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WORKING OF HUMAN ANATOMY MODEL USING AUGMENTED REALITY

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ABSTRACT :

In recent times, Augmented Reality (AR) has emerged as a versatile tool with applications spanning various fields. One particularly intriguing area of exploration is its utilization in education. Numerous studies have highlighted the benefits of integrating AR into learning environments, showcasing its capacity to foster critical thinking, enhance comprehension, and inspire learners to delve deeper into their studies. The appeal lies in AR's ability to offer real-time experiences, immersing learners in dynamic educational content. Specifically, within the domain of anatomical education, the integration of AR technology with human anatomy models represents a significant advancement. While traditional models have served as fundamental teaching aids, they often fall short in terms of interactivity and depth. By overlaying digital information onto the physical world, AR transforms the learning experience, providing students with interactive and immersive insights into the complexities of the human body. This abstract delves into the operational principles, advantages, obstacles, and future potentials of employing augmented reality in human anatomy education, offering a comprehensive exploration of this innovative approach to learning.

Keywords: – Augmented Reality, Evolution, Revolution.

INTRODUCTION:

Using augmented reality (AR) with a human anatomy model mixes real-life stuff with digital info to help us understand the human body better. Basically, it starts with a physical model of the body, like a model or poster. Then, AR adds digital stuff like 3D organs or info graphics on top of the real thing. We can use our smartphone or an AR headset to interact with this model.

When you look at the physical model through your device's camera, the AR software recognizes it and lines up the digital parts correctly. This creates an exciting learning experience where you can explore different layers of the body, see inside structures, and learn lots of details about each part. The technology behind it involves computers recognizing the physical model, making sure the digital parts stay in place as you move around, and showing everything in real-time. This AR approach to learning anatomy makes studying more fun, helps you see complicated stuff better, and lets you be more involved in your learning. It works in all sorts of places, like classrooms and medical training, and is useful for both students and professionals.

Why Augmented Reality requires

Augmented Reality (AR) has changed how we learn, especially in areas like anatomy. Traditional models are useful, but they lack the fun and depth that AR adds. By combining AR with these models, we get a whole new way to learn about the human body. With AR, we can do more than just looking at a model. We can interact with it! You can zoom in, spin it around, and even do simulations. It makes learning much more engaging and helps us to understand things better. Plus, AR can customize the learning experience for each person based on what they need to know. Another cool thing about AR is that it lets multiple people learn together, even if they're far apart. We can all explore the same model at the same time and talk about it, which makes learning more fun and helps you share ideas. And the best part? You can do all of this from anywhere with an internet connection. So even if you're not in a classroom, you can still learn about anatomy using AR.

LITERATURE REVIEW

The papers we've looked at dive deep into augmented reality (AR) and how it's used in different areas. They give us a good look at how AR technology is improving, what it's good for, what problems it still has, and what we might see in the future. By learning from these papers, we've built a solid base of knowledge about what AR can and can't do. This helps us with our own research and gives us direction for future studies in this exciting field. table 1.

S.NO	AUTHORS /YEAR	TITLE	OBSERVATIONS
1	JadeGeerlings-Batt, Carley Tillett, Ashu Guptha, Zohnghua Sun Year :2020	Enhanced Visualization of Normal Anatomy with potential use of Augmented Reality Superimposed on Three-Dimensional Printed Models	▪ This is the Study Aimed To Develop an Alternative to Traditional Teaching Method;a novel teaching tool using AR and 3D printed models to accurately demonstrate. ▪ 3D Slicer Was Used to Segment a high Magnetic Resonance Imaging (MRI) Dataset of a Healthy Volunteer.
2	Santa Dreimane,Linda Daniel Year :2020	Educational Potential Of Augmented Reality Mobile Application For Learning The Anatomy Of The Human Body.	▪ Mobile application with AR solutions allow students to understand the anatomy from both the external and internal dimensions of the body without being in a specific laboratory or anatomy laboratory.
3	MichaelH Kurniawan 2.Suharjito 3.Diana 4.Gunawan Witjaksono Year : 2018	Human Anatomy Learning Systems Using Augmented Reality on Mobile Application	▪ Student generally experience difficulties in learned human body anatomy due to constraints to visualize the body anatomy from 2D into 3D image ▪ This research aims to develop a human anatomy learning Isakson system using augmented reality technology
4	Kharisma Indiarto Putra, Patrick Jeremiah Lere Dawaa , Yoss Year: 2023	Implementation of Augmented Reality in Study for Human Anatomy	▪ This research aims to develop and evaluate an Augmented Reality that is based of biology human anatomy such as human body (human body, human muscle, and human skeleton), lung, eye, ear, digestive system. ▪ It will combine augmented reality with learning biology, especially in the field of human anatomy with the benefit of helping students learn subject matter about biology, especially in the theme of human anatomy.

PROBLEM STATEMENTS AND OBJECTIVES

The problem statement

Develop an augmented reality (AR) human anatomy model that provides an interactive and immersive learning experience for users. The model should accurately depict the various systems and structures of the human body, allowing users to explore, interact with, and learn about anatomy in a dynamic and engaging way.

Key Challenges:

When creating an augmented reality (AR) model for learning about the human body, several key factors need attention.

- **Accuracy and Detail:** Make sure the model accurately represents all the parts of the human body, like organs, bones, and tissues, at a level that's good for learning.
- **Interactivity:** Allow users to do things like zoom in, rotate, and highlight different parts of the model so they can explore and learn.
- **Realism:** Use realistic colors, textures, and movements in the model to make it feel more like the real thing and enhance the learning experience.
- **Platform Compatibility:** AR model works on different devices like mobile phones, tablets, and AR glasses so more people can use it.
- **Educational Content:** Include labels, descriptions, and quizzes in the model to teach users about the functions and importance of each body part.
- **Performance Optimization:** Ensure the model runs smoothly and doesn't lag, especially when showing complex 3D structures in real- time.
- **User Experience:** Design an easy-to-use interface that people of all ages and backgrounds can understand and enjoy using.
- **Accessibility:** Think about features that can help people with disabilities, like making the model usable for those with visual impairment or motor skill limitations.

The main objective

The main goal of using augmented reality (AR) in learning about human anatomy is to make learning more fun and effective. AR adds interactive and immersive tools to help students understand and remember anatomy better. With AR, students can interact with virtual organs and tissues in real-time, which makes learning hands- on and engaging. It also allows for personalized learning, so each student can learn at their own speed and in own way. AR lets students work together and share what they've learned, making learning more social and enjoyable. By using AR, students can see how anatomy applies to real-life situations, which helps them to get ready for jobs in healthcare. Overall, AR in human anatomy education aims to give students cool new ways to learn that spark their curiosity, encourage critical thinking, and deepen their understanding of how a human body works.

SYSTEM ARCHITECTURE

When we begin the system, users have to log in or register. Once logged in successfully, they can access the human anatomy model. This model includes three more parts: the digestive system, respiratory system, and nervous system. Augmented reality (AR) is used to explore human anatomy, offering an engaging learning experience. AR adds digital stuff like 3D models or animations onto the real world as you see it. real-time.

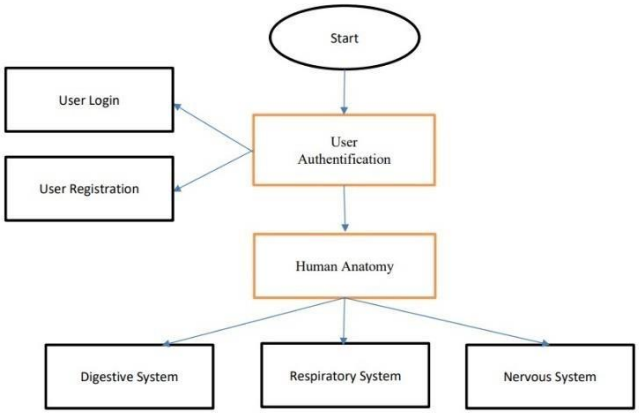

Figure1: Architecture Diagram

7. RESULTS

- ***Command Line Interface***

This CLI (Command Line Interface) screenshot demonstrates a handy tool for running JavaScript code directly from the command line. It allows developers to quickly access the JavaScript interpreter and execute scripts, which is useful for testing and debugging code snippets. The CLI offers a straightforward way to run JavaScript commands without needing a separate Integrated Development Environment (IDE) or web browser. This makes it flexible and agile for experimenting with and executing code.

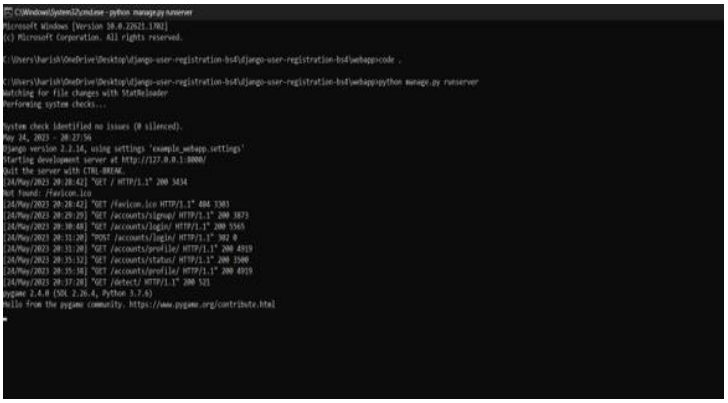

Figure2: Screenshot of Command line interface to run JavaScript

- **Screenshot of the user interface**

This screenshot of the user interface demonstrates a stylish and easy- to-use design, aimed at improving the user experience. Its simple layout and easy navigation make it effortless for users to engage with the application, boosting efficiency and productivity. Well-placed elements and attractive visuals ensure that everything is clear and easy to understand.

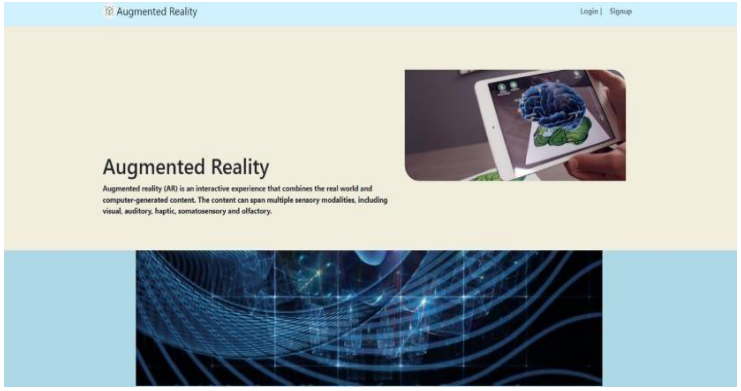

Figure3: Screenshot of the user interface

- ***Screenshot of Image profile interface***

This screenshot captures the essence of an image profile interface, serving as a dynamic platform for users to show their visual identity. With a clean and minimalist design, the interface puts the spotlight on the user's profile picture, offering a compelling representation of their persona or brand. The sleek layout and subtle graphic elements provide a polished backdrop, allowing the image. Users can easily upload or change their profile picture, customize settings, and manage their visual presence with ease. Whether it's a professional headshot, a captivating logo, or a vibrant illustration, the image profile interface provides a versatile canvas for users to express themselves creatively and leave a lasting impression.

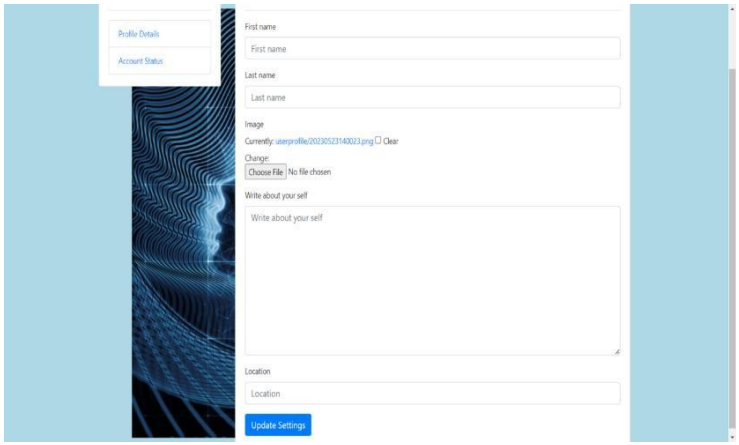

Figure4: Screenshot of Image profile interface

- ***Screenshot of the result with a AR generated image of respiratory system***

This screenshot captures the culmination of augmented reality (AR) technology, presenting users with an immersive visualization of the respiratory system. Through the integration of digital overlays onto the real-world environment, AR brings anatomical learning to life in a captivating and interactive manner. In this image, users are presented with a detailed representation of the respiratory system, complete with labelled structures and dynamic animations

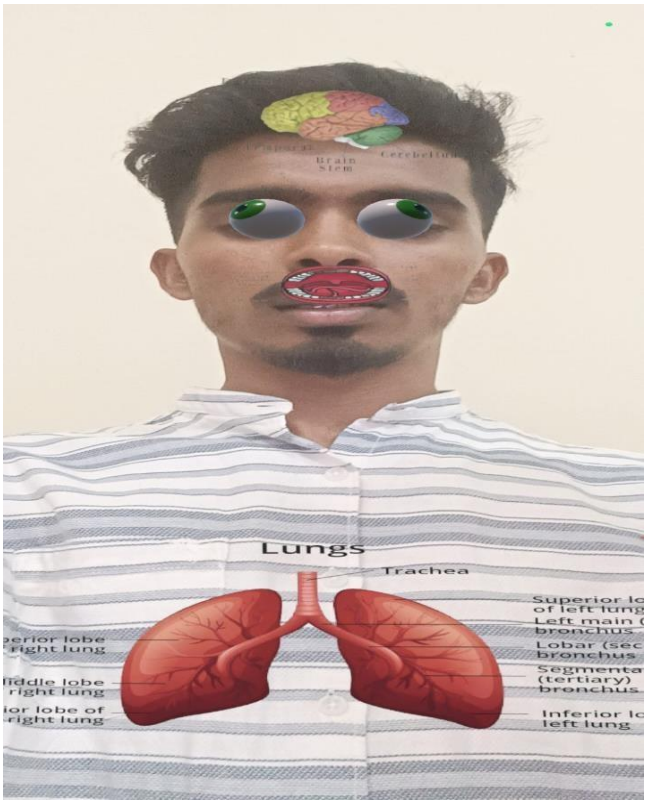

Figure4: Screenshot of the result with a AR generated image of respiratory system.

- ***Screenshot of the result with the AR generated image of digestive system***

This screenshot encapsulates the immersive experience of exploring the digestive system through augmented reality (AR). The AR- generated image presents users with a detailed visualization of the digestive tract, complete with interactive elements and informative labels. From the mouth to the intestines, users can navigate through the anatomical structures, gaining insights into the digestion process and the role of each organ. The dynamic nature of AR technology allows users to interact with the digestive system in real-time, zooming in on specific structures, rotating the model for different.

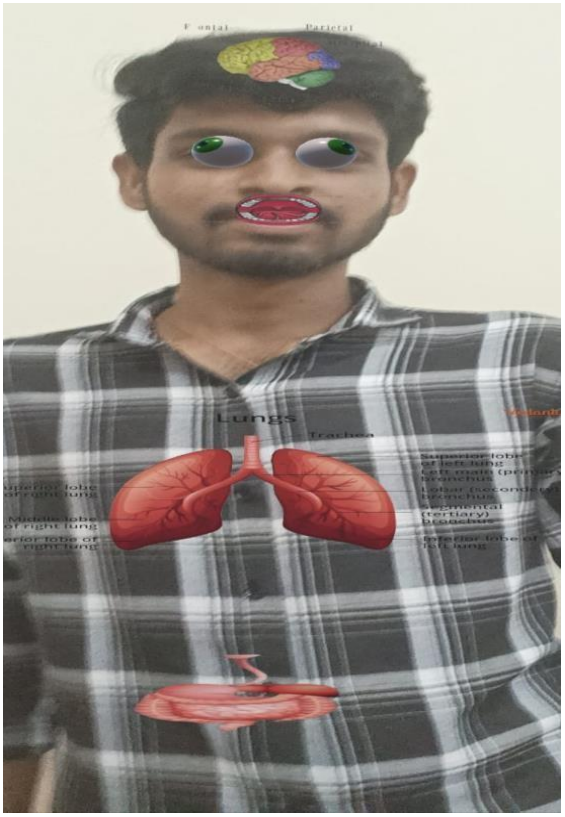

Figure5: Screenshot of the result with the AR generated image digestive system.

8.CONCLUSION AND FUTURE SCOPE

Augmented reality (AR) is a rapidly evolving technology with diverse applications, particularly in the field of education. By blending virtual information with the real world, AR enhances the learning experience, making it more interactive and effective. This paper has provided an overview of the building mechanism of AR systems and explored its usage in educational settings. The analysis highlights the benefits and challenges that learners may encounter when utilizing AR technology. Additionally, the paper talks about how we can use AR in different subjects and areas of learning. Showcasing its potential to facilitate the learning process. Overall, Augmented reality (AR) has the potential to completely change how we learn and explore new things in education. If we keep studying and improving AR technology, we could discover some really amazing new ways to teach and learn.

Future enhancement:

One potential enhancement could involve incorporating interactive features that allow users to dissect and explore anatomical structures layer by layer, providing a more immersive and educational experience. Additionally, integrating real-time simulations of physiological processes or pathology could further enhance the educational value of the model. Another idea could be to enable collaborative learning experiences where multiple users can interact with the model simultaneously, facilitating group discussions and knowledge sharing.

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