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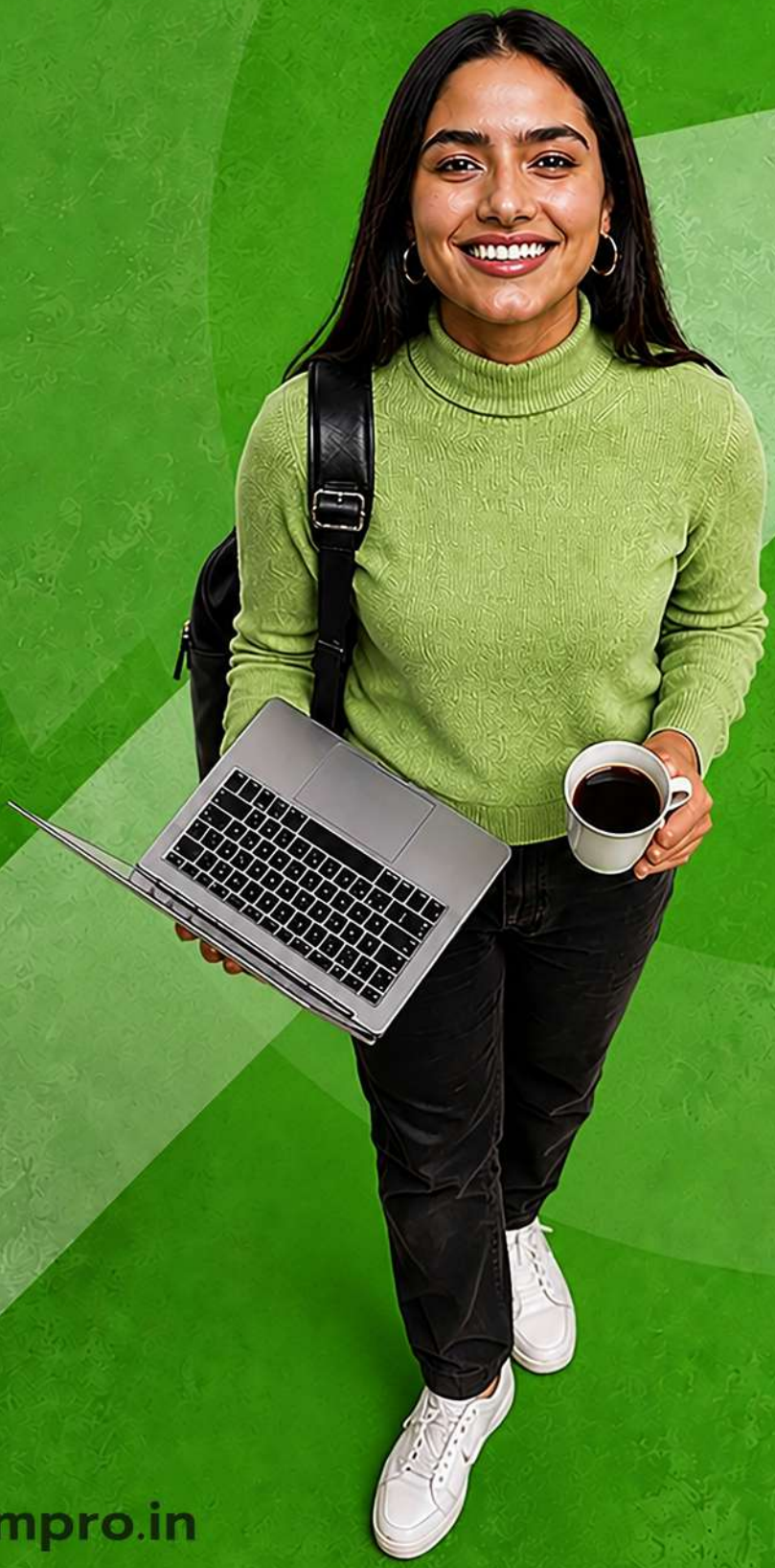
ANTENNA CST

2026 - 2027

TITLE & ABSTRACT

Advanced Academic Final Year Projects



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High-Gain Wide-Angle Scanning Array Using Slot-Based Patch Antenna for Ku-Band

PROJ24009

This project designs a high-gain slot-based microstrip patch antenna array for Ku-band applications using CST Studio Suite. The antenna geometry is modeled and optimized to achieve wide-angle beam scanning with improved radiation characteristics. Key parameters such as S11, VSWR, gain, bandwidth, and radiation pattern are analyzed. Parametric optimization is performed by varying slot dimensions, patch geometry, and element spacing. The proposed antenna can be applied to satellite communication and radar systems requiring high gain and wide-angle coverage.

Isolation and Circular Polarization Diversity in 2 × 1 MIMO Microstrip Patch Array Using Closed Metallic Loop

PROJ24020

This project develops a 2 × 1 MIMO microstrip patch antenna array with improved isolation and circular polarization diversity using CST. A closed metallic loop is incorporated into the antenna structure to reduce mutual coupling between antenna elements. The design is evaluated using S-parameters, isolation, axial ratio, gain, efficiency, and radiation patterns. CST simulation is used to optimize the loop dimensions and antenna spacing. The proposed structure is suitable for compact wireless communication and MIMO applications.

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Multi Band Miniaturized 2 × 2 MIMO Antenna for Sub-6-GHz Applications

PROJ24009

This project designs a compact 2 × 2 MIMO antenna operating across multiple Sub-6-GHz frequency bands. CST Studio Suite is used to model and optimize the antenna geometry, substrate, feeding structure, and decoupling elements. S-parameters, isolation, gain, efficiency, envelope correlation coefficient, and radiation patterns are analyzed. The antenna dimensions are minimized while maintaining acceptable impedance matching and MIMO performance. The design can support modern 5G wireless communication applications.

Flexible Cylindrical Dielectric Resonator Antenna for X-Band Applications

PROJ24020

This project develops a flexible cylindrical dielectric resonator antenna for X-band communication and sensing applications using CST. The antenna is modeled on a flexible cylindrical surface to study its performance under conformal conditions. Resonant frequency, impedance bandwidth, gain, efficiency, and radiation characteristics are analyzed. Different bending conditions can be simulated to evaluate the flexibility and stability of the antenna. The design is suitable for satellite communication, wireless sensor networks, and flexible RF systems.

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Compact MIMO Four-Antenna Module Formed by Two Mirrored Dual-Polarized Antennas for 6G U6 GHz Mobile Devices

PROJ24009

This project designs a compact four-element MIMO antenna module for mobile devices operating in the 6G sub-6-GHz frequency range. CST Studio Suite is used to model two mirrored dual-polarized antenna structures and analyze their interaction. Isolation, impedance matching, gain, efficiency, radiation pattern, and polarization characteristics are evaluated. The antenna layout is optimized to achieve high performance within limited mobile-device space. The design supports future high-speed wireless and 6G communication applications.

Compact High-Frequency-Ratio Tri-Band Antenna for Sub-6 GHz and mmWave Co-Integration

PROJ24020

This project develops a compact tri-band antenna capable of supporting Sub-6-GHz and millimeter-wave communication. CST is used to design the antenna structure and optimize multiple resonating elements for different frequency bands. S11, bandwidth, gain, radiation efficiency, and radiation patterns are analyzed at each operating frequency. Parametric studies are performed to control the resonant frequencies and improve impedance matching. The antenna provides a compact solution for multi-band 5G and future wireless communication devices.

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A Wearable Low-SAR Meandered Monopole Antenna Loaded With a Compact Backed AMC

PROJ24009

This project develops a wearable meandered monopole antenna with an artificial magnetic conductor backing for low-SAR operation. CST Studio Suite is used to simulate the antenna near human-body models and evaluate electromagnetic performance. Specific absorption rate, impedance matching, gain, efficiency, and radiation characteristics are analyzed. The AMC structure is optimized to reduce backward radiation and improve antenna-body isolation. The design is suitable for wearable healthcare, fitness monitoring, and body-area network applications.

Printed Slotted Dual-Port Shared Radiator Circular Patch Antenna for Wideband Wearable Sub-6-GHz 5G Applications

PROJ24020

This project designs a printed dual-port circular patch antenna for wearable Sub-6-GHz 5G applications using CST. Slots are introduced into the shared radiator to achieve wideband operation and polarization diversity. CST simulations evaluate S-parameters, port isolation, gain, efficiency, and radiation patterns. The antenna is also analyzed under different bending and body-proximity conditions. The proposed design provides a compact and flexible solution for wearable wireless communication systems.

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Highly Compact Dual-Band Four-Port Integrated Lens MIMO Antenna for 5G New Radio IoT Devices

PROJ24009

This project develops a compact four-port MIMO antenna with an integrated lens for dual-band 5G IoT applications. CST Studio Suite is used to design the antenna and analyze the interaction between multiple ports and the lens structure. Parameters including S11, isolation, gain, efficiency, radiation pattern, and envelope correlation coefficient are evaluated. The integrated lens is optimized to improve directional gain and radiation performance. The antenna is suitable for compact 5G New Radio and IoT devices.

Compact 5G Broadband Antenna for Sub-6-GHz Wireless Applications

PROJ24020

This project develops a compact broadband microstrip antenna for Sub-6-GHz 5G communication. CST is used to design and optimize the patch, substrate, ground plane, and feeding structure. S11, VSWR, impedance bandwidth, gain, efficiency, and radiation patterns are analyzed through electromagnetic simulation. Parametric optimization is performed to obtain broadband impedance matching within the required frequency range. The proposed antenna can support modern wireless communication and 5G-enabled devices.

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Integrated Design Framework for Scalable Series-Fed Microstrip Patch Antenna Arrays With Machine Learning Assistance

PROJ24009

This project develops a scalable series-fed microstrip patch antenna array using CST Studio Suite with machine learning-assisted optimization. Different array dimensions and geometrical parameters are simulated to generate antenna performance data. Machine learning models are trained to predict parameters such as gain, bandwidth, and beam characteristics. The predicted designs are validated using CST electromagnetic simulations. The framework reduces design iterations and supports efficient development of high-performance antenna arrays.

High-Gain Wide-Angle Scanning Array Using Slot-Based Patch Antenna for Ku-Band

PROJ24020

This project develops a Ku-band slot-based patch antenna array for high-gain and wide-angle beam scanning applications. CST Studio Suite is used to model individual antenna elements and the complete array structure. Beam steering performance is evaluated by changing excitation phase and element configuration. Gain, S11, radiation pattern, side-lobe level, and scanning characteristics are analyzed. The optimized array is suitable for satellite communication, radar, and advanced wireless systems.

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Printed Slotted Dual-Port Shared Radiator Circular Patch Antenna for Wideband Wearable Sub-6-GHz 5G Applications

PROJ24009

This project develops a dual-port circular patch antenna with a slotted shared radiator for wearable 5G applications. CST is used to optimize slot dimensions, feed positions, substrate properties, and antenna geometry. The design is evaluated using bandwidth, isolation, gain, efficiency, and radiation pattern parameters. Human-body proximity and bending conditions are included to assess wearable performance. The proposed antenna provides wideband operation in a compact and flexible configuration.

A Two-Stage Machine Learning Framework for Predicting and Validating the Structural and Beam Characteristics of a Wideband Switched-Beam Antenna

PROJ24020

This project combines CST electromagnetic simulation with machine learning for switched-beam antenna design. Multiple antenna geometries and beam configurations are simulated in CST to create a performance dataset. A two-stage machine learning model predicts structural parameters and beam characteristics such as gain and beam direction. The predicted results are validated against CST simulation outputs. The approach reduces computational design iterations and enables faster antenna optimization.

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An Ultra-Compact Embedded Slot Antenna for Full Wi-Fi 6/6E/7 Coverage in Mobile Devices

PROJ24009

This project develops an ultra-compact embedded slot antenna capable of covering modern Wi-Fi frequency bands. CST Studio Suite is used to optimize slot dimensions, feeding structure, ground configuration, and antenna placement. S11, bandwidth, gain, efficiency, and radiation patterns are evaluated across Wi-Fi 6, 6E, and 7 operating ranges. The antenna is designed to maintain performance within the restricted space of mobile devices. The proposed structure supports multi-band wireless connectivity.

Dual-Polarized Super-Wideband Antenna With Artificial Materials-Enhanced Gain for 5G Millimeter-Wave Applications

PROJ24020

This project develops a dual-polarized super-wideband antenna with artificial-material structures for enhanced gain. CST is used to design and simulate the antenna and investigate the effect of the artificial material on electromagnetic performance. Bandwidth, gain, polarization isolation, efficiency, S-parameters, and radiation patterns are analyzed. Parametric optimization is used to improve gain while maintaining wideband operation. The antenna is suitable for 5G millimeter-wave communication and remote sensing applications.

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A Two-Stage Machine Learning Framework for Predicting and Validating the Structural and Beam Characteristics of a Wideband Switched-Beam Antenna

PROJ24009

This project presents a machine learning-assisted approach for optimizing a wideband switched-beam antenna. CST simulations are performed for different structural configurations and beam-steering conditions. The generated dataset is used to train models that predict antenna geometry and beam characteristics. Predicted designs are verified using CST electromagnetic simulation results. The framework helps reduce simulation time and supports automated antenna design optimization.

Electronically Tunable Half-Mode Substrate-Integrated Waveguide Coupler

PROJ24020

This project designs an electronically tunable half-mode substrate-integrated waveguide coupler using CST Studio Suite. The structure is modeled to achieve controlled coupling between RF transmission paths. Electronic tuning elements are incorporated to adjust the coupling characteristics over the desired frequency range. S-parameters, insertion loss, return loss, isolation, and coupling coefficients are analyzed. The proposed design can support reconfigurable RF front ends and modern wireless communication systems.

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Analysis of a High-Gain, Wideband Hybrid Resonator Antenna With Near-Field Capacitive Coupling for 5G Communication Applications

PROJ24009

This project develops a high-gain wideband hybrid resonator antenna for 5G communication applications using CST. Near-field capacitive coupling is used to improve excitation and bandwidth characteristics. The antenna structure is optimized by varying resonator dimensions, coupling gaps, and feeding parameters. S11, gain, efficiency, bandwidth, and radiation patterns are evaluated through CST simulation. The proposed antenna provides improved RF performance for high-speed 5G communication systems.

A Compact On-Metal UHF RFID Tag Antenna Incorporating Multiple T-Shaped Tuning Slots

PROJ24020

This project designs a compact UHF RFID tag antenna suitable for operation on metallic surfaces. CST Studio Suite is used to model the antenna, metal backing, substrate, and RFID tag structure. Multiple T-shaped tuning slots are introduced to control the resonant frequency and improve impedance matching. Return loss, bandwidth, gain, radiation efficiency, and read-range characteristics are analyzed. The proposed antenna provides a compact and reliable solution for RFID tracking in challenging metallic environments.

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