

## ABSTRACT

*Smart Antenna* is a system that is combination type antenna array is equipped with signal processing capability which optimize the radiation pattern automatically responded by a signal in the arounds. *Smart Antenna* can be implemented in wireless communication or radar. The advantages of using a *Smart Antenna* is capable of providing maximum gain and can set the direction of beam antenna (*beamforming*). One of component *Smart Antenna* is antenna feeder are *Rotman Lens*, *Bloss Matrix*, and *Butler Matrix*. *Butler Matrix* better than others because it is simple and it need a little of *hybrid 90°* so can reduce the dimensions.

This final project designed, realized and carried out measurement of the Butler Matrix 4x4 at frequency 1.27 GHz applied to *for radar application*. The components of Butler Matrix 4x4 consist of four *hybrid 90°*, one *crossover* and two *phase shifter 45°*. All components made using microstrip with type substrate *FR4 Epoxy* with a thickness of substrate is 1.6 mm.

Realization of *Butler Matrix 4x4* has a dimension 26,5 x 16 cm. In this design, the parameters of *phase error* for each *ports* consecutive is 5.71°, 2.11°, 7.91°, 15.49°, so the *phase errors* already met the specification is  $\leq 20^\circ$ . And also the result of *Return Loss* and *Isolation* already met the specification of magnitude  $\leq -10\text{dB}$  and *Insertion Loss*  $\geq -10\text{dB}$ .

Keywords: *Beamforming*, Butler Matrix 4x4, microstrip, *hybrid*, *crossover*