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Antenna-on-X: Turning Optical Surfaces into Invisible Antennas for wireless applications

Abstract: Modern devices are increasingly dominated by optical surfaces such as displays, headlamp covers, and camera lenses. These surfaces leave little room for the antennas that wireless applications such as NFC, Wi-Fi, 5G, 6G, and integrated sensing and communication (ISAC) require, and they must remain optically clear. This talk reviews our research on antenna-on-X, an approach that turns these optical surfaces into antenna apertures. Across these platforms, it distills common design principles, including the transparency–conductivity trade-off, mesh and dummy-grid design, and mode- and dispersion-engineered multiband operation, and discusses opportunities for foldable devices, vehicles, drones, and robots.