UNIVERSITI TEKNOLOGI MARA
Institut Pengajian Siswazah

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 14, October 2018

14th ISSUE

IGS Biannual Publication

12

Name : WARISHAH ABDUL WAHAB

Title : AUTOMATIC DETECTION OF UNDERGROUND UTILITY USING GROUND PENETRATING RADAR (GPR) DATASET

Supervisor : ASSOC. PROF. SR. DR. JASMEE JAAFAR **(MS)**

ASSOC. PROF. SR. DR. AZMAN MOHD SULDI **(CS)**

Complete and accurate information regarding subsurface material such as underground utility is becoming increasingly important nowadays. With the right information and updates on the underground utility such as location, type, depth and material; catastrophic events such as underground utility damage caused by miss digging and disruption to existing utility services can be avoided or at least minimised. Based on the study, Ground Penetrating Radar (GPR) is one of the latest non-destructive geophysical technology and most widely used in detecting underground utilities. GPR has the ability to detect both metal and non-metal, however, it is unable to identify the type of underground utility object. Many researchers come out with their own techniques to interpret the GPR image. The current method requires experience in interpretation. Thus, in this study, a new method to detect underground utility by utilising the Normalised Cross Correlation (NCC) template matching technique is proposed. This technique will reduce the dependency on experts to interpret the radargram, less time consuming and eventually save cost. Upon detection, the accuracy of the system is assessed. From the accuracy assessment performed, it is shown that the system provides accurate detection results for both, depth and pipe size. The RMSE for the buried pipe depth obtained by using the proposed system is 0.110 m, whereas the highest percentage match obtained is 91.34%, the remaining 8.66% mismatched might be due to the soil condition, velocity or processing parameter that affected the radargram. Based on the assessment, the developed system seems capable to detect the subsurface utility if the radar image and template image used is acquired using the same antenna frequency, point interval and similar GPR instrument. Three Geographical Information System (GIS) software (ArcGIS, Quantum GIS and SAGA GIS) have been compared and used in achieving the objective. The final outputs of the study include portraying the detected utility in 3D view.