

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

**Area: Microwave & Radio Frequency (MWRF)**

**Host: Assoc Prof Koenraad Mouthaan**

<b>TOPIC</b>	:	<b>A Compact L-band 4×4 Butler Matrix Using Commercial LTCC 90° Hybrids</b>
<b>SPEAKER</b>	:	<b>Mr Xiao Juntian Graduate Student, ECE Dept, NUS</b>
<b>DATE</b>	:	<b>Thursday, 26 March 2026</b>
<b>TIME</b>	:	<b>10:00AM-11:00AM</b>
<b>VENUE</b>	:	<b>E4-05-39 ECE Conference Room</b>

### ABSTRACT

A compact 4×4 Butler matrix for 1.25 GHz beamforming applications is presented. The design combines microstrip transmission lines with commercially available low temperature co-fired ceramics (LTCC) 90° hybrid modules, replacing conventional couplers and crossovers to achieve significant miniaturization. Compared with a conventional microstrip Butler matrix, the proposed design achieves a 96% size reduction, with a core area of 57 mm×43mm (0.24λ×0.18λ at 1.25GHz). After fabrication, the Butler matrix is measured over a wide frequency range, and it is found that within the operating bandwidth from 1.12 GHz to 1.3 GHz, i.e., a fractional bandwidth of 14.9%, the insertion loss is below 2 dB, the input reflection loss and isolation are better than 20 dB, and the phase difference between the output ports is within ±20°. The proposed design is suitable for compact L-band phased-array feed networks.

### BIOGRAPHY

Xiao Juntian is currently pursuing his M.Eng degree in the Department of ECE, NUS. His current research interests are beamforming networks and Butler matrix design.

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