

COEN/ELEC 490 Project Proposal (Student)

2024-2025

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Project Title : Immersive Sports VR Experience with Real-Time Player POV and Biometric Feedback

Description:

As live sports evolve, hockey in particular, audiences are constantly seeking more immersive and engaging ways to experience the match. Traditional broadcasts, limit viewers to predetermined camera angles and often audience members have difficulty keeping an eye on the puck and following critical moments.

Despite advances in live sports coverage, there remains a gap in bringing fans closer to the authentic experience of being in the game. Current methods, such as sideline views, aerial shots, and instant replays, fall short in offering fans an intimate, first-person perspective of live sports. This limits the emotional engagement and personal involvement that audiences could have, reducing the potential excitement and connection to their favorite athletes.

The hockey industry has yet to effectively capitalize on recent advances in virtual reality (VR) technology to create a product that allows users to feel like they are part of the game. Fans are left to imagine what it would be like to "glide in the skates" of their favorite hockey player.

With the rapid advancement of immersive technologies, fans are increasingly demanding real-time, personalized, and interactive experiences, but the infrastructure and technology to deliver such an experience remain underdeveloped. Without such innovation, the sports viewing experience will stagnate, leaving a growing audience dissatisfied and disengaged.

Additionally, player safety is a top priority. The product will provide immersive VR experiences while monitoring vital data such as heart rate and head movement, detecting risks like concussions. This data can alert medical professionals and the VR audience to potential injuries. The lightweight design (150g headband with securely attached antenna and battery) ensures it doesn't obstruct movement or vision. Temperature control keeps the device cool, and the system provides a minimum video resolution of 720p for high-quality visuals, maintaining both safety and comfort for the player.

In summary, the current system does not provide fans with the level of immersion they desire. There is a clear need for a more engaging, real-time, and personalized method of experiencing hockey. Our product not only offers an immersive VR experience but also integrates advanced health monitoring features to detect and predict risks such as concussions, ensuring that athletes are protected while fans enjoy a dynamic, first-person view of the game. This innovative approach satisfies the growing demand for an immersive hockey viewing experience while also prioritizing the well-being of the players.

Required Resources:

Laptop, Mobile Device, VR Goggles (Meta Quest 3), SDK (Meta Quest Dev Center), MicroController w/ integrated Wi-fi / Custom PCB, Camera (Arducam IMX477), Battery (Lithium-Ion), Wires, Router, Wi-fi Connection, KiCAD, C++, Python, Java, MATLAB, PSPICE, Android Studio, Blender, GPS module, physical model, Ambient cooling methods for device,

Student Requirements:

Background: Android App development (**COEN 390**), Microprocessor Based Systems (**COEN 317**), Communication Networks & Protocols (**ELEC/COEN 366**), Electronics I & II (**ELEC 311 & 312**), Programming Methodology I & II (**COEN 243 & 244**), Modern Analog Filters (**ELEC 412**), Introduction to Digital Communications (**ELEC 367**)

Software Skills: Programming, PCB Design, 3D Modeling, Debugging

Task Distribution:

Health Monitoring Device: 1 ELEC student

Camera/Microphone Integration: 1 ELEC student

Broadcasting system: 1 ELEC & COEN student

Embedded software: 1 COEN student

VR Application software: 1 COEN student