

## ABSTRACT

Nowadays, the development of technology is getting more to utilize subsurface (surface of underground) as its medium. To be able to detect objects that are located at under ground level without digging the soil, it is needed a narrow duration of pulse in order to generate a good quality of pulse. In addition, it is also needed an ultra-wide band frequency. But, obviously it will cause a late-time-ringing.

To solve the problem then was created a system that can detect objects under the soil surface without a dig, which is **Ground Penetrating Radar (GPR)**. GPR works by using the signal reflection. The GPR system having 2 identic antenna which function as transmitter and receiver antenna. These antennas need to have wide bandwidth characteristic. Therefore, this final project uses a *bowtie antenna* which has an ultra-wide band characteristic. The addition of resistive loading on those 2 arms of bowtie antenna can reduce the reflection signal which can cause a *late-time-ringing*, so that it changes the signal characteristic to frequency domain.

The bowtie antenna design also can suppress the ringing value. The VSWR value which is generated by this bowtie antenna is  $\leq 2$  and the ringing value becomes  $\leq 10\%$ . While the value of bandwidth in each designs of antenna is  $\geq 150$  MHz, and it meets the requirement of *ultra wideband* condition. In summary, those specifications above show that the bowtie antennas with resistive loading are suitable for middle resolution GPR System.

**Keyword :** GPR, *bowtie antenna*, *ultra-wide band*, *late-time riging*, resistive loading