

ABSTRAK

Pembelajaran di sekolah sering kali monoton karena dominasi teori dan kurangnya variasi media, sehingga siswa kesulitan memahami materi. Salah satu cara mengatasi hal tersebut, penelitian ini mengembangkan media pembelajaran interaktif berbasis *Augmented Reality* (AR). Aplikasi ini berfokus pada pengenalan organ tubuh manusia menggunakan metode *markerless tracking* dan Mediapipe. Metode ini memungkinkan objek 3D organ tubuh ditampilkan secara *real-time* dan selaras dengan tubuh manusia asli tanpa perlu menggunakan penanda, sehingga menciptakan pengalaman belajar yang menarik.

Pengembangan aplikasi menggunakan metode *Multimedia Development Life Cycle* (MDLC) yang mencakup tahap konsep, desain, pengumpulan materi, pembuatan, pengujian, dan distribusi. Pembuatan aplikasi mengintegrasikan Vuforia dan Mediapipe. Pengujian sistem menggunakan metode *Blackbox* melalui dua tahap. *Alpha testing* menguji fungsionalitas dan sensitivitas sensor deteksi. Sementara itu, *Beta testing* dilakukan melalui kuesioner kepada 33 responden (guru dan murid SD Kanisius Klepu) guna menilai kelayakan aplikasi pada aspek pembelajaran, kepuasan pengguna, dan penilaian keseluruhan.

Hasil *Alpha testing* menunjukkan secara keseluruhan aplikasi berjalan dengan baik dari fitur tombol maupun sensitivitas marker-nya. Deteksi objek paling optimal saat pengguna berdiri tegak menghadap kamera (sudut 90 derajat), intensitas cahaya terang (100-140 lux), dan jarak 1,8 - 3 meter. Hasil *Beta testing* memperoleh persentase kelayakan 77,63% (kategori "baik"), yang didukung aspek penilaian keseluruhan (83,9%), pembelajaran (78,18%), dan kepuasan pengguna (76,16%). Kesimpulannya, teknologi AR dengan *markerless tracking* dan Mediapipe sangat layak dan efektif diimplementasikan sebagai inovasi media pembelajaran anatomi manusia.

Kata Kunci: *Augmented Reality*, Media Pembelajaran, Organ Tubuh Manusia, *Markerless Tracking*, Mediapipe, MDLC.

ABSTRACT

Learning in schools is often monotonous due to the dominance of theory and a lack of media variety, making it difficult for students to comprehend the material. To overcome this issue, this research develops an interactive Augmented Reality (AR)-based learning media named "MY AMAZING BODY AR". This application focuses on introducing human body organs using markerless tracking and Mediapipe methods. These methods allow 3D organ objects to be displayed in real-time and aligned with the actual human body, thereby creating an engaging learning experience.

The application development utilizes the Multimedia Development Life Cycle (MDLC) method, which encompasses the stages of concept, design, material collection, assembly, testing, and distribution. The creation of the application integrates Vuforia and Mediapipe to detect the human body. System testing employs the Blackbox method through two stages. Alpha testing examines the functionality and sensitivity of the detection sensor. Meanwhile, Beta testing was conducted via questionnaires distributed to 33 respondents (teachers and students of SD Kanisius Klepu) to assess the application's feasibility based on learning, user satisfaction, and overall assessment aspects.

Alpha testing results indicate that all features function properly. Object detection is most optimal when the user stands upright facing the camera (at a 90-degree angle), under bright light intensity (100-140 lux), and at a distance of 1.8 – 3 meters. Beta testing results achieved a feasibility percentage of 77.63% ("good" category), supported by the overall assessment (83,9%), learning (78,18%), and user satisfaction (76,16%) aspects. In conclusion, AR technology utilizing markerless tracking and Mediapipe is highly feasible and effective to be implemented as an innovative learning media for human anatomy.

Keywords: *Augmented Reality, Learning Media, Human Body Organs, Markerless Tracking, Mediapipe, MDLC*