Realtime AR Based Tool for Digital Media Production

SLIIT
FACULTY OF COMPUTING

Team Members

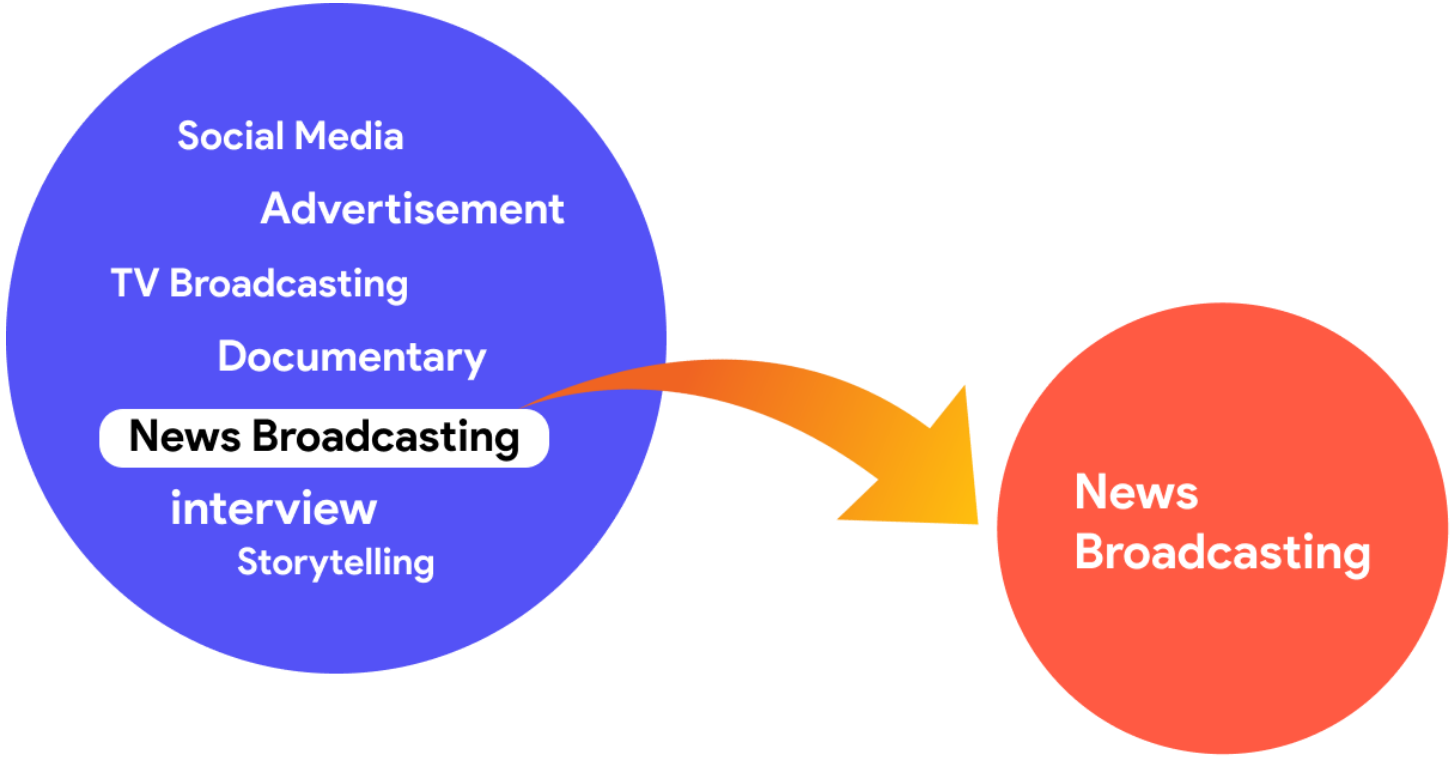
Supervisor: Dr. Shyam Mehraaj

Co Supervisor: Mr. Thusithanjana Thilakarathne

Student Name	Student ID
Wanigasekara M.P.W.P.A (Leader)	IT18108514
R.M Bawantha Thilan	IT18175080
A.Vihanga Nivarthana	IT18091380
Gankanda G.M.J.U.	IT18063738

Introduction

- What is digital media?
- Why we focus on television news broadcasts?



Media Evaluation

https://www.bbc.com/news/world-south-asia-12000330

https://www.albany.edu/newscenter/news/university-albany-week-airs-wamcs-academic-minute

https://www.sait.ca/programs-and-courses/diplomas/radio-television-and-broadcast-news

https://www.vizrt.com/-/media/Images/Segments/Broadcasting/Sky-Italy-virtual-window.ashx

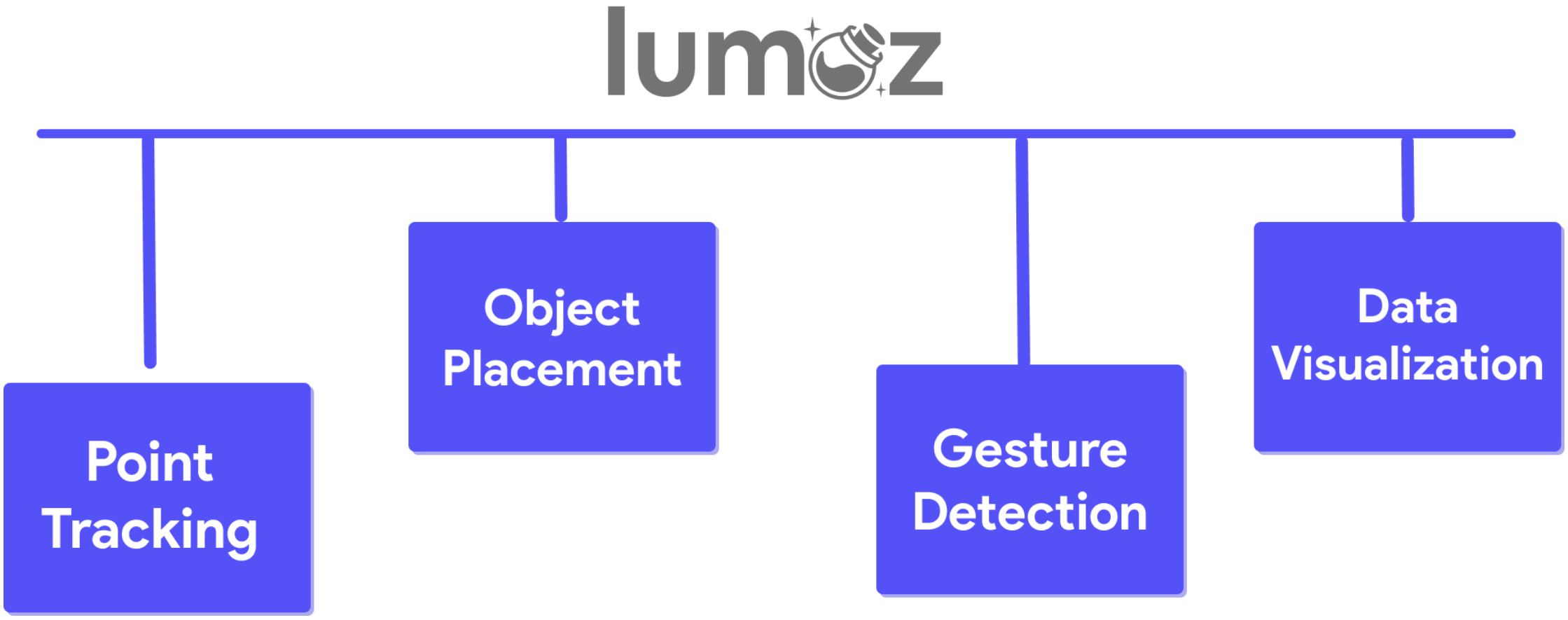
Research Problem

- Large production time.
- Large production cost
- High employee training cost and time.
- High cost in outsourcing to 3rd Party graphic companies.

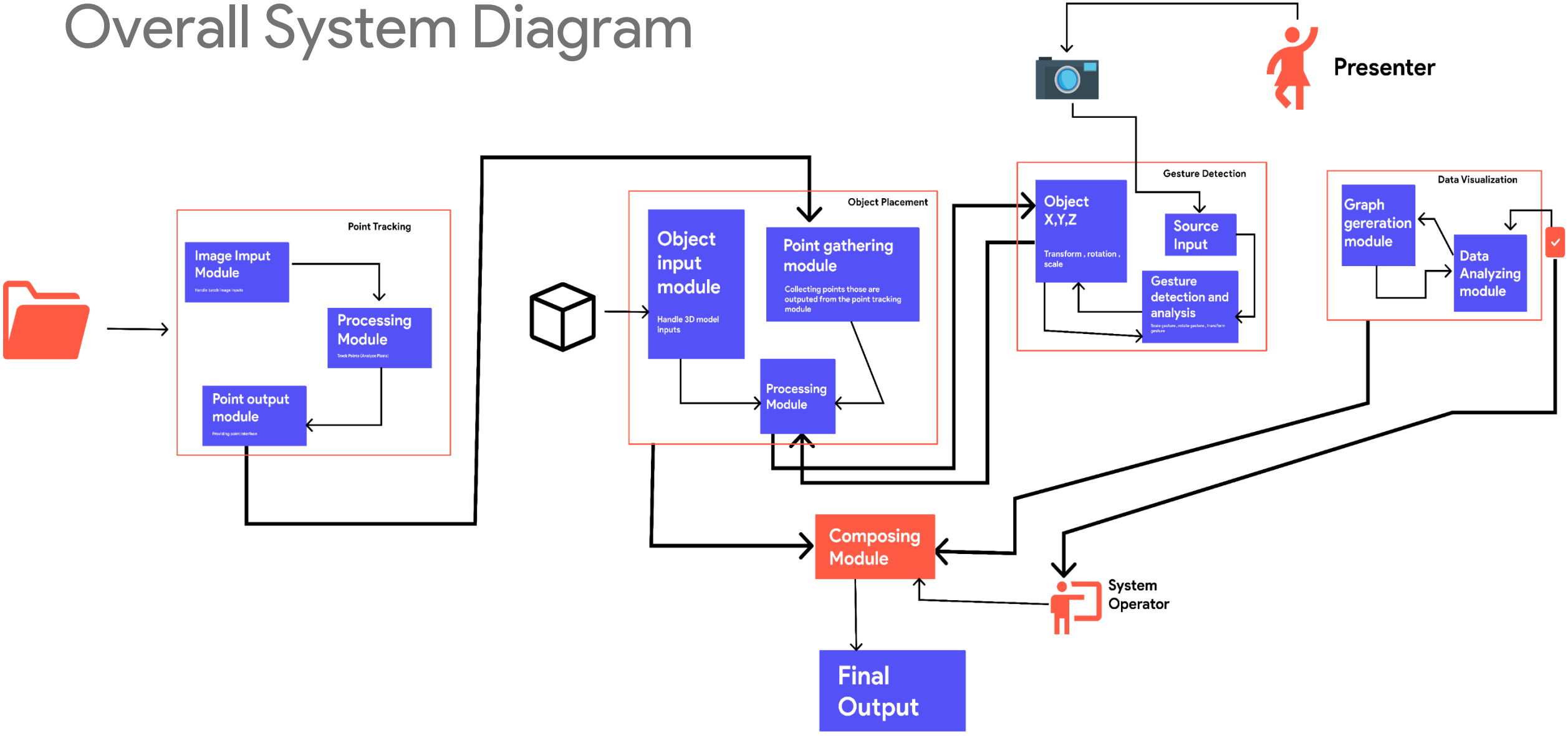
Main Objectives

To crate an easier way to add creative details for a news broadcast withing a less amount of time and low budget.

Sub Objectives



Overall System Diagram



Point Tracking

A.Vihanga Nivarthana

IT18091380

Introduction

Background
Research Gap
Research Problem
Specific

Background

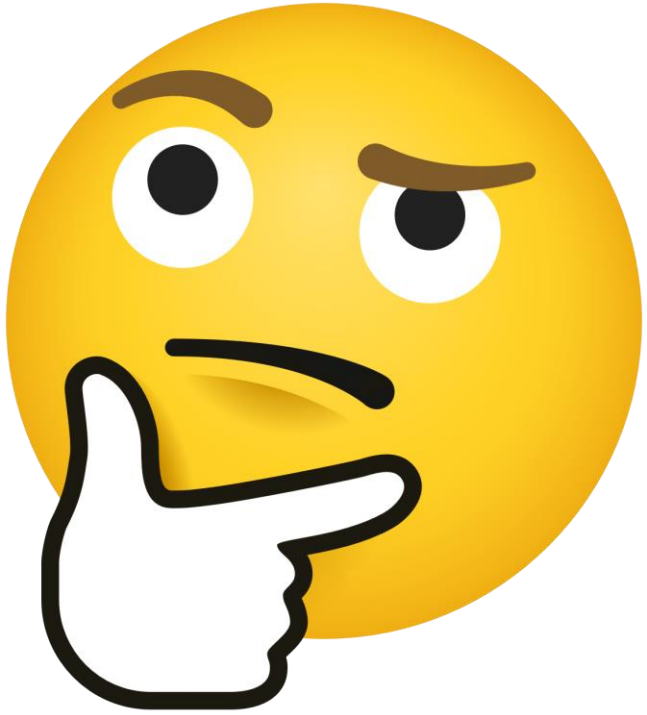
- What is Point tracking ?
- How point tracking works ?
- How does point tracking relate to augmented reality?

Research Gap

Features	After Effects	Mocha Pro	Nuke	Kinect Sensor	Anipose	Line-mod	Lumoz
Marker Base	Yes	Yes	Yes	Yes	No	No	Yes
Stable Point Tracking	Yes	Yes	Yes	No	Yes	Yes	Yes
3D Tracking	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Live Streaming Support	No	No	No	Yes	Yes	Yes	Yes

Research Problem

- How to create a point tracking system that can be used by any non-technical person?
- How to provide a low budget system for live point tracking ?



Specific and Sub Objectives

- Main objective

Develop a system that can deploy point tracking live broadcasts at minimal cost that can be easily used with minimal technical knowledge.

- Sub Objectives
  - Providing a Simple user interface to the user
  - Providing a Realtime tracking feature

Methodology

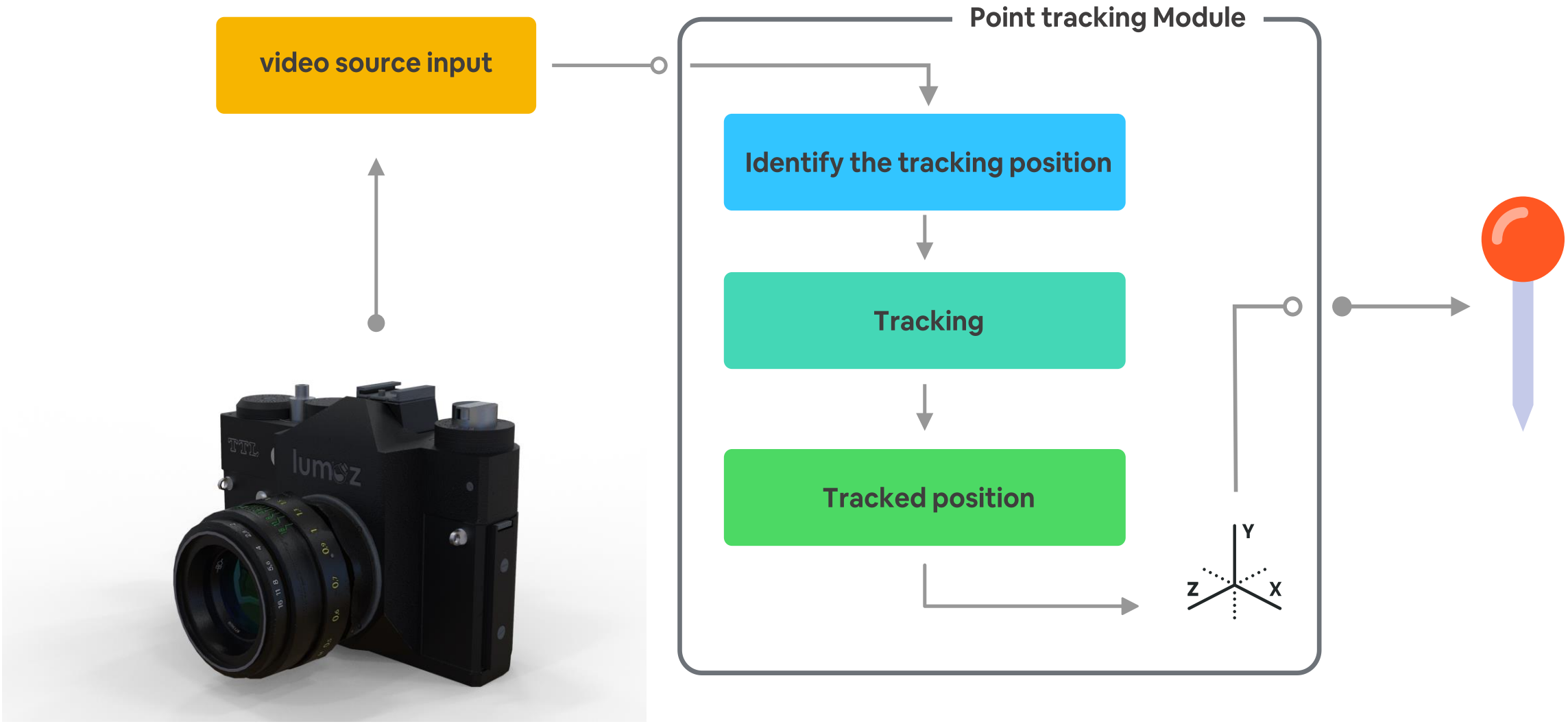
System Diagram

Technologies

Requirements

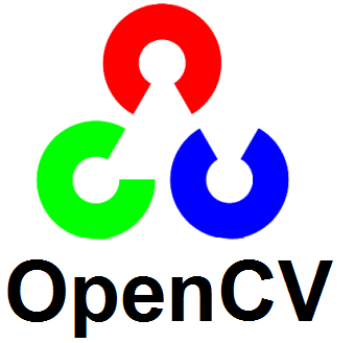
WBS

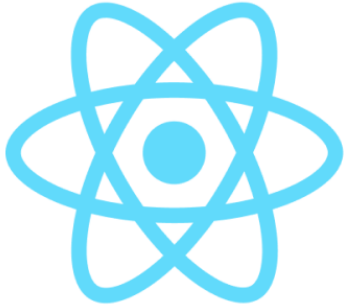
System Diagram



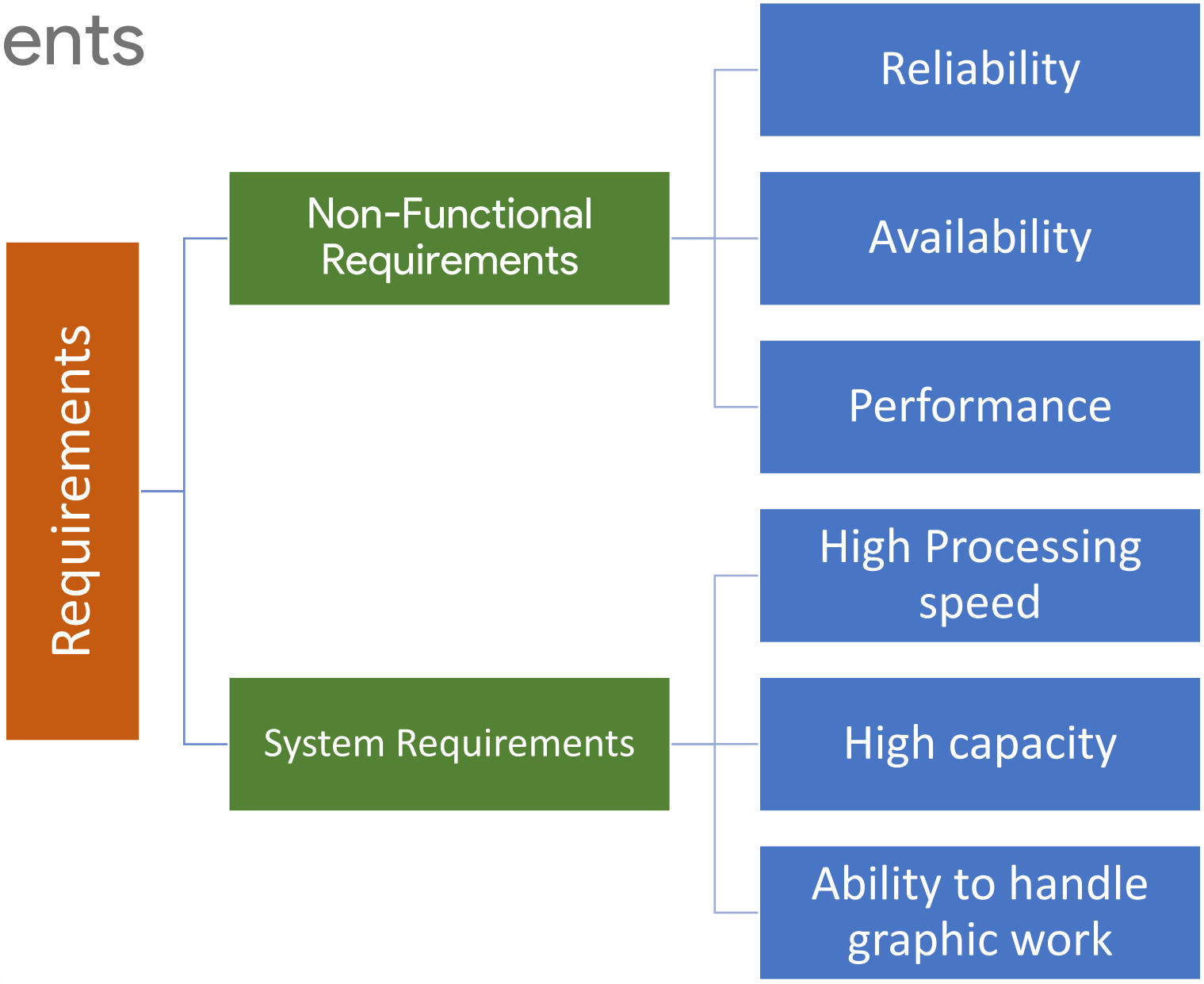
Technologies

- OpenCV
- Python
- WebRTC
- Electron

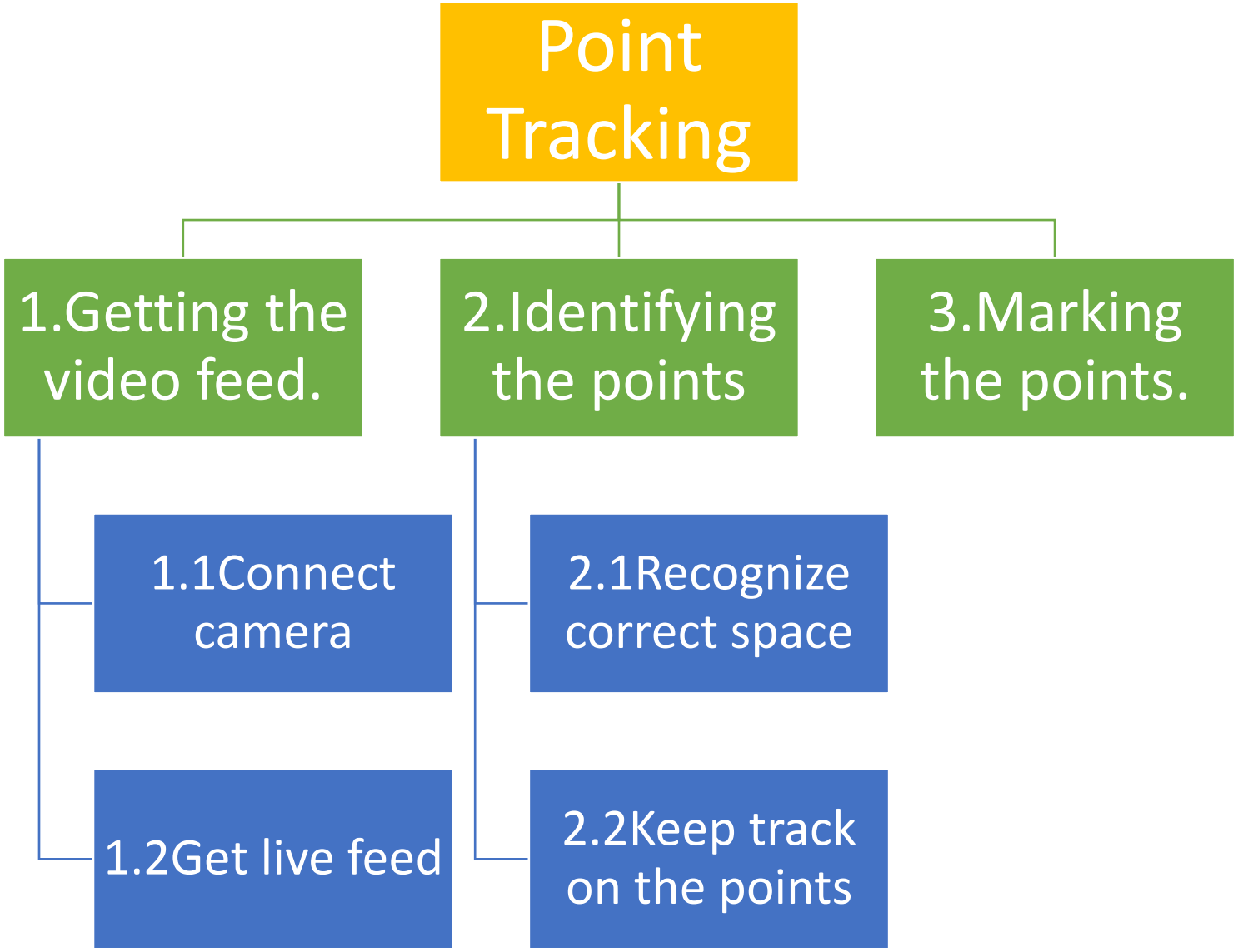




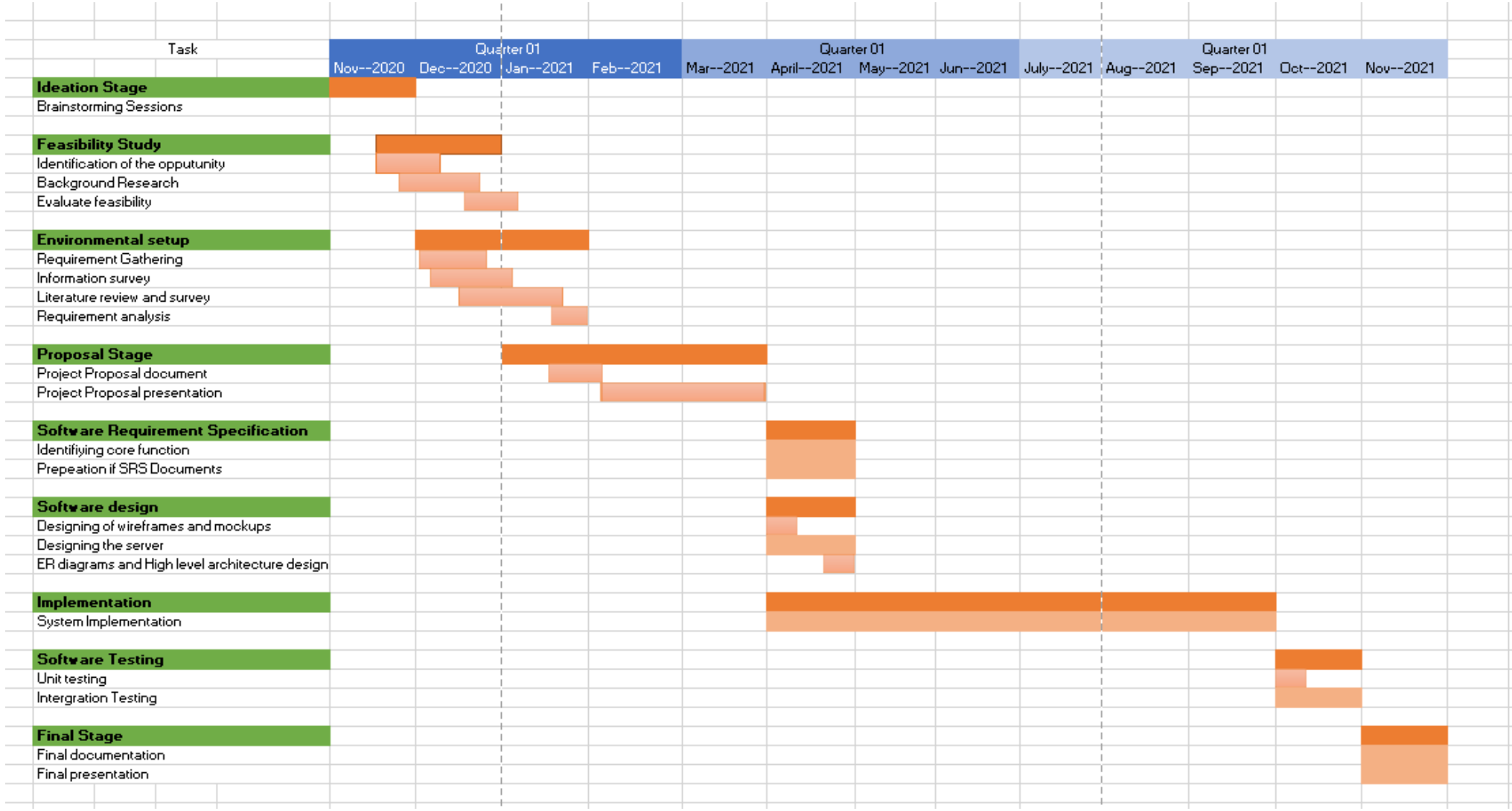
Requirements



WBS


Point Tracking
1.Getting the video feed.
2.Identifying the points
3.Marking the points.
1.1Connect camera
1.2Get live feed
2.1Recognize correct space
2.2Keep track on the points

Gannt Chart


Task
Quarter 01
Nov--2020
Dec--2020
Jan--2021
Feb--2021
Quarter 01
Mar--2021
April--2021
May--2021
Jun--2021
Quarter 01
July--2021
Aug--2021
Sep--2021
Oct--2021
Nov--2021
Ideation Stage
Brainstorming Sessions
Feasibility Study
Identification of the opputunity
Background Research
Evaluate feasibility
Environmental setup
Requirement Gathering
Information survey
Literature review and survey
Requirement analysis
Proposal Stage
Project Proposal document
Project Proposal presentation
Software Requirement Specification
Identifiying core function
Prepeation if SRS Documents
Software design
Designing of wireframes and mockups
Designing the server
ER diagrams and High level architecture design
Implementation
System Implementation
Software Testing
Unit testing
Intergration Testing
Final Stage
Final documentation
Final presentation

References

[1]Ying Kin Yu, Kin Hong Wong and Ming Yuen Chang, "Merging artificial objects with marker-less video sequences based on the interacting multiple model method", IEEE Transactions on Multimedia, vol. 8, no. 3, pp. 521-528, 2006. Available: 10.1109/tmm.2006.870734 [Accessed 24 February 2021].

[2]Y. Genc, S. Riedel, F. Souvannavong, C. Akinlar and N. Navab, "Marker-less tracking for AR: a learning-based approach", Proceedings. International Symposium on Mixed and Augmented Reality. Available: 10.1109/ismar.2002.1115122 [Accessed 24 February 2021].

[3]Ramesh Jain and Koji Wakimoto, “Machine dynamic selection of one video camera/image of a scene from multiple video cameras/images of the scene in accordance with a particular perspective on the scene, an object in the scene, or an event in the scene,” 17-Mar-1998. [Accessed 24 February 2021].

[4] Bilesan, A., Owlia, M., Behzadipour, S., Ogawa, S., Tsujita, T., Komizunai, S. and Konno, A., 2021. Marker-based motion tracking using Microsoft Kinect.

[5] 2021. Markerless Tracking System for Augmented Reality in the Automotive Industry. [online] Available at: <https://sci-hub.se/https://www.sciencedirect.com/science/article/abs/pii/S0957417417302221> [Accessed 9 March 2021].

[6] P. Karashchuk et al., “Anipose: a toolkit for robust markerless 3D pose estimation,” bioRxiv, p. 2020.05.26.117325, 2020.

[7] Y. Wang, S. Zhang, S. Yang, W. He, X. Bai, and Y. Zeng, “A LINE-MOD-based markerless tracking approachfor AR applications,” Int. J. Adv. Manuf. Technol., vol. 89, no. 5–8, pp. 1699–1707, 2017.

Object Placement

R.M Bawantha Thilan

IT18175080

Introduction

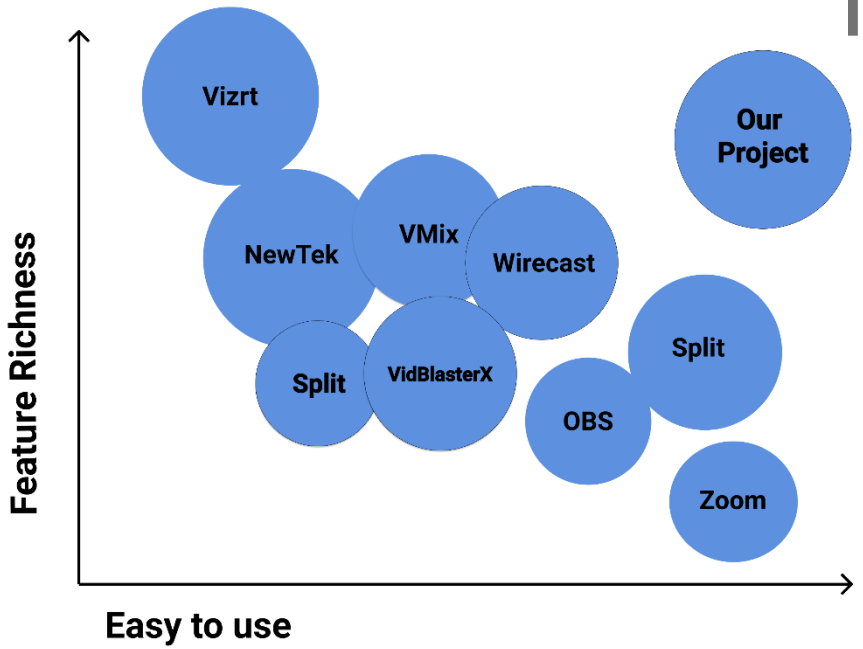
Background
Research Gap
Research Questions
Objectives

Background

- What is object placement.
- How can we improve news attractiveness
  using object placement?
- Problems in the current use
  of this technology.

Research Gap

Once the ‘Lumoz’ application is hosted on a live environment, it’s fruitful in changing discrepancies and malpractices in existing procedures, to a system that is user friendly, and budget system.



Features	ViMix	After Efects	OBS	Vizrt Engine	Our Product
Adding 3d object to video	yes	yes	yes	yes	yes
Adding 3d object to live video stream in realtime	yes	no	no	yes	yes
Prior training on the system is required	yes	yes	yes	yes	no
Spending higher budget	yes	yes	no	yes	no
Lowest latency	no	no	no	yes	yes
Simplify UI	No	No	No	No	Yes

Research Questions

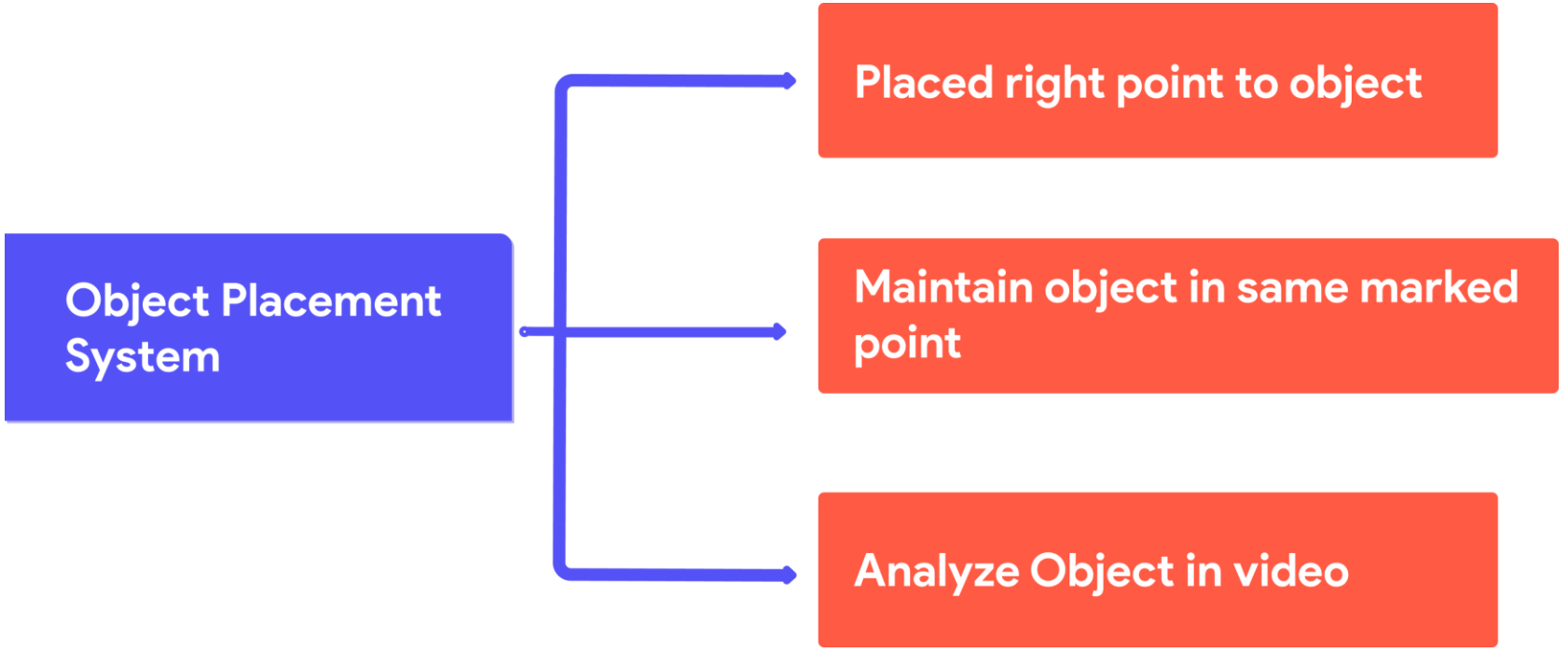
- Local channel news example.
- Production cost is high
- Day to day events can’t be used this technique.
- Having a good knowledge kind of software's

https://youtu.be/bmEKuHvCdmM?t=12

Objectives

- Main objective

show a three-dimensional object or graphical 3D object representing the news item in the

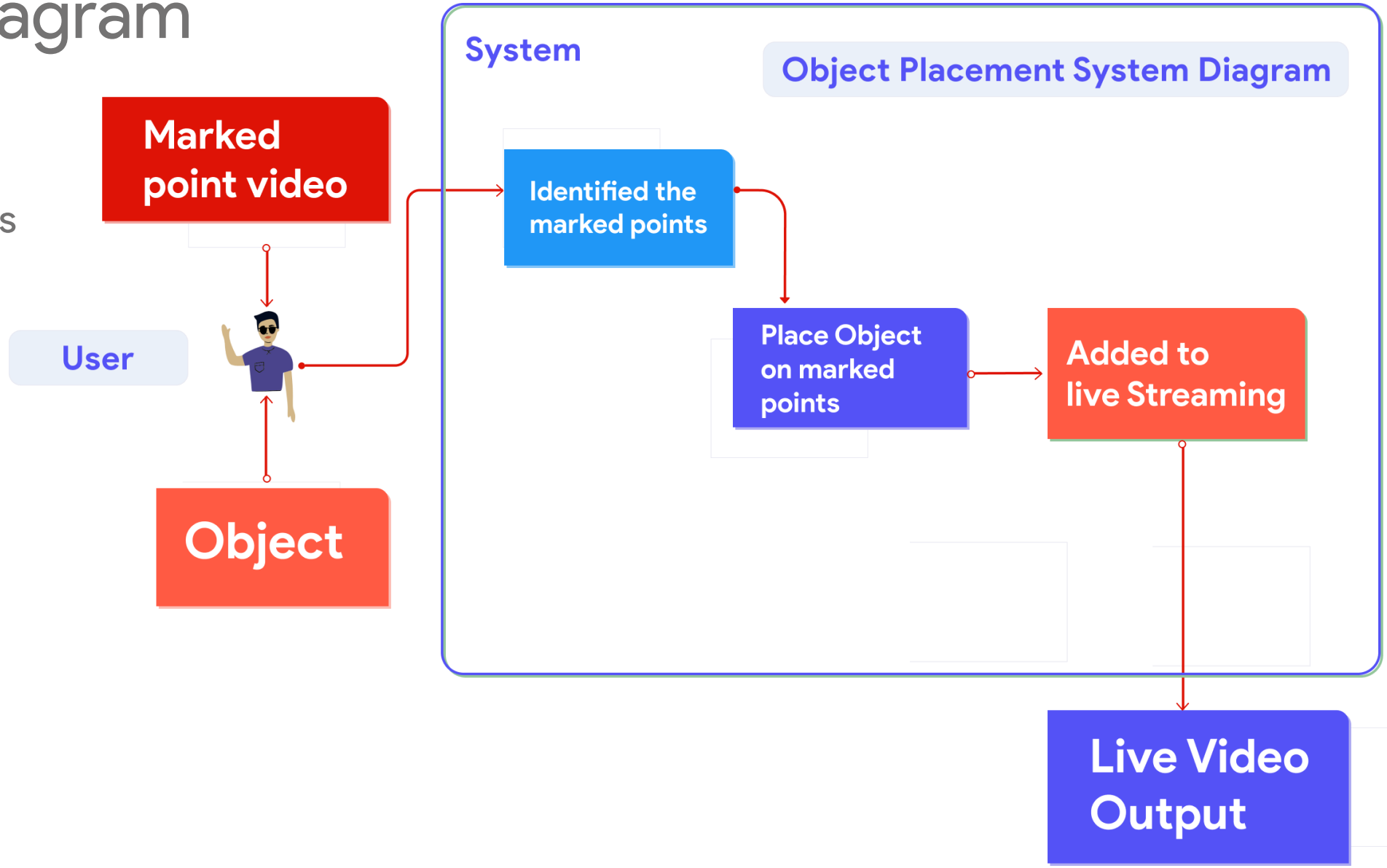


Methodology

System Diagram
Technologies , Techniques
Requirements
WBS

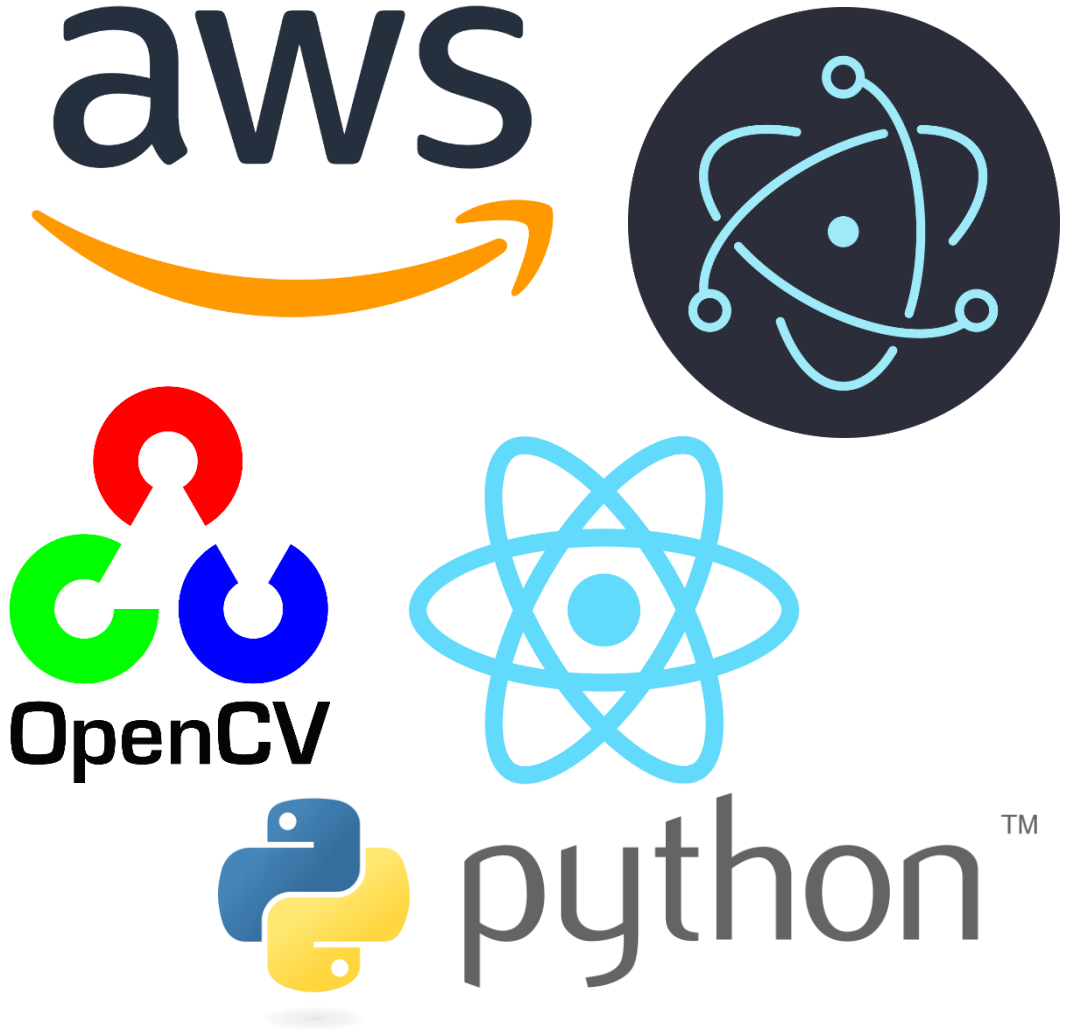
System Diagram

- User getting marks and objects

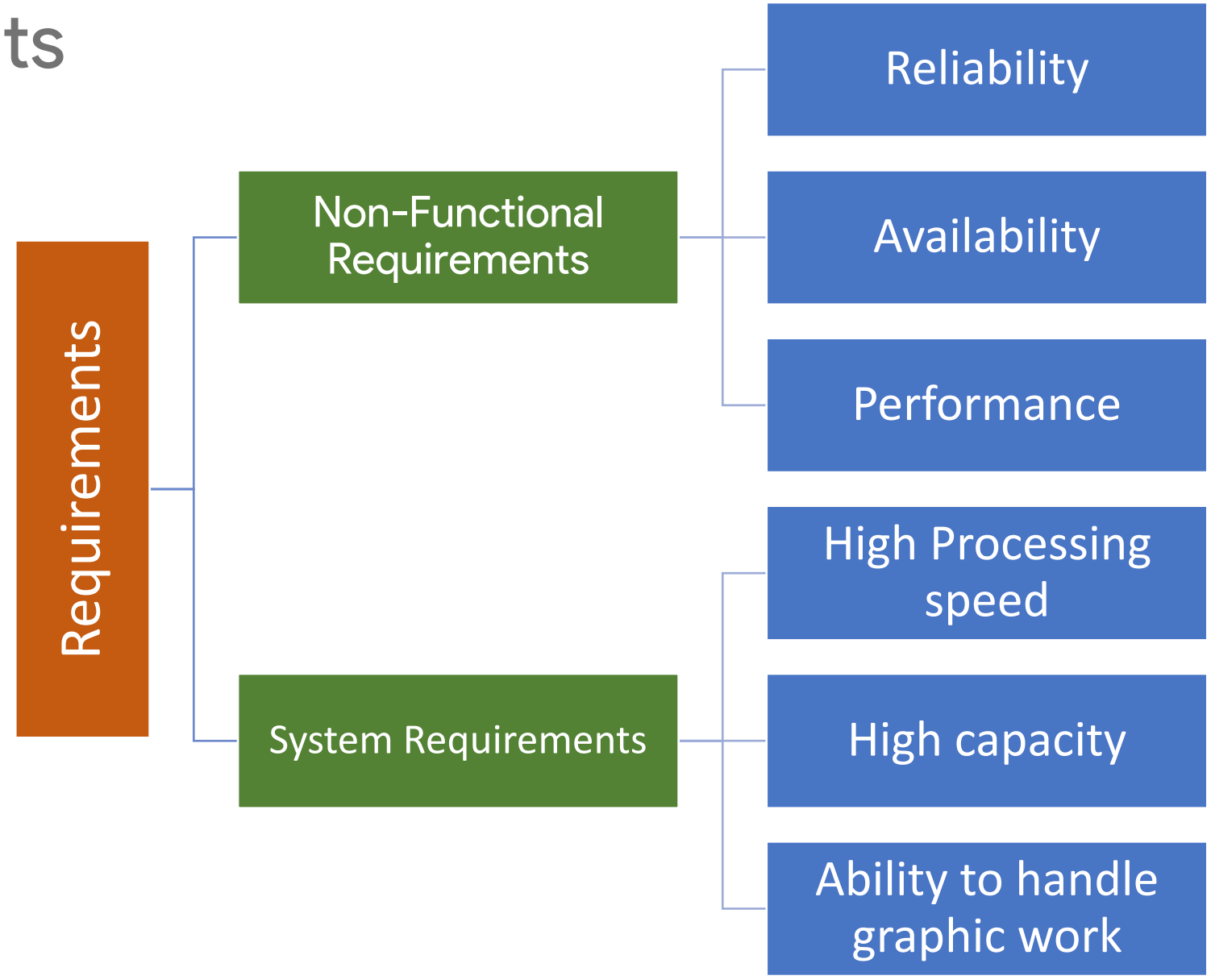


Technologies and Techniques

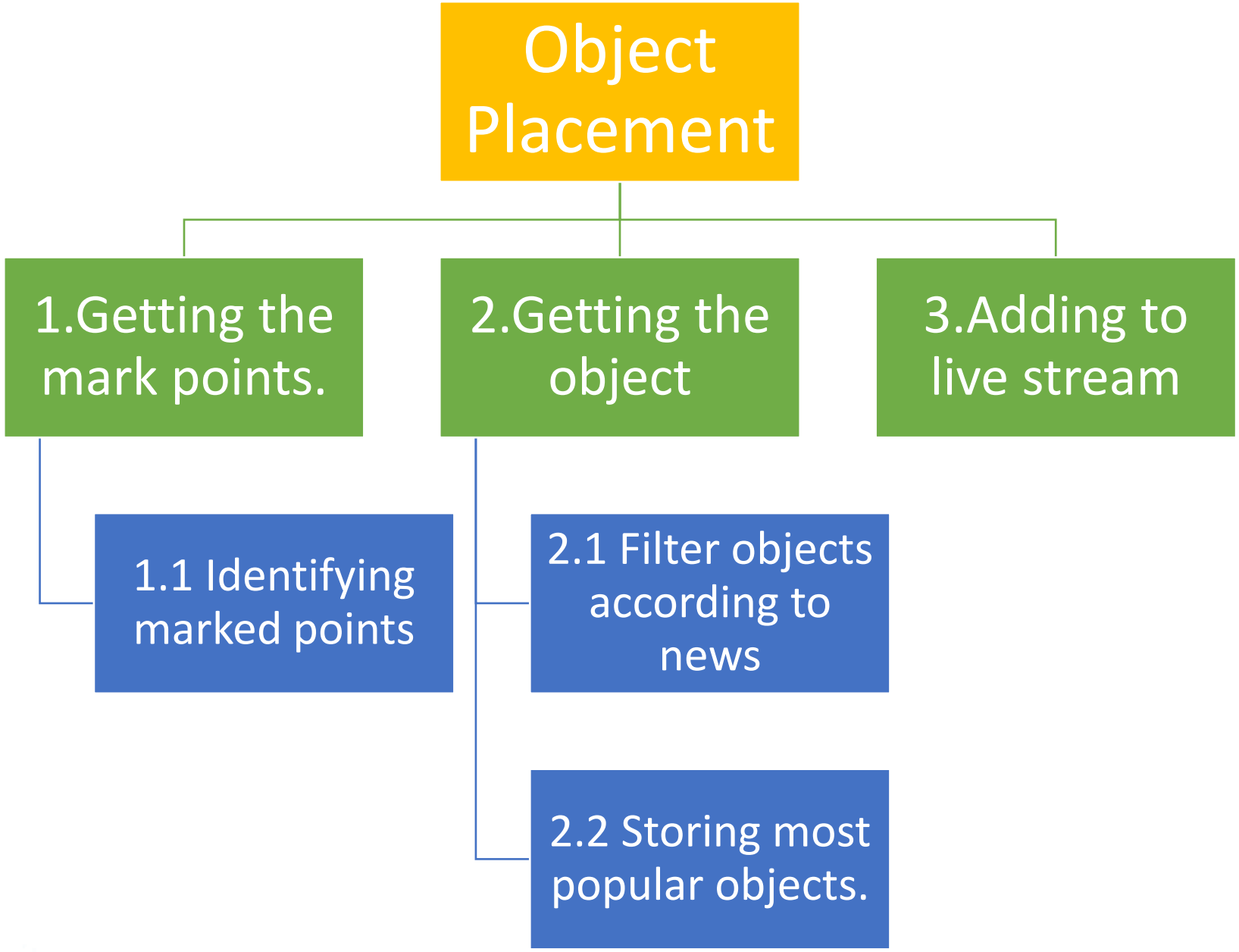
- We will be used in react, electron python and OpenCV
- Backend server hosted in AWS
- Analyze the current points
- Place in right point in video stream



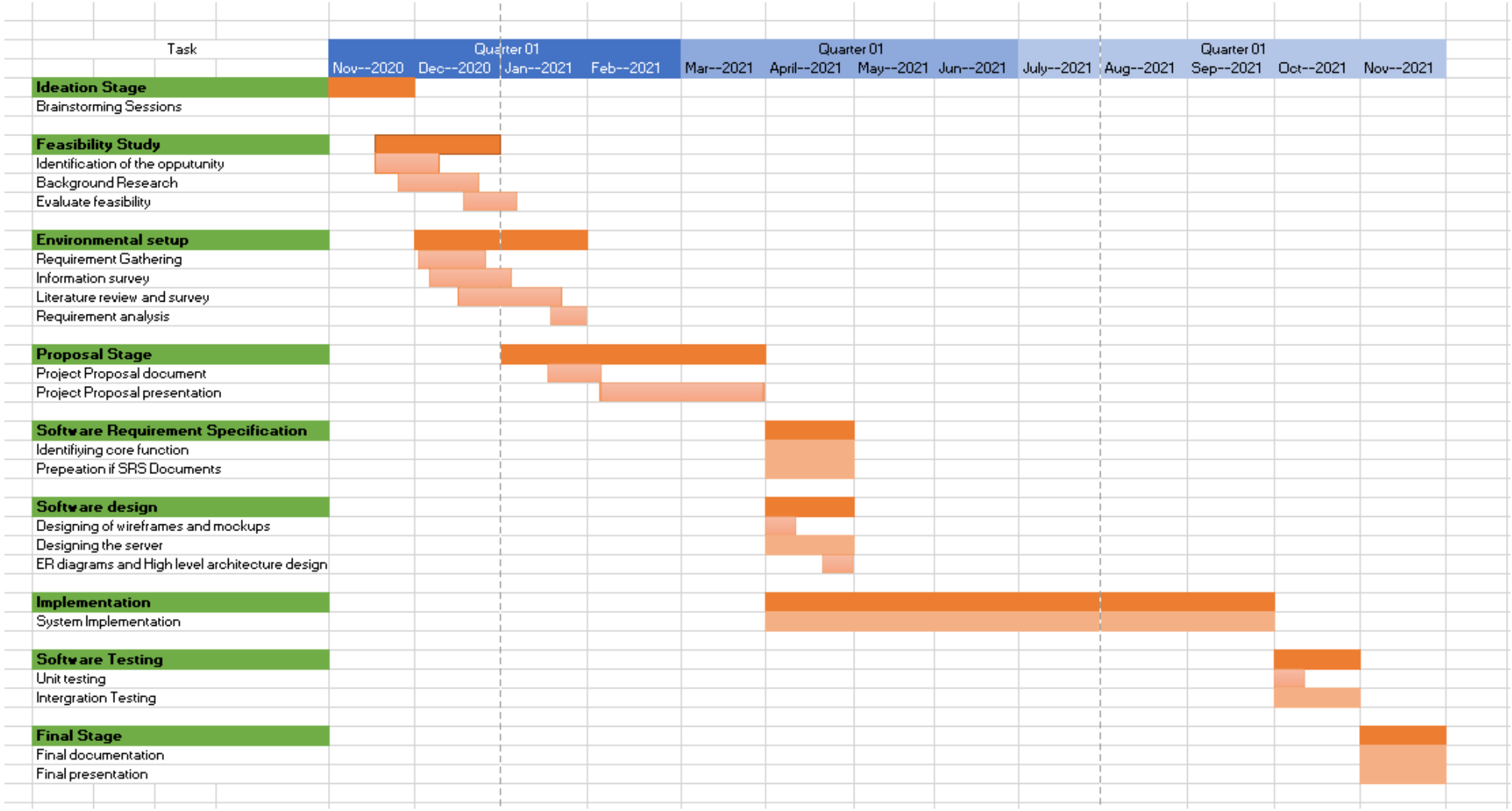
Requirements



WBS


Object Placement
1.Getting the mark points.
2.Getting the object
3.Adding to live stream
1.1 Identifying marked points
2.1 Filter objects according to news
2.2 Storing most popular objects.

Gantt Chart


Task
Quarter 01
Nov--2020
Dec--2020
Jan--2021
Feb--2021
Quarter 01
Mar--2021
April--2021
May--2021
Jun--2021
Quarter 01
July--2021
Aug--2021
Sep--2021
Oct--2021
Nov--2021
Ideation Stage
Brainstorming Sessions
Feasibility Study
Identification of the opputunity
Background Research
Evaluate feasibility
Environmental setup
Requirement Gathering
Information survey
Literature review and survey
Requirement analysis
Proposal Stage
Project Proposal document
Project Proposal presentation
Software Requirement Specification
Identifiying core function
Prepeation if SRS Documents
Software design
Designing of wireframes and mockups
Designing the server
ER diagrams and High level architecture design
Implementation
System Implementation
Software Testing
Unit testing
Intergration Testing
Final Stage
Final documentation
Final presentation

References

[1] Park, J., Sung, M. and Noh, S., 2021. *Virtual Object Placement in Video for Augmented Reality*.

[2] Druzhkov, P., Erukhimov, V., Zolotykh, N., Kozinov, E., Kustikova, V., Meerov, I. and Polovinkin, A., 2021. *New object detection features in the OpenCV library*.

[3] Cho, H., 2021. *Vizrt Engine-Based Virtual Reality Graphics Algorithm A Study on the Basic Practical Training Method*. [online] Koreascience.or.kr. Available at: <https://www.koreascience.or.kr/article/JAKO201925454133719.page> [Accessed 24 February 2021].

[4] Sri Lanka, N., 2020. *වට ප්‍රමාණය අනුව පොල් මිලදී ගන්න, පාරිභෝගික සමිති නියෝජිතයින් වෙළෙඳපොළට*. [video] Available at: < https://youtu.be/bmEKuHvCdmM?t=12 > [Accessed 22 January 2021].

[5] Dl.acm.org. 2021. *An online video placement policy based on bandwidth to space ratio (BSR) | Proceedings of the 1995 ACM SIGMOD international conference on Management of data*. [online] Available at: <https://dl.acm.org/doi/abs/10.1145/223784.223853> [Accessed 8 March 2021].

[6] Bacher, I., Javidnia, H., Dev, S., Agrahari, R., Hossari, M., Nicholson, M., Conran, C., Tang, J., Song, P., Corrigan, D. and Pitié, F., 2021. *An Advert Creation System for 3D Product Placements*. [online] arXiv.org. Available at: <https://arxiv.org/abs/2006.15131> [Accessed 8 March 2021].

Gesture Detection

Wanigasekara.M.P.W.P.A

IT18108514

Introduction

Background
Research Gap
Research Problem
Specific

Background

- How the presenter communicate with the audience?
- How to attract the audience to this frame?
  - Facial Expression
  - Body Language
  - Different Camera Angeles
  - Voice Balance
  - Animations
  - Images
  - Data Visualization
  - Augmented Reality

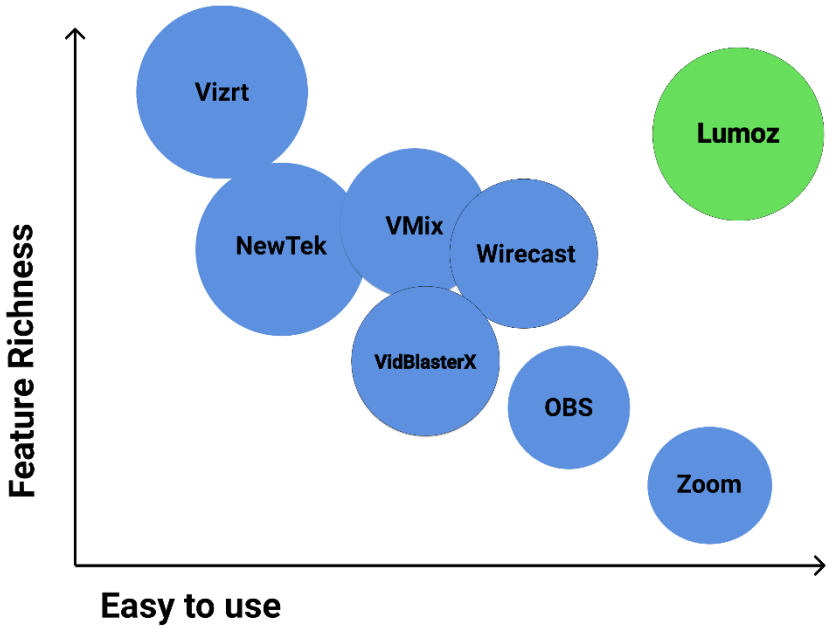
https://gifer.com/en/7qXN

Research Gap

Features	HGCARS	VECAR	EMG Gesture Recognition	In-Air Gesture Interaction	Lumoz
Real time gesture detection	Yes	Yes	Yes	Yes	Yes
Showing a preview for the object	Yes	Yes	No	Yes	Yes
Is there a live connection according to the presenter?	Yes	No	No	No	Yes
Can it real-time connect with 3D objects	No	Yes	Yes	No	Yes
Detecting movements (rotate, up , down, scaling) using gesture detection	Yes	No	Yes	Yes	Yes
Prior training giving to use the system	No	No	No	Yes	Yes

Research Gap

Features	VMix	NewTek	VidBlasterX	Zoom	Wirecast	OBS	Vizrt Engine	Lumoz
Adding 3D object to the video	No	No	Yes	No	Yes	Yes	Yes	Yes
Adding 3D object to live video stream in real-time	No	Yes	Yes	No	No	No	Yes	Yes
Prior training on the system is required	Yes	No	Yes	Yes	Yes	Yes	Yes	No
Spending higher budget	Yes	Yes	No	No	Yes	Yes	Yes	No
Lowest latency	No	Yes	No	Yes	No	No	Yes	Yes
Is there a live connection according to the presenter?	No	No	Yes	Yes	Yes	Yes	Yes	Yes
can it real-time connect with 3D objects	No	No	Yes	No	Yes	Yes	Yes	Yes



Product Comparison

Research Problem

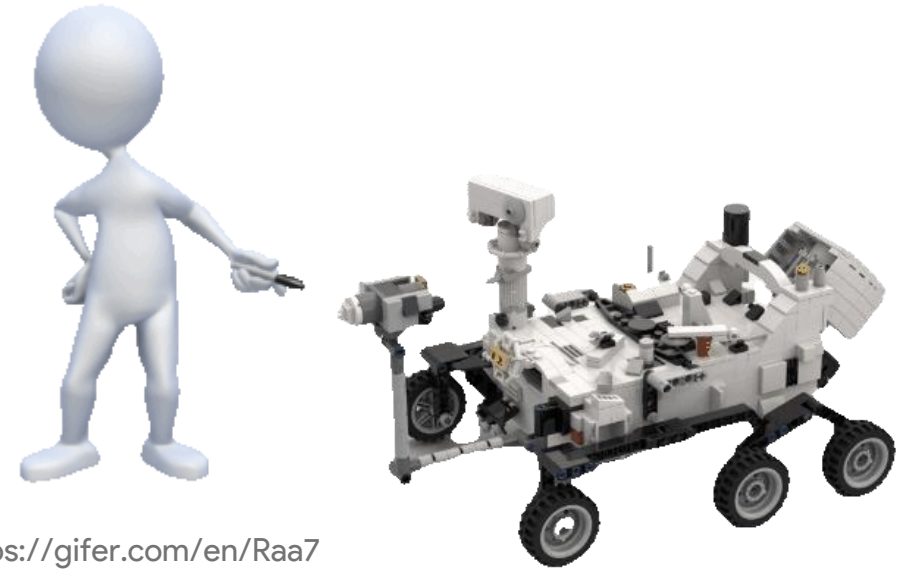
How the presenter communicate AR objects in a live stream ?

How the presenter knows whether the object is in the space?

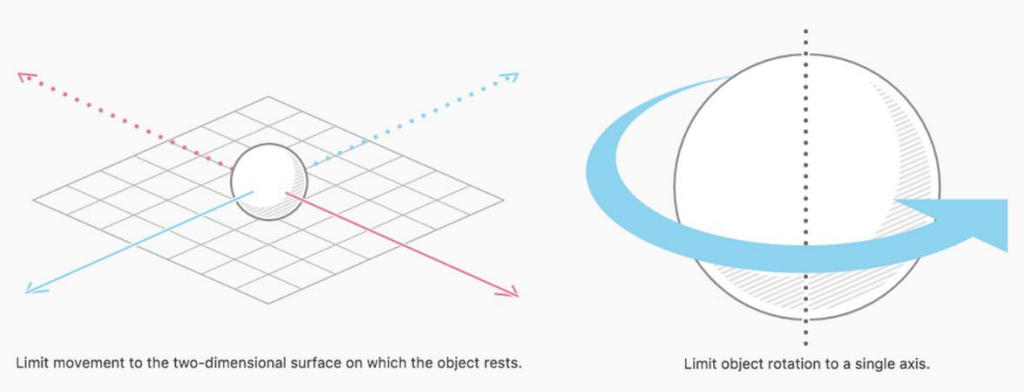
https://www.newscaststudio.com/2017/04/19/provost-studio-partners-dahooo-unique-ar-solution-broadcast/

Specific and Sub Objectives

- Communicate AR object and AR object movement in live
- Presenter preview



https://gifer.com/en/Raa7



https://zhuanlan.zhihu.com/p/29494658

https://www.blackmagicdesign.com/products/ultimatte

Methodology

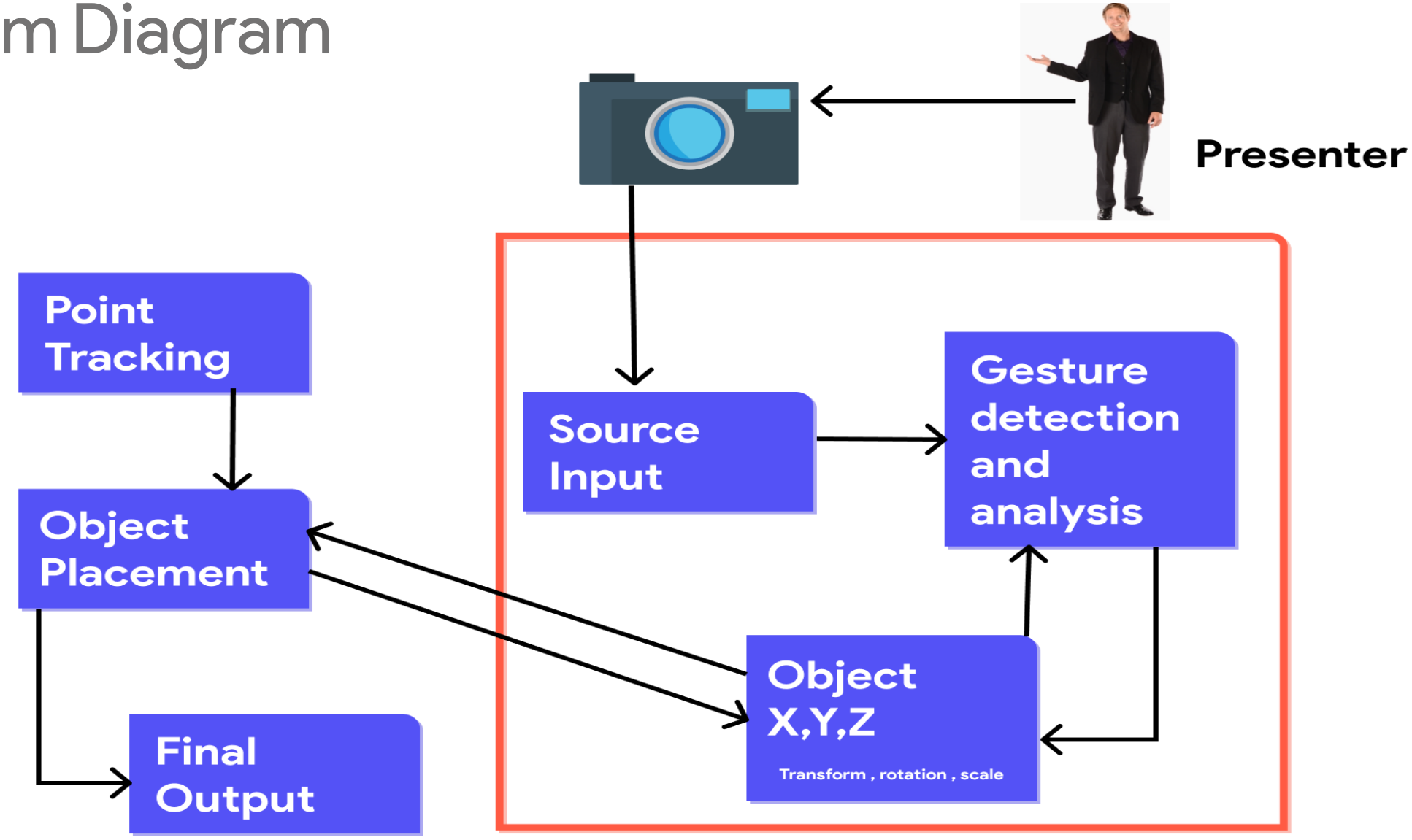
System Diagram

Technologies

Requirements

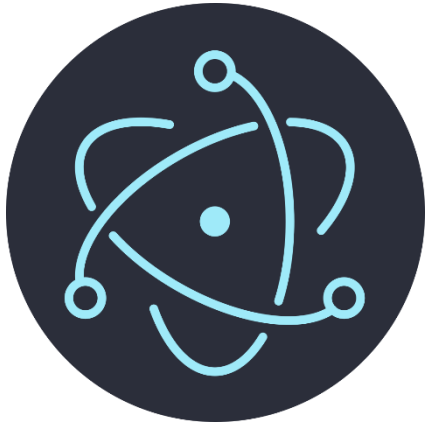
WBS

System Diagram

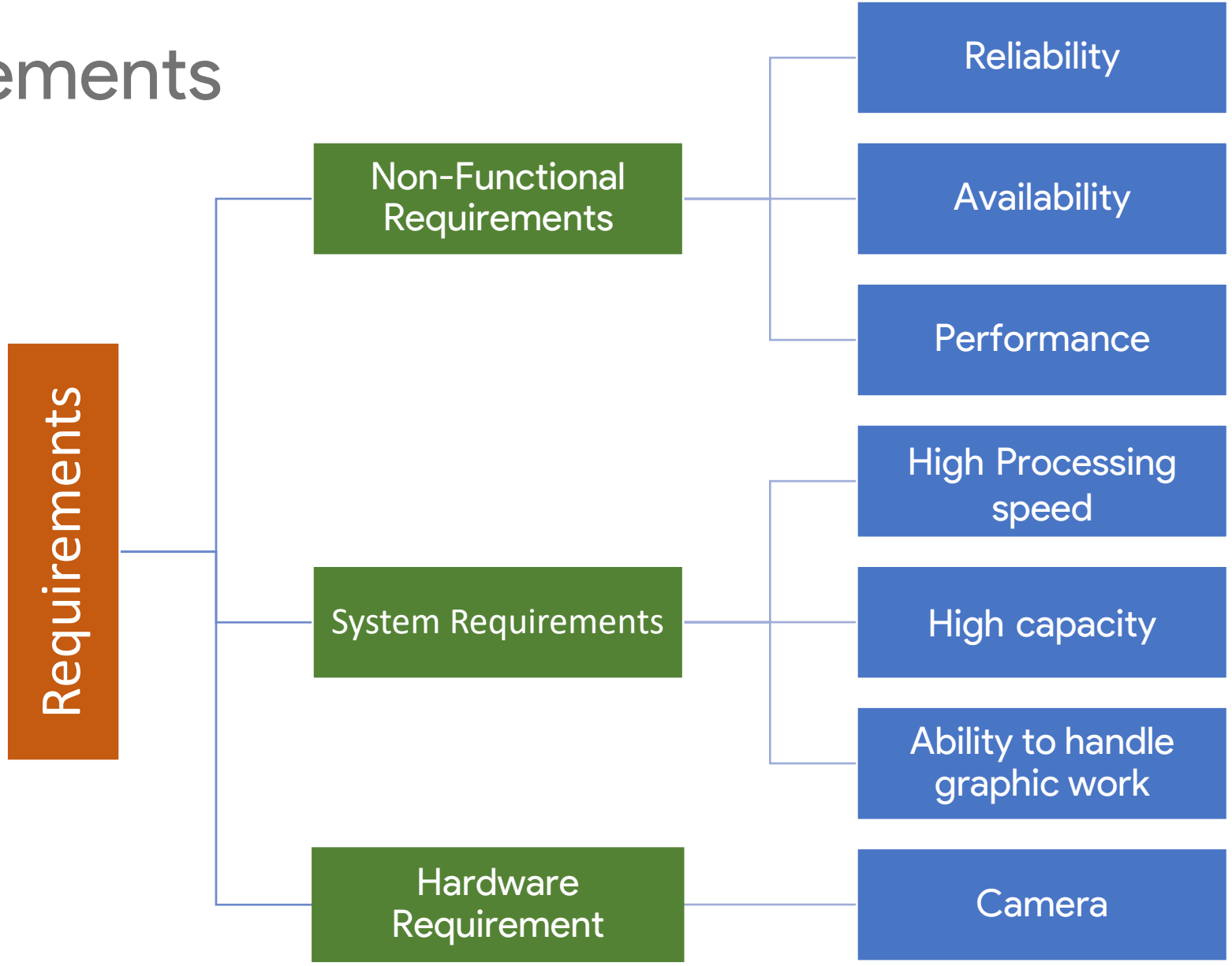


Technologies

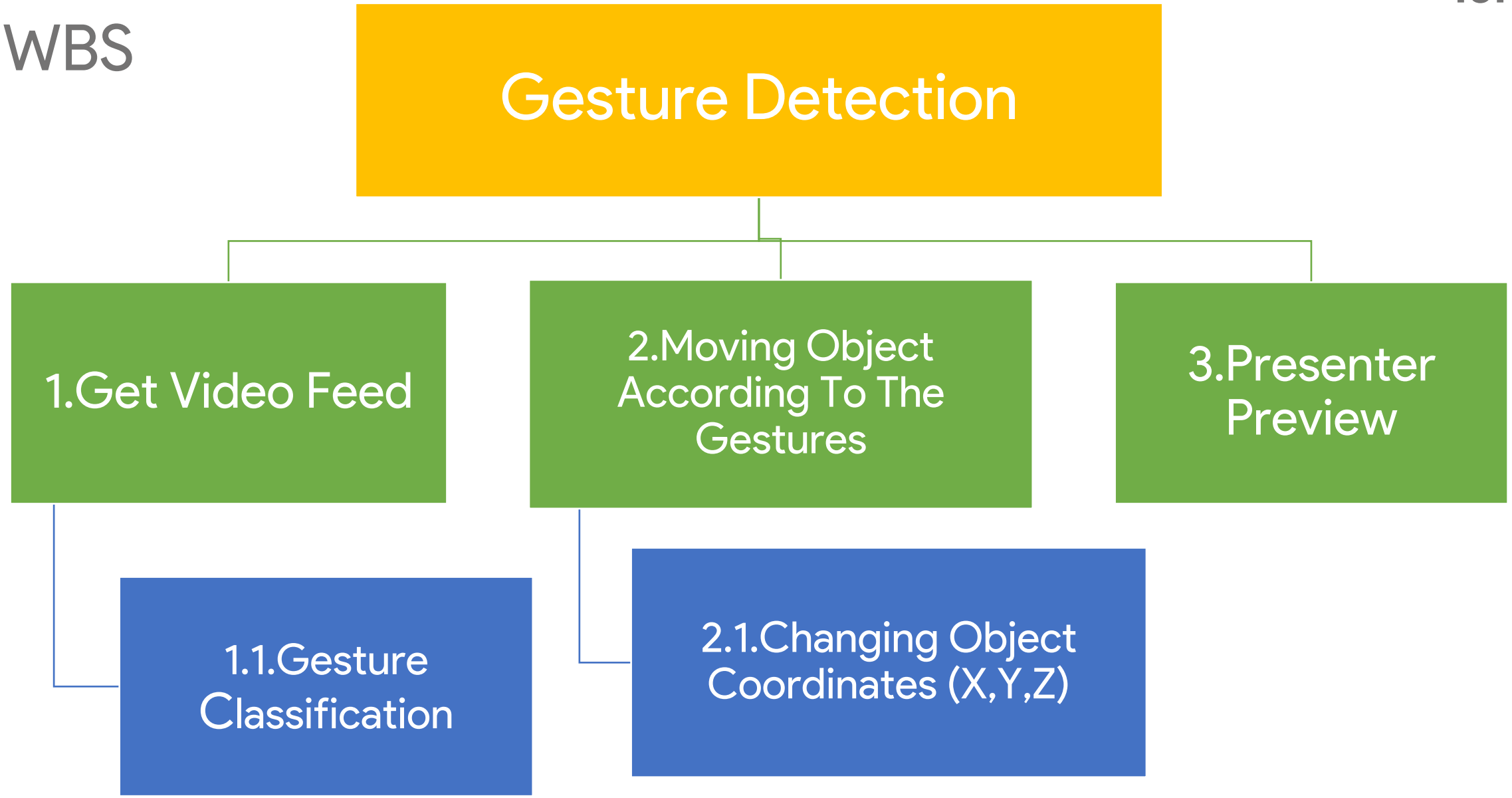
Part	Technology
Gesture detection	OpenCV, Python
Real time communication between two or more computers	WebRTC
Back End	Python
Front End	Electron



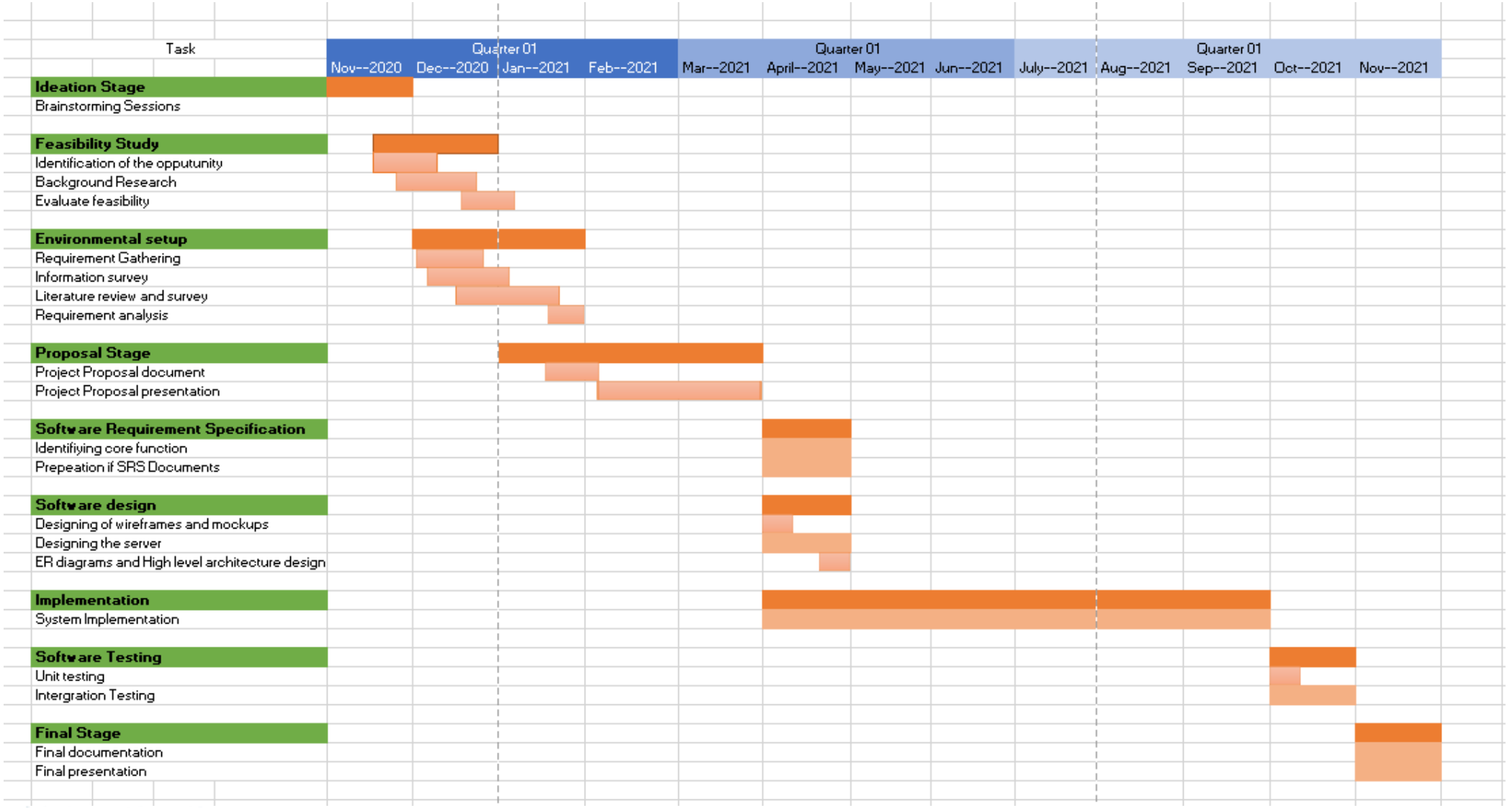
Requirements



WBS


Gesture Detection
1.Get Video Feed
2.Moving Object According To The Gestures
3.Presenter Preview
1.1.Gesture Classification
2.1.Changing Object Coordinates (X,Y,Z)

Gannt Chart


Task
Quarter 01
Nov--2020
Dec--2020
Jan--2021
Feb--2021
Quarter 01
Mar--2021
April--2021
May--2021
Jun--2021
July--2021
Quarter 01
Aug--2021
Sep--2021
Oct--2021
Nov--2021
Ideation Stage
Brainstorming Sessions
Feasibility Study
Identification of the opputunity
Background Research
Evaluate feasibility
Environmental setup
Requirement Gathering
Information survey
Literature review and survey
Requirement analysis
Proposal Stage
Project Proposal document
Project Proposal presentation
Software Requirement Specification
Identifiying core function
Prepeation if SRS Documents
Software design
Designing of wireframes and mockups
Designing the server
ER diagrams and High level architecture design
Implementation
System Implementation
Software Testing
Unit testing
Intergration Testing
Final Stage
Final documentation
Final presentation

References

[1] Craig Arnott - TV & Film Portfolio. 2021. *Presentation Techniques for Broadcast.*. [online] Available at: <http://neptunestritonproductions.weebly.com/presentation-techniques-for-broadcast.html> [Accessed 4 March 2021].

[2] advice, C. and descriptions, J., 2021. *Presenter, radio and television*. [online] gradireland. Available at: <https://gradireland.com/careers-advice/job-descriptions/presenter-radio-and-television> [Accessed 4 March 2021].

[3] Mindtools.com. 2021. *Body Language: Beyond Words – How to Read Unspoken Signals*. [online] Available at: <https://www.mindtools.com/pages/article/Body_Language.htm#:~:text=Body%20language%20is%20the%20range,or%20negative%20feelings%20in%20others.> [Accessed 5 March 2021].

[4] Ieeexplore.ieee.org. 2021. Hand gesture control of virtual object in augmented reality. [online] Available at: <https://ieeexplore.ieee.org/document/8126053> [Accessed 7 March 2021].

[5] Ieeexplore.ieee.org. 2021. Computer-Assisted Culture Learning in an Online Augmented Reality Environment Based on Free-Hand Gesture Interaction. [online] Available at: <https://ieeexplore.ieee.org/document/6750035> [Accessed 7 March 2021].

[6] Vmix.com. 2021. Purchase Live Stream Software | vMix. [online] Available at: <https://www.vmix.com/purchase/#comparisontable> [Accessed 6 March 2021].

[7] Ieeexplore.ieee.org. 2021. Hand gesture detection and recognition using principal component analysis. [online] Available at: <https://ieeexplore.ieee.org/abstract/document/6059935> [Accessed 8 March 2021].

[8] Ieeexplore.ieee.org. 2021. Intelligent Human-Computer Interaction Based on Surface EMG Gesture Recognition. [online] Available at: <https://ieeexplore.ieee.org/abstract/document/8706969/keywords#keywords> [Accessed 8 March 2021].

[9] Vixm.com. 2021. Purchase Live Stream Software | vMix. [online] Available at: <https://www.vmix.com/purchase/#comparisontable> [Accessed 6 March 2021].

References

[10] advice, C. and descriptions, J., 2021. Presenter, radio and television. [online] gradireland. Available at: <https://gradireland.com/careers-advice/job-descriptions/presenter-radio-and-television> [Accessed 4 March 2021].

[11] Bartolomeu, C., 2021. How To Master Audience Engagement When You Present. [online] Duarte. Available at: <https://www.duarte.com/presentation-skills-resources/audience-engagement-strategies-presentations/> [Accessed 26 February 2021].

[12] Ieeexplore.ieee.org. 2021. In-Air Gesture Interaction: Real Time Hand Posture Recognition Using Passive RFID Tags. [online] Available at: <https://ieeexplore.ieee.org/abstract/document/8760239> [Accessed 26 February 2021].

[13] Mohanty, A., 2021. Deep Gesture: Static Hand Gesture Recognition Using CNN. [online] springer.com. Available at: <https://link.springer.com/chapter/10.1007/978-981-10-2107-7_41> [Accessed 26 February 2021].

Data Visualization

Gankanda G.M.J.U

IT18063738

Introduction

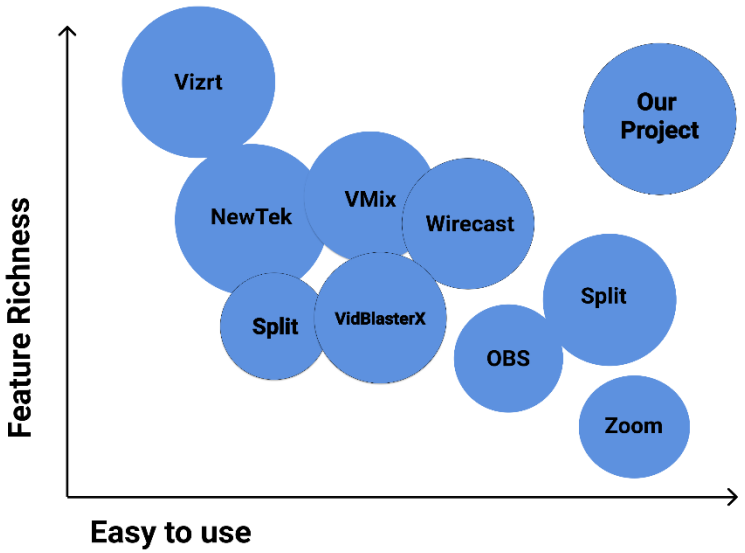
Background
Research Gap
Research Problem
Specific

Background to Data Visualization

- What is Data Visualization?.
- Is it a new technology?
- How our tool changes from the reset of the tools available in the society?

Research Gap

Features	XmdvTool	Kyrix	Mondrian	LUMOZ
Creation of visual elements.	yes	yes	yes	yes
Showing color pallet.	yes	yes	yes	yes
Showing the default color theme.	No	No	No	yes
Creating a 3D effect.	No	No	No	yes
One overall interface.	No	yes	yes	yes



Product Comparison

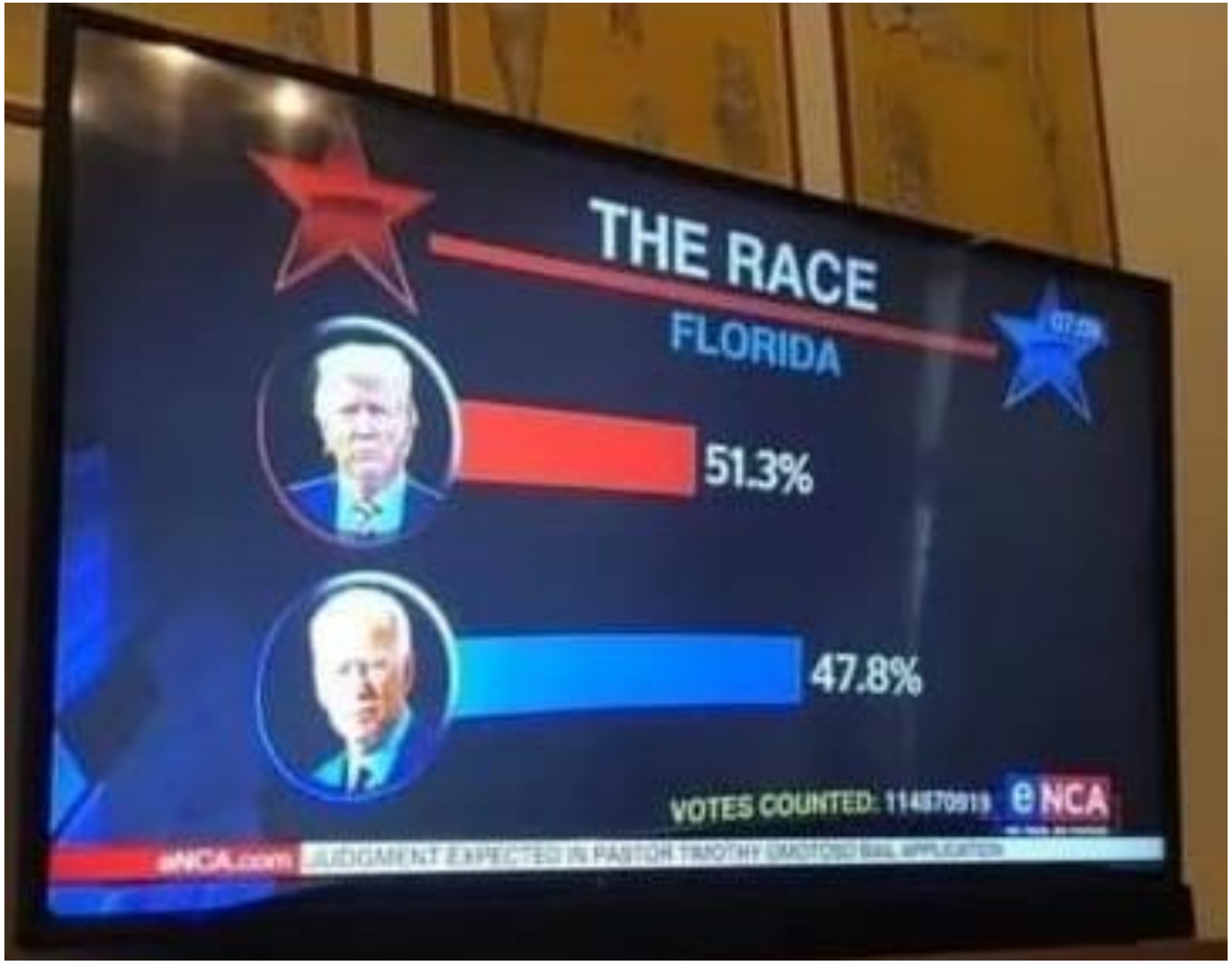
Research Problem

- Correct statistics are not represented.
- Local channel news example.

Research Problem

Reasons;

- Less Mathematical knowledge.
- Less concern.
- No proper tool for daily use.

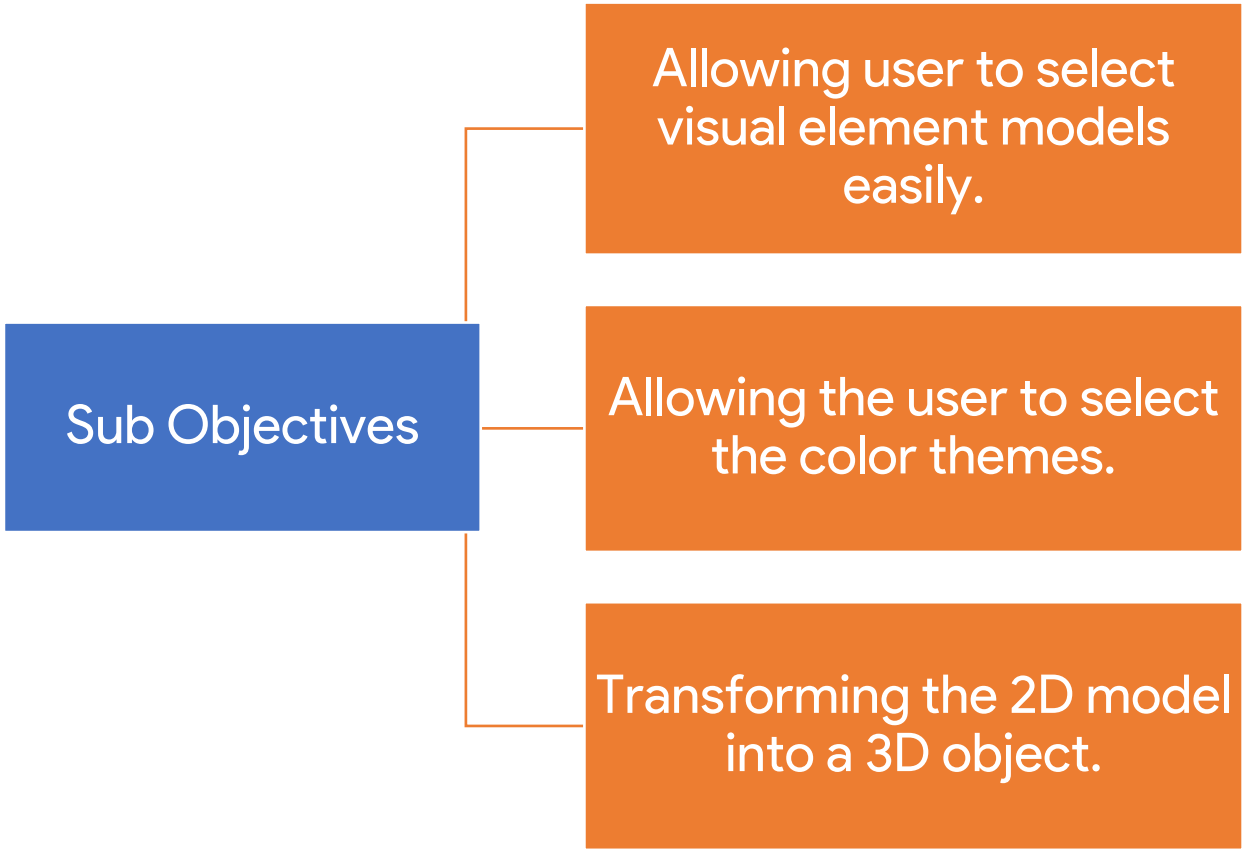


https://www.youtube.com/watch?v=NLl07fgpyH8&t=286s&ab_channel=eNCA

Specific and Sub Objectives

Specific Objective :

Improve the correctness of data visualization in a news program. User should be able to use this tool easily with or without much mathematical knowledge.



Methodology

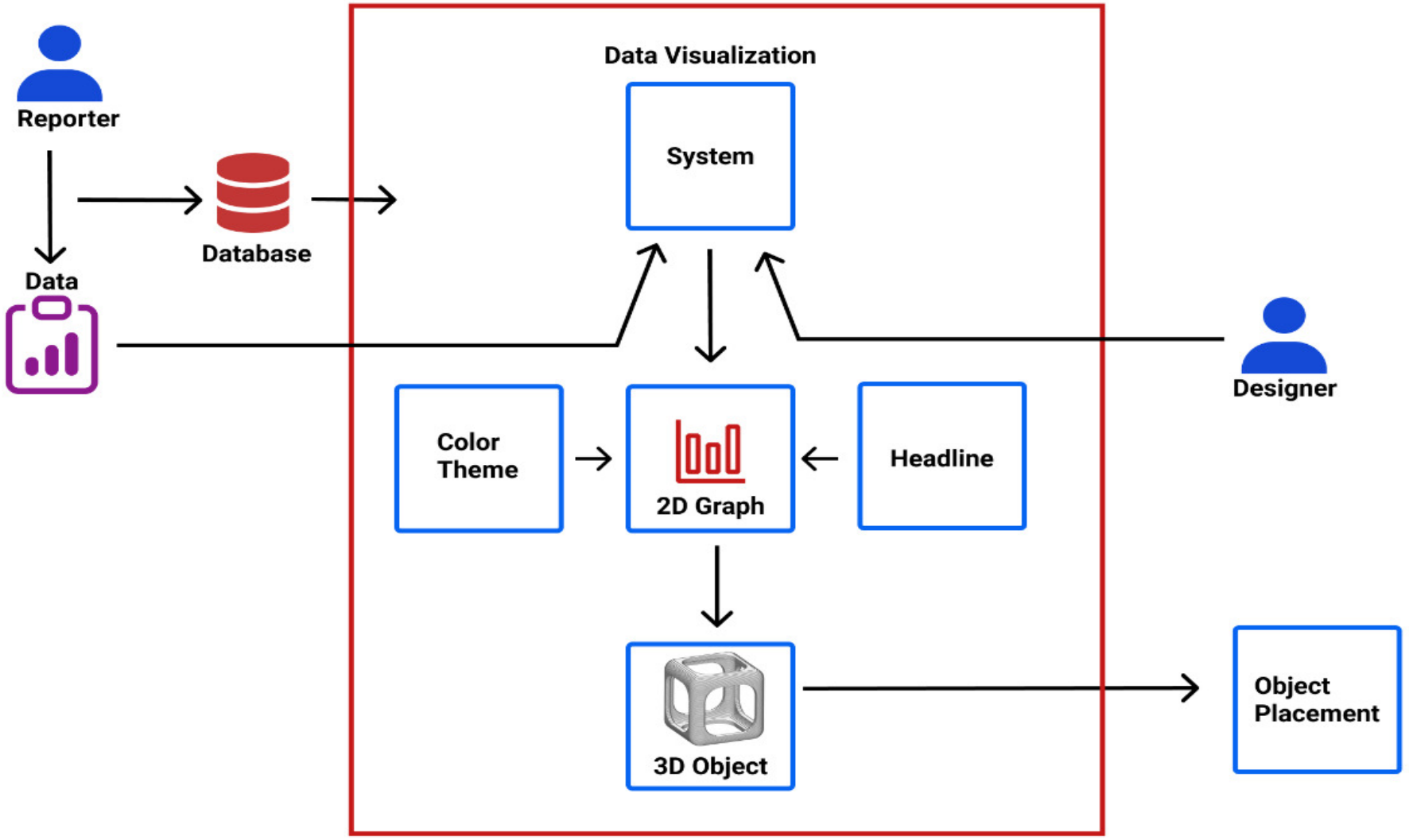
System Diagram

Technologies

Requirements

WBS

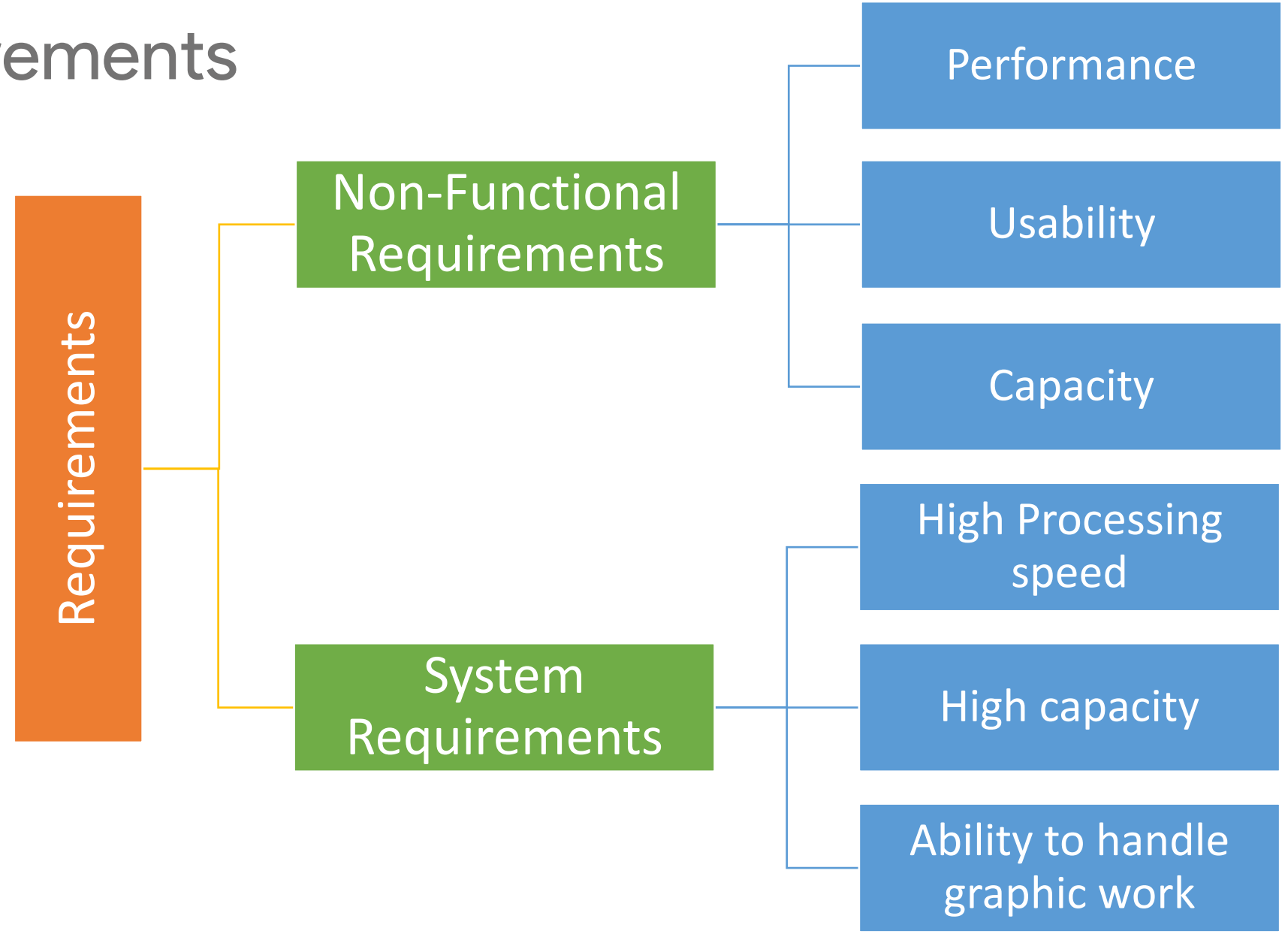
System Diagram



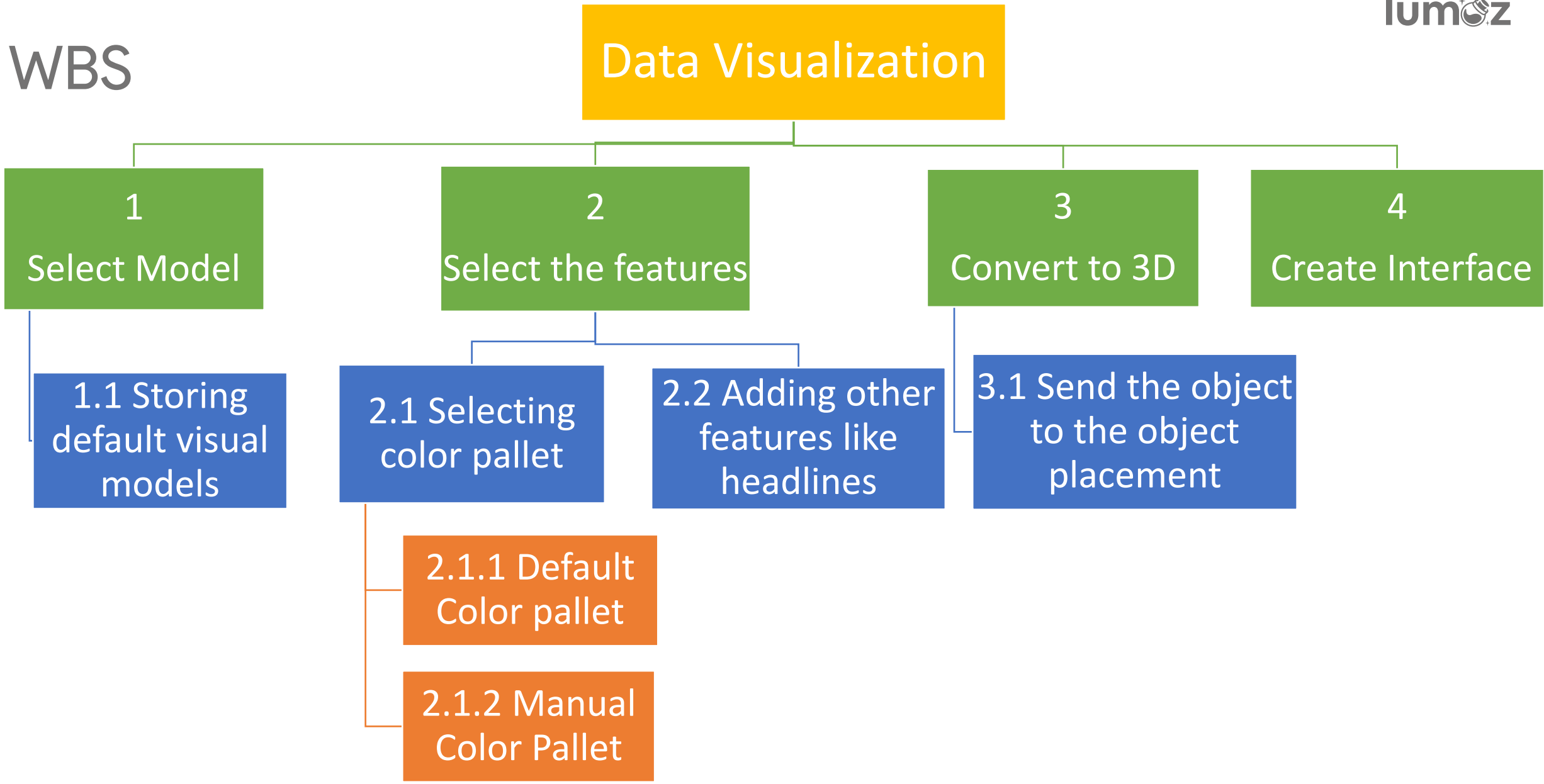
Technologies

Part	Technology
Creating the User Interface	Electron
Visualizing Data as highly scalable graphs	SVG (Scalable Vector Graphics)
Creating back end	Python Language

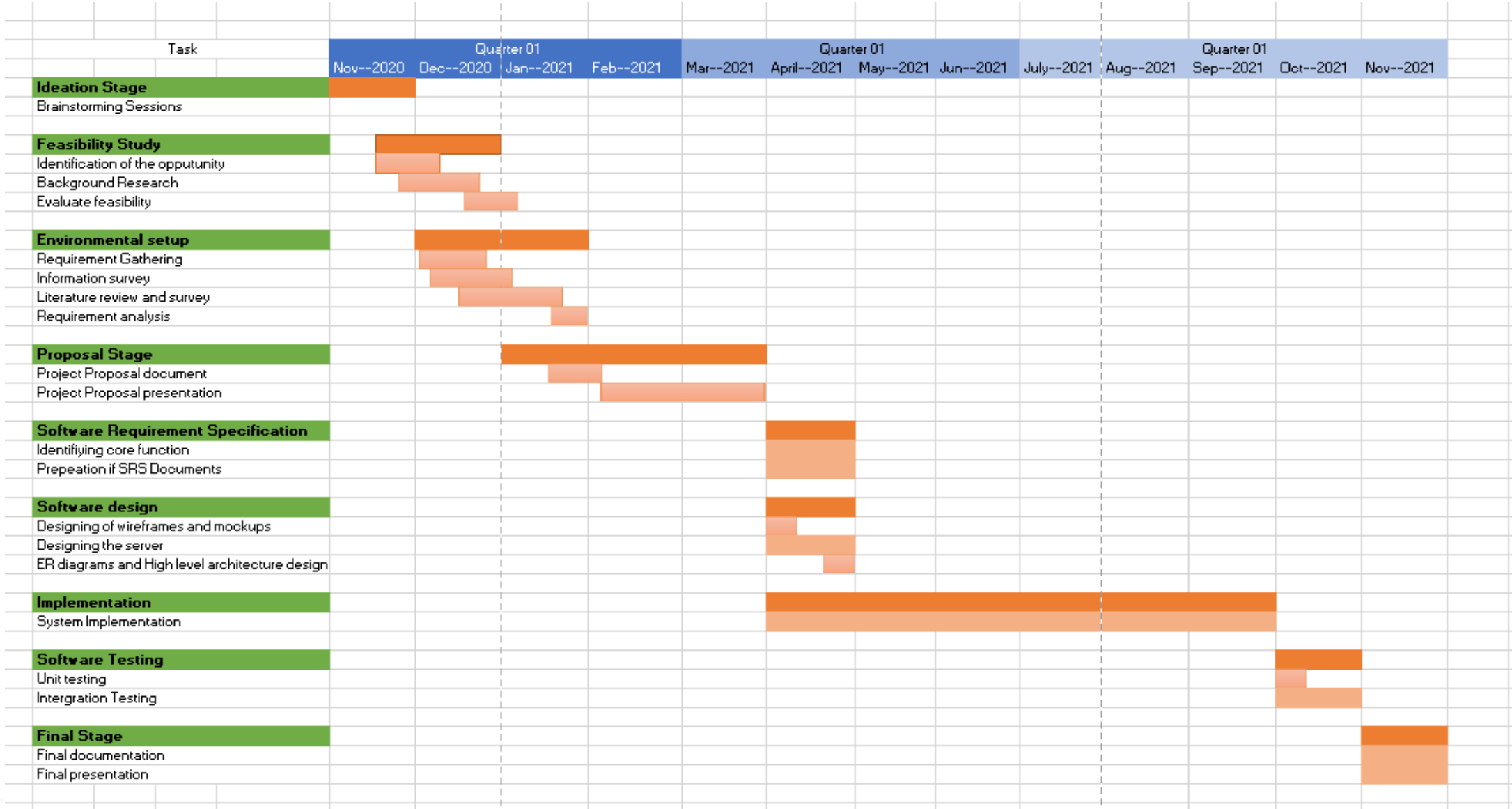
Requirements



WBS


Data Visualization
1
Select Model
2
Select the features
3
Convert to 3D
4
Create Interface
1.1 Storing default visual models
2.1 Selecting color pallet
2.2 Adding other features like headlines
3.1 Send the object to the object placement
2.1.1 Default Color pallet
2.1.2 Manual Color Pallet

Gannt Chart


Task
Quarter 01
Nov--2020
Dec--2020
Jan--2021
Feb--2021
Quarter 01
Mar--2021
April--2021
May--2021
Jun--2021
July--2021
Quarter 01
Aug--2021
Sep--2021
Oct--2021
Nov--2021
Ideation Stage
Brainstorming Sessions
Feasibility Study
Identification of the opputunity
Background Research
Evaluate feasibility
Environmental setup
Requirement Gathering
Information survey
Literature review and survey
Requirement analysis
Proposal Stage
Project Proposal document
Project Proposal presentation
Software Requirement Specification
Identifiying core function
Prepeation if SRS Documents
Software design
Designing of wireframes and mockups
Designing the server
ER diagrams and High level architecture design
Implementation
System Implementation
Software Testing
Unit testing
Intergration Testing
Final Stage
Final documentation
Final presentation

References

[1] Yang, B., Vargas Restrepo, C., Stanley, M. and Marsh, E., 2021. Truncating Bar Graphs Persistently Misleads Viewers.

[2] Qin, X., Luo, Y., Tang, N. and Li, G., 2021. Making data visualization more efficient and effective: a survey.

[3] https://www.researchgate.net/profile/Martin-Theus/publication/5142809_Interactive_Data_Visualization_Using_Mondrian/links/0046353a45ba147e0b000000/Interactive-Data-Visualization-Using-Mondrian.pdf

[4] D. Swayne, D. Temple, A. Buja, and D. Cook. Ggobi: Xgobi redesigned and extended. In Proceedings of the 33th Symposium on the Interface: Computing Science and Statistics, 2001

[5] Luo, W., 2021. User choice of interactive data visualization format: The effects of cognitive style and spatial ability. [6] Library.oapen.org. 2021. [online] Available at: <https://library.oapen.org/bitstream/handle/20.500.12657/22273/9789048543137.pdf?sequence=1#page=170> [Accessed 26 February 2021].

[7] Nadig, A., 2021. Visualization of social media data in disaster recovery. [online] Csus-dspace.calstate.edu. Available at: <http://csus-dspace.calstate.edu/handle/10211.3/216042> [Accessed 26 February 2021].

References

[8] https://mediaweb.saintleo.edu/Courses/COM430/M2Readings/WATEERFALLVs%20V-MODEL%20Vs%20AGILE%20A%20COMPARATIVE%20STUDY%20ON%20SDLC.pdf

[9] S. Rose, "Return on Information : The New ROI Getting value from data.," SAS Inst. Inc. U.S.A, 2014.

[10] Toasa, R., Maximiano, M., Reis, C., & Guevara, D. (2018). Data visualization techniques for real-time information — A custom and dynamic dashboard for analyzing surveys' results. 2018 13th Iberian Conference on Information Systems and Technologies (CISTI). doi:10.23919/cisti.2018.8398641

[11] MICROSOFT CORPORATION, WASHINGTON, "Large scale data visualization with interactive chart ," U.S. Patent 3 624 125, Jul. 16, 1990.

[12] Jayaweera, D., 2020. Bad Graph !!! Hope This Will Be Corrected By Ada Derana With An Apology .. [image] Available at: < https://www.facebook.com/dilith.jayaweera/posts/10157995591750977 > [Accessed 19 April 2020].

[13] https://onlinelibrary.wiley.com/doi/full/10.1046/j.1525-1497.2003.20703.x (research Problem)

[14] Channel Africa, e., 2020. The Race 2020 | Details From The US Presidential Election. [video] Available at: < https://youtu.be/NLI07fgpyH8?t=286 > [Accessed 22 January 2021].

Supporting Items

Commercialization

Budget

Commercialization

- Create social media marketing plan.
- Developed a sales plan among the digital media content creators.
- Creating customer packages plans(Subscription, Platinum).
- Developed a pricing strategy.
- Creating a public relations and news media strategy.
- Recognizing target audience.




Budget for the overall system

Resources	Prices (LKR)
Electricity	2000.00
Stationary	1000.00
Internet	2000.00
Communication	1000.00
Paper Publish Cost	5000.00
Software Purchasing	2000.00
Total	**13000.00**

Thank you