GRIFFIN

A VIRTUAL EXPERIENCE

Presented by:

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A Virtual Flight Simulator for young children(4 – 8 years).

The Aim of this project is to explore the navigational experiences of flying in a virtual in a virtual experiment via body gestures.

The project also offers a simulation of various worlds with exciting and interactive powerups.

NEED ANALYSIS

The project is needed to make young children acquainted with technology and give them a virtual experience aimed at making learning enjoyable with real-world objects, along with keeping them engaged and active.

- **Market Demand**
- **Target Audience**
- **Learning Objectives**
- **Scalability**

RELATED WORK

Sr No	Title	Author	Year	Content
1	Virtual reality flight simulator.	Valentino, Kelvin & Christian, K. & Joelianto, Endra	2017	The paper presents virtual reality, flight simulator, and programming process of virtual reality flight simulator
2	Exploring Body Gestures as Natural User Interface for Flying in a Virtual Reality Game with Kinect	Exploring Body Gestures as Natural User Interface for Flying in a Virtual Reality Game with Kinect	2017	The paper consisted of a VR game called Beyond. In the game, players wear an Oculus Rift DK2 HMD with headphones, and controls their flying movements using pre-defined body gestures captured by a Kinect tracking sensor
3	The Progress of Human Pose Estimation: A Survey and Taxonomy of Models Applied in 2D Human Pose Estimation	T. L. Munea, Y. Z. Jembre, H. T. Weldegebriel, L. Chen, C. Huang and C. Yang	2020	For pose estimation,several approaches in the literature have been proposed
4	Pictorial structures revisited: People detection and articulated pose estimation	M. Andriluka, S. Roth and B. Schiele	2009	In this paper we proposed a generic model for detection and articulated pose estimation. We demonstrated the generality of our approach on 3 recent datasets, where it outperformed specialized approaches by a large margin, which have been designed specifically for only one of these tasks
5	Poselet conditioned pictorial structures	L. Pishchulin, M. Andriluka, P. Gehler and B. Schiele	2013	This work proposes to capture such dependencies using poselets that serve as a mid-level representation that jointly encodes articulation of several body parts.
6	Human Pose Estimation via Deep Neural Networks	A. Toshev and C. Szegedy	2014	This paper proposes a method for human pose estimation based on Deep Neural Networks (DNNs). The pose estimation is formulated as a DNN-based regression problem towards body joints
7	Articulated pose estimation with flexible mixtures-of-parts	Y. Yang and D. Ramanan	2011	This survey paper presents different deep learning-based 2D human pose estimation models. The backbone architecture used, loss functions, the datasets used, as well as evaluation metrics implied are discussed and evaluated
8	Human Pose Estimation for Fitness Exercise Movement Correction	A. Rahmadani, B. S. Bayu Dewantara and D. M. Sari	2022	Based on computer vision technology, this research suggests an application to identify and assess a fitness practitioner's movement

PROBLEM STATEMENT & OBJECTIVES

PROBLEM STATEMENT :

Despite the growing popularity of virtual reality games for kids, there is a lack of educational games that utilize body tracking technology and real-world objects to make learning enjoyable and interactive for the 4-8-year-old age group.

OBJECTIVES :

- A fully functional and interactive body pose estimation flight simulator using the user's camera.
- Create a game that is both educational and entertaining, encouraging kids to actively participate in the learning process while keeping them engaged and active.

ASSUMPTIONS AND CONSTRAINTS

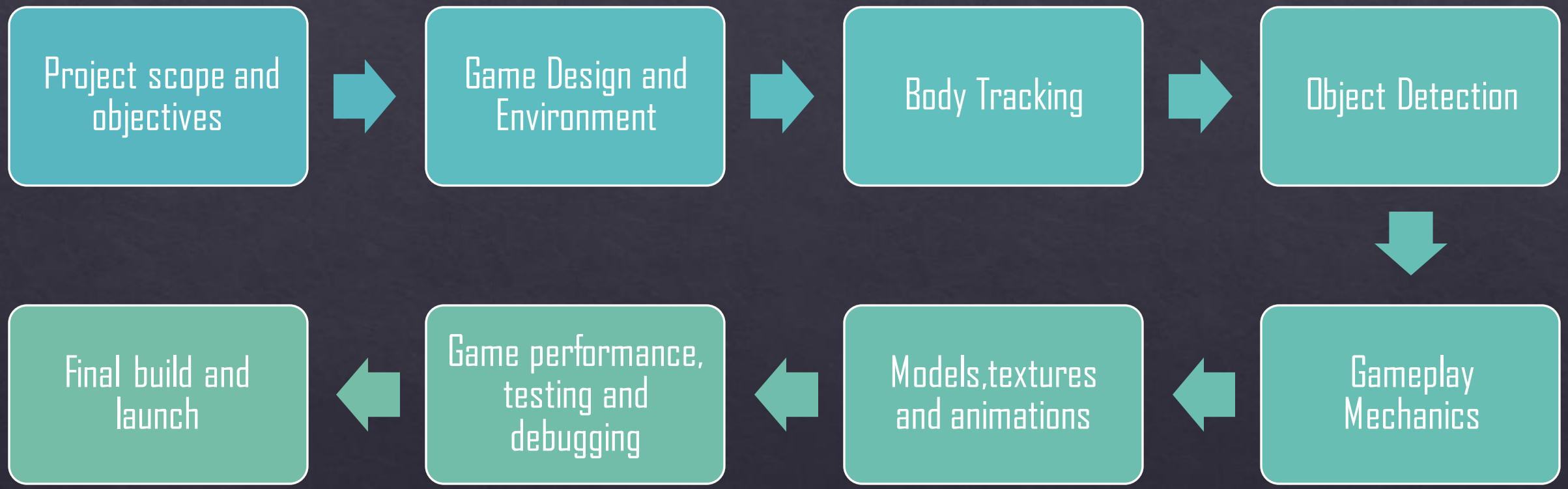
Assumptions:

- Access to appropriate hardware and can use it effectively.
- Safe environment with adult supervision
- Accessible to kids with different skill levels and abilities.
- Age-appropriate learning objectives for 4-8-year-old kids.

Constraints:

- Designed to run on existing hardware
- Strict timeline and budget
- Limit the complexity of the concepts that can be introduced.
- The game's pose detection model may have limitations in terms of accuracy and responsiveness, which could impact the player's experience.

PROJECT EXECUTION PLAN



PROJECT REQUIREMENTS

Hardware requirements :

A laptop capable of fast 3d rendering and GPU preferably ,Nvidia, for best performance

Tool and libraries :

- Unity software and libraries for building the application
- Open source pose estimation and object detection models for building the game features
- Access to basic desktop with moderate processing power and webcam , that can run the built application
- Machine learning and computer vision libraries like Tensorflow, OpenCV & Unity ML-Agents for ease of creation

PROJECT OUTCOMES

- **Enhanced Learning Experience:** Virtual flight simulation providing a fun learning experience improving hand eye coordination and overall cognitive ability.
- **Increased Engagement and Active Learning:** Keeps kids engaged at home and provides an enjoyable source of physical activity.
- **Improved Spatial Awareness:** The virtual flight simulator game can improve kids' spatial awareness by giving them a sense of how objects move in three-dimensional space.
- **Enhanced Problem-Solving Skills:** Improves problem solving skills by presenting challenges related to navigation and flight control.

WORKPLAN

Sr. No.	Activity	Month	February				March				April				May			
		Week no	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Define project scope and objectives	Plan																
		Actual																
2	Develop game design concept	Plan																
		Actual																
3	Create game environment in unity	Plan																
		Actual																
4	Pose detection models creation	Plan																
		Actual																
5	Integrate body-tracking technology and object detection model	Plan																
		Actual																
6	Develop gameplay mechanics	Plan																
		Actual																
7	Design and create 3d models and textures	Plan																
		Actual																
8	create animations for characters/objects	Plan																
		Actual																
9	Optimize game performance, testing and debugging	Plan																
		Actual																
10	Conduct user acceptance testing and obtain feedback	Plan																
		Actual																
11	Make necessary changes based on feedback	Plan																
		Actual																
12	Launch the game	Plan																
		Actual																

CONTRIBUTION OF INDIVIDUAL TEAM MEMBERS

- **Anjali Rana (Group Leader / Game Designer):** Responsible for overseeing the overall development of the game and ensuring that it meets the project's goal and deadlines.
- **Aurav (Unity Developer):** Responsible for the technical aspects of developing the game.
- **Saurabh (3D Artist):** Responsible for creating 3D models and textures for the game environment and objects.
- **Vanshaj (Computer Vision Specialist):** Responsible for integrating the body – tracking technology into the game.

REFERENCES

- [1] Tong, Xin & Pekcetin, Serkan & Gromala, Diane & Machuca, Frederico. (2017). Exploring Body Gestures as Natural User Interface for Flying in a Virtual Reality Game with Kinect. Electronic Imaging. 2017. 60-63. 10.2352/ISSN.2470-1173.2017.3.ERVR-101.
- [2] Josip Josifovski,Matthias Kerzel,Christoph Pregizer, Lukas Posniak, Stefan Wermter (2018). Object Detection and Pose Estimation based on Convolutional Neural Networks Trained with Synthetic Data. *2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) Madrid, Spain, October 1-5, 2018*
- [3] Maria A Yala. Plus+: Exploring Using the Body as a Game Controller.Available:http://blog.ocad.ca/wordpress/digf6898-su201901-05/files/2019/08/Plus-_-Exploring-Using-the-Body-as-a-Game-Controller.pdf