Passive Direction of Arrival System
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Introduction and Background
The aim of the project is to design and build a two antennas system which will detect the direction of a single incoming signal whose frequency is within a specified frequency range.

This system consists of four main components:
- Patch antennas
- Power Detectors
- Data Capturing Circuit
- Software part

Significance
The two antenna system can be used to perform amplitude based direction finding. These two antennas are identical to each other and are squinted at a fixed angle alpha from the y-axis. The incoming from the direction will go through the two antennas' radiation pattern at different places, therefore the two antennas will receive different power. Therefore a look-up table which contains the relationship between the power ratio and the arriving angle will be used to find the direction of arrival.

Antennas are going to detect signal with frequency of 1710-1785MHz. Patch antennas are designed and built. The three antennas are tested in the chamber with the network analyzer to test its bandwidth and central frequency and the results are compared with simulated one. The center of two antennas are slightly lower than expected but the cover range is still acceptable.

Outcomes and Limitations
The powers received by antennas and the angle of incidence will be shown in MATLAB GUI. The system works on a distance of 45cm and degree range of 45-135 degree.

Antenna Design, Simulation and Test Analysis

Future Work
- Dual band and Broadband antenna: add slots on radiating patch.
- By combine the amplitude and phase method to extend the system’s effective distance.
- To increase the effective angle range: using eight or more antennas to expand the effective angle to 360 degree.
- To detect multiple signals: using antenna array. The number of signals resolvable depends on the number of elements of the array. With n elements, it can resolve n-1 elements.

Power Detectors
To detect the power received by Antennas and show the result in the form of voltage.

Data Capturing Circuit
To send data from the power detectors to computers for further processing.

Patch Antenna & its Radiation Pattern