

RESEARCH ROADMAP

Developing innovative microwave and millimeter-wave components, integrated circuits, and systems for wireless broadband communication, biomedicine, and environmental protection is our research roadmap (Fig. 1). These include compact filters, transceiver MMICs, Butler-matrix beamforming phased arrays (Fig. 2), vital radars, wireless indoor positioning systems (Fig. 3), and wireless ecological monitoring systems, based on printed-circuit low temperature co-fired ceramic (LTCC), integrated passive device (IPD), and Si-based and III-V compound MMIC technologies.

For millimeter-wave wireless broadband communication, a new beamforming technique has been demonstrated, where the adaptive antenna beam pattern is synthesized in beam space instead of element space of the conventional approach. This beamformer consumes only 30 mW and the chip size is only 1.4 mm² (Fig. 2). An emergency E-Nurse system was also developed (Fig. 3), where the vital radar and wireless positioning techniques are integrated into a name-card size tag to simultaneously detect the heart-beat, breath rates, and indoor/outdoor positions.

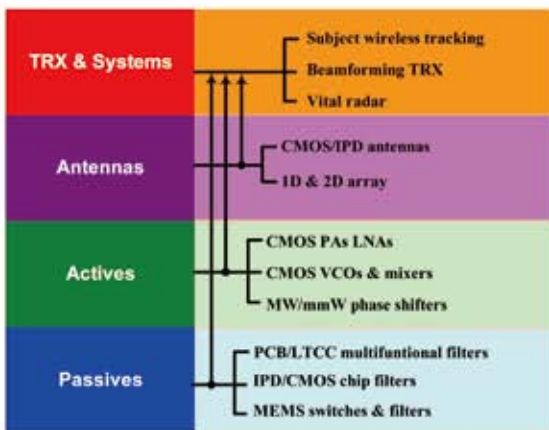


Fig. 1 EMIC research roadmap

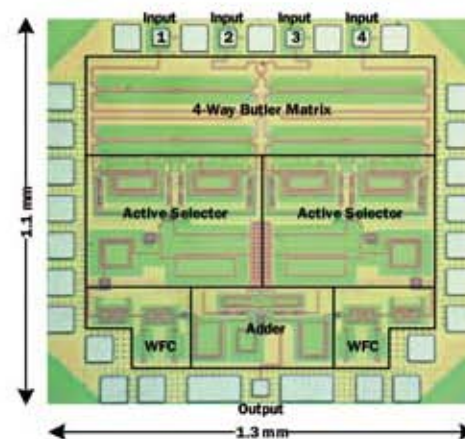


Fig. 2 CMOS Butler phased-array beamformer



Fig. 3 Emergency E-nurse system: Cardiopulmonary Detection and Wireless Positioning

