

UNIVERSITI TEKNOLOGI MARA

**GPR-BASED ADAPTIVE NEURO
FUZZY INFERENCE SYSTEM
(ANFIS) MODEL FOR DIESEL
PIPELINE CORROSION**

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Thesis submitted in partial fulfillment
of the requirements for the degree of
Geomatics Science and Surveying

Faculty of Architecture Planning and Survey

January 2019

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

This research stimulated the investigation of using the Adaptive Neuro Fuzzy Inference System (ANFIS) model in detecting corrosion of diesel pipeline. This problem highlighted to retrieve the permittivity on contaminated soil because there were several common factors that affected dielectric permittivity such as temperature and moisture content which were causing difficulty in GPR data interpretation. This research aims to investigate the capability of ANFIS in locating the underground diesel pipeline corrosion based on GPR data. The aim of this research can be achieved by identifying three objectives for these studies. The objective is to identify the parameters involved in designing ANFIS, to identify the capabilities of ANFIS in for modeling the GPR data, and to produce an analysis of the technique for locating the corrosion in the underground pipeline. The study area was at UiTM Perlis. The experimental site designed and filled with dry sand and Jitra soil with corroded pipeline installed and diesel is inserted through the pipeline. GPR measurement carried out by using an 800MHz antenna while the temperature and soil moisture reading recorded to analyze the relationship between temperature and soil moisture towards permittivity. Dielectric permittivity of underground contaminant retrieved based on dielectric contrast in radargram, GPR signal amplitude, time travel, and electromagnetic wave velocity. The dielectric permittivity reading then analyzed using the ANFIS method. MATLAB is used to produce a model for a corroded pipeline based on the ANFIS method. This study aimed to understand and utilize the use of ANFIS in producing a model for detecting corrosion on the underground pipeline.

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