps that give us a deeper understanding of customer needs and what would commercially viable.

Triggers:

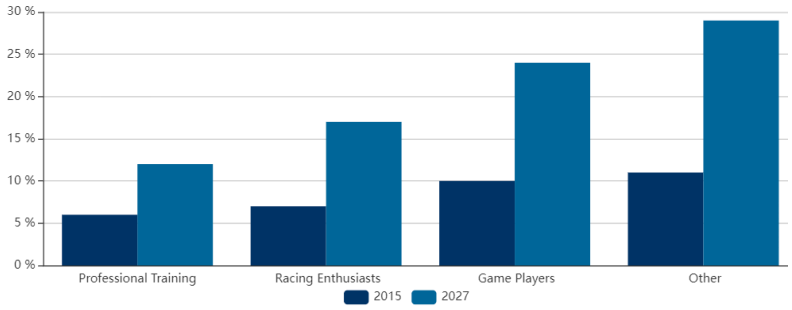
Major triggers for development of moving platform specifically meant for VR simulators are

- Advancements in technology: Advancements in VR technology has led to make the experience more affordable and better. As their popularity increases demand for hardware to support this experience is expected to raise.
- Market gap- There are no specifically manufactured Bases for VR simulators.
- Opportunity- Playseat is a major player in VR cockpits meant for Virtual racing hence providing a larger customer base.

Market Research:

The gaming simulator market size was valued at $4.04 billion in 2020 and is forecasted to be $9.99 billion by the year 2027. The market share of driving sim is estimated to be about 70% which is $ 3.9 billion in 2022 with annual growth of 12.1% till 2027.

From the data on Sim wheel users market size of potential buyers is identified. SOM= £0.7- 1.2 million if product is prices at £100-150.



Competitor Analysis:

There is a gap in availability of specific platforms for playseat in market. The most used product commercially is a custom-built flight case with Playseat branding.

Other alternatives include plastic or wooden stands. But most of them lack mobility.

Identify Barriers:

- DIY alternatives are cheaper than dedicated product.
- Residential users might not require mobility due to their current using habit.
- If priced too low might not attract existing playseat users and if priced too heigh potential playseat users might not buy it.

Design Specification:

In this stage Insight from market research and analysis is used to decide on features of the product and also specifying requirements quantitatively so it can be used as an guideline for concept development.

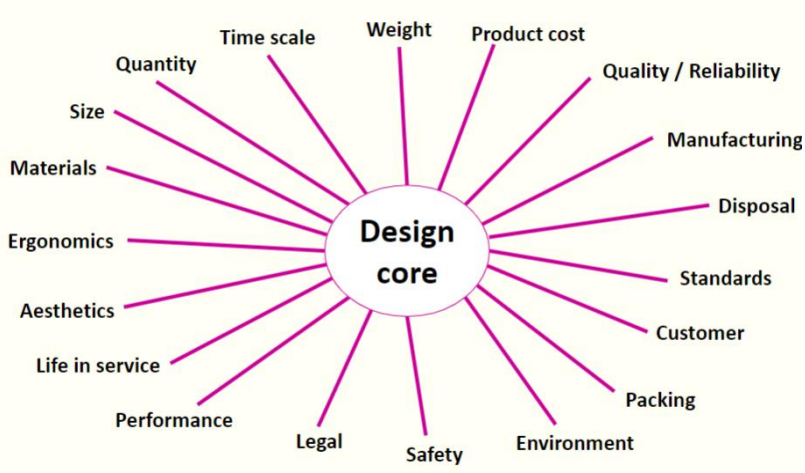
Customer requirements:

- No scratch or damage to the floor
- Fit the gaming Ambience
- Easy to move
- Hight adjustable or of 30 cm height,
- Sturdy while in use
- Able to move through standard doorways
- Easy to manoeuvre
- Able to stand small impacts with walls
- Modularity to increase functionality
- Customizable appearance
- Enough space for branding.

Performance specifications:

Most important PS

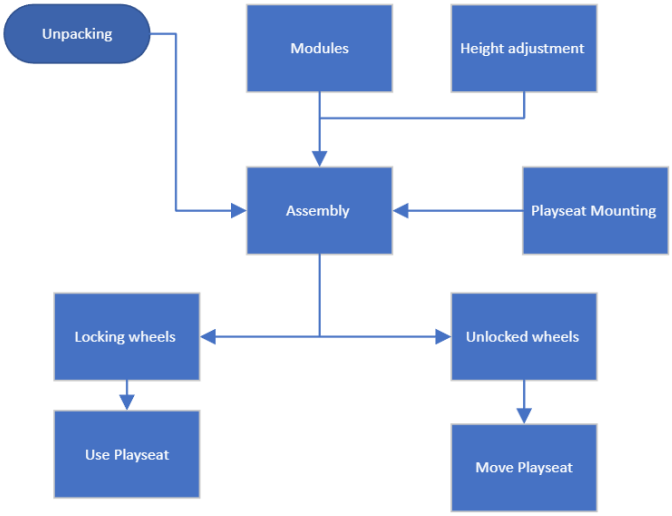
- Functionality- Mass, Utilisation, Interchangeable, Safeguard, Target Product cost, Effectiveness and efficiency, Capacity, Size.
- Materials- Strength, Recycling & potential.
- Dependability- Modification, Level of service.
- Environment- Mass, Relative humidity, Temperature, Erosion, Corrosion, Access.
- Ergonomics and Aesthetics- Illumination. Colour, Size & shape, Transportability, Visual Impact.
- Interface- Configuration, Interchangeability, Use & Tolerance.
- Cost And Timing- Unit cost, Marketing and sales factors, Customer support.
- Training And safety- Education, Accessibility, cultural, Documentation.



Conceptual Design:

In this phase various concepts will be developed that are able to meet criteria for the mobile base design these include mobility, sturdiness, height suitable for monitor use, mounting with most VR simulators but highly compatible with the Playseat.

Functional Structure:



Functional Solutions:

- Mounting- Screws, Magnetic mount, Clamping with mounts, Special joints.
- Height – Fixed height, Rack and pinion, Screw lift, Stacking, Crossbar mechanism
- Wheel locking- Gear locking, Caster locking, Off centre locking
- Mobility type- small wheels, Hub less wheels, Belt tracks, Rubber ball.
- Configuration-One large base, Two Bases for each end, Four bases for each corner.
- Materials- HDPE, Aluminium, Stainless steel, Rubber, PP (transparent)
- Eco friendly options- Recycled aluminium, recycled HDPE, Recycles shoe soles for griping, wood for main body.
- Modules- Keyboard holder, VR headset Holder, Motion simulator, Game lighting, Side table.

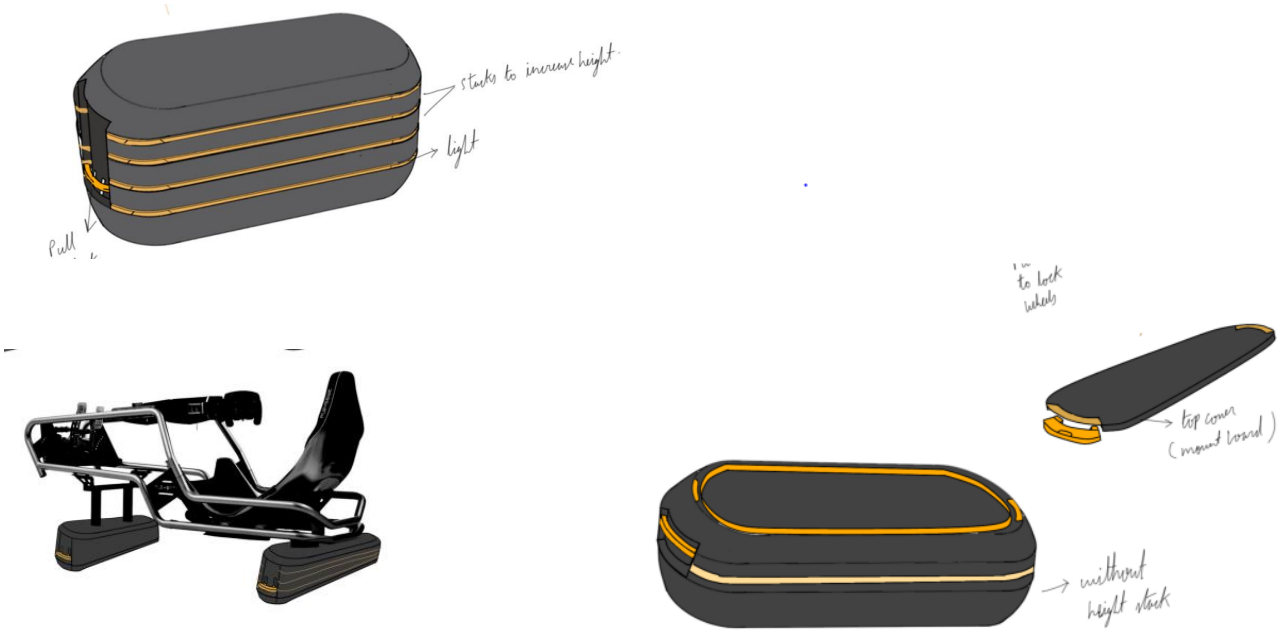
Concept Variant Analysis

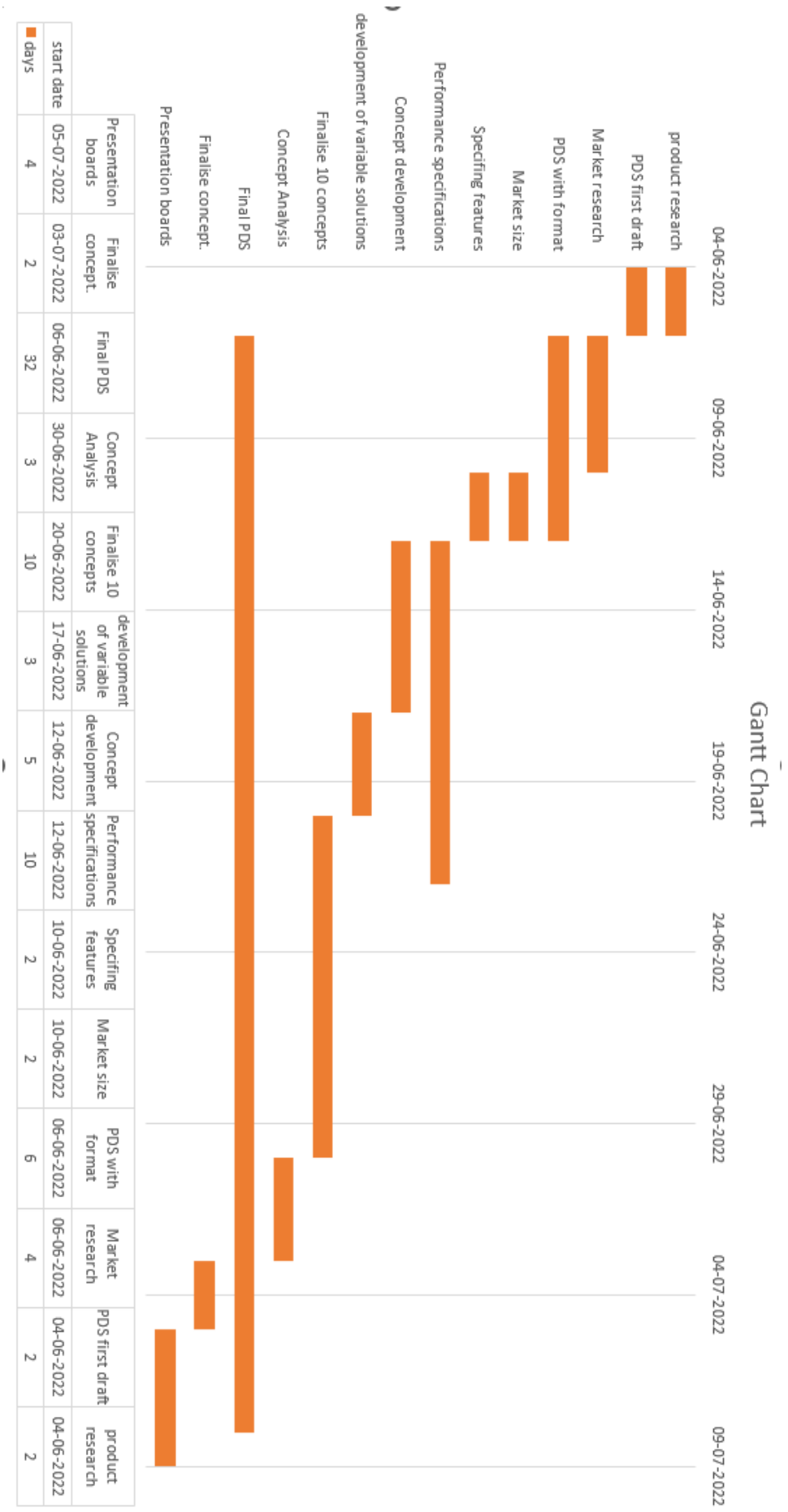
It is the analysis of all the concepts developed in the conceptualization phase using functional solutions. The concepts are to be rated based on set criteria's and ranked to find the top 3 of which most feasible one is selected to go further into detailed and embodiment design phase.
Criteria's-
Stability, Height adjustment, Reliable mobility, Reliable locking, Easy manufacturing, Easy assembly, Modularity, Branding visibility.

Sr No.	Parameters	Cv1	Cv2	Cv3	Cv4	Cv5	Cv6	Cv7	Cv8	Cv9	Cv10
1	Stability	1	1	1	0	1	1	1	1	1	0
2	Reliable mobility	1	1	1	1	1	1	1	1	0	1
3	Reliable locking	1	1	1	1	1	1	0	1	0	1
4	Easy Manufacturing	0	0	1	0	1	1	0	0	1	0
5	User Assembly	1	0	0	0	1	1	1	0	1	0
6	Modularity	1	0	1	1	0	0	0	1	1	1
7	Branding Visibility	1	0	1	0	0	0	0	0	0	0
8	Height	1	1	1	0	0	0	1	1	1	1
9	Portability	1	1	0	0	1	1	1	0	1	0
Total		8	5	7	3	6	6	5	5	6	4
Rank		1	6	2	10	3	4	7	8	5	9

Value	Scheme	According to analysis the concept with highest ranks are short listed for further design stage.
0	Bad	
1	Good	

Final Design: CV1





	Presentation boards	Finalise concept.	Final PDS	Concept Analysis	Finalise 10 concepts	development of variable solutions	Concept development	Performance specifications	Specifing features	Market size	PDS with format	Market research	PDS first draft	product research
start date	05-07-2022	03-07-2022	06-06-2022	30-06-2022	20-06-2022	17-06-2022	12-06-2022	12-06-2022	10-06-2022	10-06-2022	06-06-2022	06-06-2022	04-06-2022	04-06-2022
days	4	2	32	3	10	3	5	10	2	2	6	4	2	2