

CELEBRATING
COMMERCIALISATION
YEAR 2014

iiindex 2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

invention
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exposition 2014

INNOVATEUR
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2014

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UNIVERSITI TEKNOLOGI MARA
MALAYSIA

*Bridging
the valley of death :
advancing the
commercialisation
of research*

RESEARCH BOOK

iiindex2014

AN INTERNATIONAL EXPOSITION ON RESEARCH AND INNOVATION

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FOREWORD

The Honourable Minister of Science, Technology and Innovation (MOSTI) has launched 2014 as Malaysia Commercialisation Year 2014 (MCY2014) with the theme Science Technology and Innovation (STI) for Wealth Creation. In line with this theme, Invention, Innovation, Design & Exposition 2014 (iidex2014) is an annual exposition organized by UiTM and is the ultimate platform to highlight and commercialise new inventions and innovations. Researchers and inventors will exhibit their products which cater to the needs and wants of the community and the country.

The iidex2014 creates a new dimension by fusing two competitive concepts, a competition among innovative products and a competition to invite Innovateur Wannabes to perform live pitching of their products to the audience. The iidex2014 focuses on comprehensive commercialization and creating opportunities for entrepreneurs to carry out R&D as well as to provide avenue to commercialise their products. Through expositions such as iidex2014, MOSTI hopes to inculcate the culture of commercialisation of new technology designed and created by Malaysians.

I wish to congratulate all the participants of the iidex2014 and this is the opportunity for all researchers to show their ideas and exhibits their products and creativity. Apart from showcasing their products, innovators will have the opportunity to provide a window to the industry for business matching during the exposition.

Tan Sri Dato' Sri Sallehuddin Mohamed
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PDE-BASED DENOISING TOOL FOR DIGITAL RADIOGRAPHIC IMAGE OF WELDING DEFECT

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The quality of digital radiographic image plays an important role for accurate evaluation analysis. Mostly, raw images are degraded by noise during its acquisition. Hence, for a proper analysis and diagnosis, it is required to reduce the image noise to clear its disturbance that might affect the evaluation results. The process is called image denoising. Image denoising is the first process in image processing and it is remained as an open problem because each technique has its own limitation such as blurring effect on the whole image and quality reduction, image edges get blurred, unwanted blocking effect and loss of signal information. The application of digital radiographic image in welding industry requires certified inspector with several years of experiences and knowledge to identify the existence of welding defect accurately. In the current situation, radiography inspector is a certified person who is able to identify and trace the existence of defect on radiographic image based on codes and specifications manually. The manual inspection is time consuming, may produce inconsistent, biased and inaccurate results. Inaccurate results may affect the quality and reliability of the welding component that is being evaluated. Image processing has played an important role in detecting weld defects on welded parts accurately with the advancement of computer technology. It is aimed to increase the inspection speed, accuracy and reduce subjectivity of manual inspection results which depends much on the quality of the image due to the low quality of image. In the recent years, the mathematical community has come up with a new branch in image processing namely Partial Differential Equation (PDE)-based image processing. Many authors have proposed several mathematical models to solve the problem related to the problem of image denoising. In this project, PDE-based denoising tool is designed to reduce image noise on digital radiographic image of welding defect and hence improve the quality of image for better visualization. The tool deals with image denoising methods using second-order and fourth-order PDEs based and evaluated the performance of the models with the conventional filters. The PDE-based model is applied as image denoising so that the process could be able to reduce the noise without blurring effect which could change the defects edge locations. Due to the problem of the conventional image filtering methods which reduced the image noise while smoothing and blurring the object boundaries, the PDE-based has the ability in the data smoothing and preserving the important features in the data. The application of PDE-based method normally produced promising results and outperformed in the quantitative measurement and visual evaluation. The tool is aimed to assist radiography inspector in producing accurate evaluation results although on the low quality of image. The tool is also compiled using graphical user interface (GUI) windows standalone application that can be executed independently. The tool has potential to be commercialized in the area of manufacturing industry and fabrication company that involved the welding defect inspection. The potential areas are automotive industry, oil and gas industry, aerospace industry, non-destructive technique (NDT) consultant and universities as for training and research development purposes.