

## ABSTRACT

Combining the real world with the virtual world and then modeling it into 3D is an effort carried on Augmented Reality (AR) technology. Using fingers for computer operations on multi-devices makes AR more interactive. Marker-based AR is one type of AR that uses markers in its detection. AR technology is divided into three types: Projector-Camera-AR, Mobile-AR, and Hand-Gesture-AR. In this final project an AR system is designed which combines the Projector-Camera-AR and Hand-Gesture-AR with the fingertips as markers. Many previous studies have used color detecting in their detection. The AR system designed in this study uses tracking-by-detection. Finger detection using the Region-based Fully Convolutional Network method. This method develops detection results obtained from the Fully Connected Network. The results of detection and tracking will be integrated with a computer pointer and can be moved through the user's finger gestures. This final project uses stride configuration with a 25K, 50K, 75K, and learning rate scheme of 0,0003, 0,0004. Testing is done by making a model to test performance using the parameters: accuracy, Intersect of Union, and precision. The model with the best performance will be applied to the AR system. This project produces the best model, which is a model with 8-2-2-2 stride configuration, 50K training step and 0,0004 learning rate. The best model obtained an accuracy of 98.442%, IoU 0.845, and a precision of 3.131.

**Keywords:** *Augmented Reality*, R-FCN, Tracking-by-detection, Pointer, Finger Gestures.