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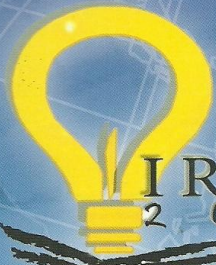
IIUM Research, Innovation & Invention Exhibition 2010 (IRIIE 2010)

ENHANCING QUALITY RESEARCH &
INNOVATION
for
SOCIETAL
DEVELOPMENT

P-1   **Tuning Fork Type Ultra Wide Band (UWB) Antenna**

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In this work a tuning fork type structure of Ultra Wideband (UWB) antenna is proposed. The antenna offers excellent performance for UWB system, ranging from 3.7 GHz to 13.8 GHz. The antenna exhibits a 10 dB return loss bandwidth over the entire frequency band. The rectangular patch antenna is designed on FR4 substrate and fed with 50 ohms microstrip line by optimizing the width of partial ground, the width and position of the feedline to operate in UWB. The rectangular patch is then modified to tuning fork structure by maintaining UWB frequency range.

P-12   **Watermarking Technique Based on ISB (Intermediate Significant Bit)**

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Digital watermarking is a special case of the general information hiding problem. It inserts a perceptually transparent pattern called watermark in an image called host or cover using an embedding algorithm. The purpose of the watermark is to supply the ownership of the image or copyright protection information. The energy of the embedded data should be low enough when projected onto the human perception domain but it should be strong enough for robust machine detection. Least Significant Bit (LSB) technique is the earliest developed technique in watermarking and it is also the most simple, direct and common technique. It essentially involves embedding the watermark by replacing the least significant bit of the image data with a bit of the watermark data. The disadvantage of LSB is that it is not robust against attacks. The aim of this study is to develop a robust watermarking model using spatial domain technique and at the same time maintaining important watermarking requirements of picture quality. The new model has been developed based on intermediate significant bit (ISB) aim to replace the watermarked image pixels by new pixels that can protect the watermark data against attacks and at the same time keeping the new pixels very close to the original pixels in order to protect the quality of watermarked image. The technique is based on testing the value of the watermark pixel according to the range of each bit-plane. The main contribution of this research is replacing the classic least significant bits (LSB) technique by a new technique called intermediate significant bits ISB, which improves the robustness and maintains the quality of watermarked images.

P-13   **An Eco-Plastic Made of PLA-Kenaf Fibre Biocomposite for Cleaner Environment**

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Every year more than 100,000,000 polyethylene terephtalate (PET) bottles are used in Malaysia, Singapore and Brunei. Out of this gigantic figure, 85,000,000 PET bottles end up as garbage and caused the landfills to be filled by the PET bottle toxic wastes that leach into the soil. This may pollute and endangers our environment specifically our drinking water.

This project focuses on the potential of kenaf fibre (KF) as a reinforcing material for poly(lactic acid) (PLA) biopolymer. PLA is a food grade plastic and kenaf fibre is a kind of natural fibre widely available in Malaysia. The fabrication of kenaf bast fibre reinforced poly(lactic acid) biocomposite is expected to be applied as food and beverages containers with the properties that are comparable to man-made based composite. The kenaf fibre content in the PLA was 5%, 10%, 15% and 20% by weight. PLA-KF biocomposite was extruded using Haake twin screw extruder then injection molded for further mechanical characterisation. The kenaf-fibre aspect ratio is 34. Single fibre tests shown that tensile strength and tensile modulus for KF are 119.6 MPa and 6206.1 MPa, respectively. Processing parameters have been