ABSTRACT

The development of electronic technology in the field of geophysics has led to the ground penetrating radar (GPR) method. Currently, GPR is widely used in geophysical surveys, underground infrastructure mapping, unexploded ordnance (UXO) and mine detection, buried object search, archeology and many other fields of study. In most cases, GPR surveys are tough work and can be very dangerous for field personnel due to the harsh topographic environment and weather conditions. This is where the UAV comes into play. UAVs are much lighter (compared to manned aircraft or helicopters), easy to transport by car and capable of flying independently at low altitude with high precision. Such an approach ensures the delivery of survey results that is accurate, is also safer for personnel, and is more time efficient.

In this final project, a UAV with a hexa x configuration has been designed that is able to carry the GPR along the area to be observed manually or automatically, to retrieve the data and then process it to determine the image of the soil in the area.

Based on the test results using a 6 cell LiPo battery with a capacity of 16 Ah, hexacopter is capable of flying in a time range of 17.3 minutes to 17.5 minutes when no load and 11.6 to 12 minutes when using GPR loads. Hexacopter is capable of flying with a maximum take-off weight (MTOW) of 13.3 Kg with a maximum load of 6 Kg. In carrying out the mission, the hexacopter is able to perform fairly good constant elevation control with an altitude error rate of 6% to 6.5% when not carrying a GPR load and 8.5% to 24.5% when carrying a GPR load. Hexacopter is also capable of carrying out autonomous missions on a predetermined path with a waypoint error of 32 cm to 354 cm.

Keyword : *UAV, Hexacopter, Ground Penetrating Radar* (GPR)