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Project Title: To develop Artificial Neural Network based Automated Welding Defect Classification Methodology

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Project Outline:

This project aims at developing a methodology, using artificial neural network (ANN) to process complex welding parameters and images, for detecting and classifying the welding defects which are perceived difficulty by human eye.

MIG welding is one of the most widely used process in construction industry for prefabricated structure. Using MIG welding mild steel as case study for network training and validation could fully demonstrate and evaluate the characteristics of the developed welding defect classification methodology.

Under this project, an automated welding and monitoring system would be established in order to obtain the welding data and images for further processing and network training. Trial testing would be conducted to evaluate the performance of the methodology. Documentation would be compiled for technology transfer.

By adopting this newly methodology for welding defect classification, the production efficiency and cost effectiveness could be improved. This helps to expand the application of robotic welding and automated inspection through applying neural network in construction industry and bring to endless possibility in further research and development.

The research is planned to be conducted by three stages as (1) Design and conduct welding and inspection experiments thorough central composite design (CCD) methodology; (2) Gather, process and analyse the data and images for training neural network; and (3) Increase the successfully inspection reliability of the network through expanding the data set.

Objectives:

The research project will generate understanding and data on the application of robotic welding and automated inspection through applying neural network in construction industry.

Expected deliverables:

- An automated MIG welding system with image capture function;
- A data set of welding parameters, images with classified defects;
- A trained neural network for MIG welding defect classification; and
- Technical file consisting of all project deliverables.