ABSTRACT

Augmented Reality (AR) is a technology that combines two-dimensional and three-dimensional virtual objects into a real three-dimensional environment and then projects these virtual objects into real time. The communication system is a subject that is achieved during the Telecommunication Engineering study program, in practice it requires a tool that can visualize signals such as digital modulation. But in lectures during a pandemic like this, of course, it creates a burden by requiring online learning. Meanwhile, during the practicum process in the communication system lab, sometimes problems occur, such as damage to kits or other tools that suddenly break or die and it takes time to replace them. Even the final solution is to draw manually on a blackboard or book. Then for students who need review material using practical tools, the obstacles in licensing in using these tools for use are very difficult to do. The use of matlab is difficult for students for the first time, because it requires a GUI design process first.

In this final project, an application based on augmented reality technology using Unity3D software is created that can be installed on an android smartphone. It can display object shapes in the form of ASK, FSK, BPSK, QPSK, 16QAM modulation signals created using Adobe Illustrator software, by recording a marker using the camera on a smartphone. When the camera records the marker, the system in the application will render and then display the output object. There is a button in the application which is useful for changing the bit variations to be able to display different output objects.

Based on test results, all functions are 100% running well. With the average MOS value obtained is 3.366 for the appearance of the AR application, the MOS value is 3.366 for the function of the AR application and the MOS value is 3.450 for the benefits of the AR application. The system is able to output different objects in the form of ASK, FSK, BPSK, QPSK and 16QAM modulation signals with 4 bit variations and show the values of Vmax = 5 and Vmin = -5. Recording markers can be detected by the system with a distance of 20 – 90 cm for a marker size of 20 x 20 cm. The best distance to record the marker is 40cm. The intensity of light in bright conditions lux 1100 makes the process of making markers optimal with a delay of 0.37 seconds, in dark conditions the system cannot record markers. As for the angle for recording a good marker shows 45˚. At a marker slope of 90˚, the object signal has a 180 phase change, which means it shows an incorrect result. AR applications are able to work well on android smartphones. It is proven by the absence of problems during the process of testing the application. From the delay test by the AR application, the average total delay is 1.130 seconds. This can be proven through the results of the delay testing which varies from 0.34 to 4.4 seconds. The closer the marker distance that can be scanned, the greater the delay value.

Keywords: *Augmented Reality, Digital Modulation, Practicum Kit Digital Modulation.*