ECEN 452 Lab 9: Patch Antenna
HFSS Design

For the Lab 9 activity you made an edge-fed patch antenna using copper tape on an FR4 substrate. You used either a quarter wave transformer or a single stub to impedance match the antenna. In the HFSS file for Lab 9 you will design a probe-fed patch antenna on 62 mil FR4 at 3GHz; same parameters as the in-lab activity. You will impedance match this antenna by adjusting the position of the probe feed. The following steps outline the process for designing this antenna.

1. Calculate the dimensions of the patch using the formulas and design parameters from the in-lab activity (f = 3GHz, ε_r = 4.1, h = 1.5748mm)
2. Enter these dimensions into the HFSS design for patch_width and patch_length
3. Enter a value for the probe position along the x-axis (probe_feed_x)
4. Look at the VSWR plot to make sure the patch is resonant at 3GHz. You should see a minimum at 3GHz. Adjust patch_length accordingly.
5. Look at the Smith Chart to check the impedance match of the antenna. Use your notes from class to determine whether to move the probe closer to the center or closer to the edge of the patch. Adjust probe_feed_x accordingly and rerun your simulation.
6. Repeat steps 4 and 5 and keep adjusting until the design is impedance matched at 3GHz. You should see a VSWR minimum at 3GHz (±50MHz); try to get the value at 3GHz below 1.2. The 3GHz marker on the Smith Chart should be close to the center of the Smith Chart

Compare your results to the patch antenna you made during the lab session and use the lab report template to summarize the design objective, process, and results for Lab9.