

UNIVERSITI TEKNOLOGI MARA

**BEAM SHAPING OF PHASED
ARRAY ANTENNA USING PHASE
OPTIMIZATION METHOD FOR
SATELLITE APPLICATION**

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ABSTRACT

The capability to control the shape and direction of an antenna's radiation pattern for optimizing the antenna coverage, has attracted a lot of attentions especially for Mobile and Wireless Communication System, Satellite and Radar System and Smart Antenna applications. In a wireless communication system, the main beam direction and radiation pattern of an antenna can affect the coverage area and interference level which in return can decrease the system performance. These problem can be overcome in a controlled way by introducing beam shaping or beam steering capability to the antenna. The performance and advantages of microstrip patch antenna is consider the perfect choice for communication engineers due to its low cost, low weight and low profile attributes.

In this thesis, a design of 1X4 microstrip array antenna operating at 6.3GHz is presented. The project objective is to investigate the ability of the designed array antenna to change the direction of the main beam and beam shape through a systematic pattern synthesis technique using least mean square method and to validate the design through accurate electromagnetic analysis. The designed array antenna's element consists of rectangular microstrip patch fed by inset feed. The single rectangular microstrip patch size and feed position is obtained by theoretical calculation, MATLAB and CST Studio software simulation. Based on the single element design, an array of four elements with equal sizes and spacing is designed. The desired beam direction or beam shape is determined through passive feed control of the transmission line length to adjust each element's phase of the designed antenna.

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