ABSTRACT

Through the wall radar (TWR) is a technolrogy to detect and identify an object which located behind a wall. TWR is commonly used for military, police, and other applications. TWR is an upgrade of a ground-penetrating radar (GPR) application which is applied to the walls while GPR applied to the ground. The conventional TWR can only be used for one object and now need to be upgraded to detect more than one objects. Meanwhile, when there are two objects that near one another, the detection progress will be more difficult to interfere which should be two objects but detected as one. To get better accuracy, the radar multiple-input multiple-output (MIMO) antenna should be applied to TWR to provide better accuracy of object detection results.

In this thesis, MIMO radar antenna is applied to TWR applications modeled by 2-dimensional finite-difference time-domain (FDTD) TWR and simulated by MATLAB. This simulation aimed to detect two close metal objects behind a wall. To compare the B-scan image resulted by a single-input single-output (SISO) antenna with multiple-input multiple-output (MIMO), this thesis proves that MIMO antennas increased the resolution of detection results and also split the interference of two close objects. It is also proven that with the same SNR, the detection ability of MIMO antenna is better than SISO antenna.

Keywords: Through Wall Radar (TWR), Multiple Input and Multiple Output (MIMO), Finite-Difference Time-Domain (FDTD)