**Project 2 - Measuring Wireless Channels**

**Project Overview**

* The project is a group project.
* In this project, each team shall use the Linksys router to set up a wireless LAN, then use another device (PC or smartphone) to measure wireless channel, next use Python to analyze the measurement data, and finally prepare a report to summarize the observations.

**Required Steps**

* 1. Channel Measurement
  2. Install a software in PC or smartphone that can measure the signal strength of Wi-Fi signal
  3. Place the router at a certain position
  4. Use PC (or Smartphone) to measure the signal strength at different positions
     + You will need to measure at 10 or more different locations
       1. It is preferred that all locations are along the same line
     + You will need to determine the unit for distance
     + For each measurement, you will need to measure
       1. the signal strength in dBm, and
       2. the distance between the router and the receiver in units
  5. Save your measurement in a txt file
  6. Data analysis in Python
  7. Install the latest version of Python 3 and Jupyter notebook
     + You can install sklearn in Python for data analysis
  8. Create a Jupyter notebook and do the following
     + Load measurement data
       1. You shall have a list of distance and a list of signal strength
     + Calculate a list of log of distance
     + Plot data using the lists for log of distance and signal strength in dBm
       1. The x-axis shall be the log of distance
       2. The y-axis shall be the signal strength in dBm
     + Use linear regression to analyze the measured data
       1. The input for linear regression must be
          1. The list of log of distance
          2. The list of signal strength in dBm
       2. The output shall include the linear coefficient and variance
     + Use the linear coefficient and variance to draw a line with confidence interval in the same figure for the measured data
  9. Record a video to walk through all steps in your data analysis
  10. Write a report that includes the following
  11. The software you installed in Step 1.1
  12. The environment of your experiments in Step 1.3
  13. The detailed settings of your experiments in Step 1.3
  14. All measurement data in a table
  15. The figure (or figures) generated in Step 2.2
  16. The discussion about the accuracy of linear regression
  17. Submit the report and Jupyter notebook in ecourse