

## **The application of Ground Penetrating Radar (GPR) in mapping buried utilities**

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Ground Penetrating Radar (GPR) telah lama digunakan dalam pelbagai bidang. Aplikasi kaedah ini semakin berkembang sejajar dengan penemuan kaedah-kaedah baru dan permintaan bagi tinjauan yang besar. Projek ini memfokuskan kepada pengesanan bahan-bahan yang ditanam di bawah permukaan bumi seperti paip dan kabel dan menghasilkan imej 3 dimensi bagi objek-objek tersebut. Dua kawasan tinjauan yang telah dipilih ialah tapak Konvokesyen, Universiti Sains Malaysia dan kilang Intel PG12, Bayan lepas, Pulau Pinang. Data-data diambil dengan menggunakan peralatan GPR RAMAC dengan antena 250MHz. Selepas data diproses dengan menggunakan penuras seperti penuras DC dan AGC Gain, kesemua paip dan kabel yang

tertanam di bawah permukaan bumi ditemui. Kedalaman objek-objek tersebut juga dapat dikenalpasti. Kelebaran objek-objek tersebut agak sukar untuk dikenalpasti, tetapi ahli geofizik yang berpengalaman dapat meramal kelebaran objek tersebut dengan baik.

*Ground Penetration Radar (GPR) has since long been used in various fields. But its range of applications is growing bigger with the emergence of new techniques and requests for larger investigations. This Project focuses on detection of buried utilities such as pipes, and cables and producing 3 dimensional images of those utilities. Two test sites had been chosen as the study field, which were Tapak Konvokesyen, Universiti Sains Malaysia, and Intel PG12, Bayan Lepas, Pulau Pinang. Data was collected using RAMAC GPR 250MHz shielded antenna. After preprocessing using filter such as DC Filter and AGC Gain, all the pipes and wire beneath the ground were detected. The depth of the object can also be obtained. Determination of the object width was quite difficult, however experience geophysicists are able to predict with confidant.*