Engineering Project Titles M Alsunaidi Fall 2024

	Title	Abstract	Remarks
1	A Multi-layer Meanderline Patch Antenna for Wi-Fi Applications	A hybrid traditional FR-4 PCB substrates and flexible polymer-based substrates are used to design a multi-layer meanderline antenna. The work starts with simulation analysis on COMSOL to study the performance and parameters of the antenna design and arrive at acceptable bandwidth and radiation pattern. Next, the successful design is fabricated and tested in our antenna lab.	2 Students Background: EE4051 Work hours/week: 10 Duration: 1 semester
2	Metal Discrimination Using Broadband Pulse Induction in Metal Detectors	One approach to discriminate between non-ferrous metals in metal detectors is to transmit a broadband pulse. A 2D simulation model based on the solution of Maxwell's equations is used to study the response of different metals based on the eddy currents generated inside the metal. Also, pulse parameters are studied for best discrimination.	1 Student Background: EE4051 and Programming skills Work hours/week: 10 Duration: 1 semester
3	Double-D Coil Design Parameters for Metal Detectors	Most modern metal detectors use the double-D coil structure. In this project, the different parameters that affect the sensitivity and effectiveness of DD-based metal detection is studied. The work is done first by simulation using a 3D Maxwell's equations solver. Experimental work is done for verification.	2 Students Background: EE4051 and Programming skills Work hours/week: 10 Duration: 1 semester
4	A Complementary Meanderline Patch Antenna for IoT Applications	A novel double-sided meanderline patch antenna is designed and tested to serve in IoT applications. The antenna and its complement are printed on both sides on a flexible substrate. The work starts with simulation analysis on COMSOL to study the performance and parameters of the antenna design. Next, The successful design is fabricated and tested in our antenna lab.	2 Students Background: EE4051 Work hours/week: 10 Duration: 1 semester
5	Bandwidth Enhancement of ISM-band 5G Patch Antennas Using Shorting Pins	Methods based on shorting pins for bandwidth enhancement of patch antennas are studied. The work starts with simulation analysis on COMSOL to study the performance and parameters of the antenna design. Next, The successful design is fabricated and tested in our antenna lab.	2 Students Background: EE4051 Work hours/week: 10 Duration: 1 semester
6	Reusable, Non-invasive LC-shaped Patch Antenna Bio-sensor	A patch antenna design utilizing LC resonance in detecting biomaterial in the RF range is considered. The L and C components are realized by the antenna shape with a small compartment for the bio sample. The work starts with simulation analysis on COMSOL to study the performance and parameters of the sensor design. Next, The successful design is fabricated and tested in our antenna lab.	2 Students Background: EE4051 Work hours/week: 10 Duration: 1 semester
7	A Sensitive Microwave Sensor for Dielectric Constant Measurement	The concept of this RF sensor is based on the change in coupling between two resonating elements. The unknown dielectric material, when placed between the elements, causes a change in the coupling, which corresponds to the dielectric constant. The work starts with simulation analysis on COMSOL to study the performance and parameters of the sensor design. Next, The successful design is fabricated and tested in our antenna lab.	2 Students Background: EE4051 Work hours/week: 10 Duration: 1 semester
8	Cavity-assisted Plasmonic Sensor for Glucose Level Determination	A bio-medical sensor based on plasmonic resonance at metal-dielectric interface is studied. A nano-cavity is introduced to enhance the sensitivity of the sensor. The work is performed using a 2D simulation algorithm based on the solution of Maxwell's equations. The application of this optical sensor in the determination of Glucose concentration is studied.	1 Student Background: EE4051 and Programming skills Work hours/week: 10 Duration: 1 semester