

EMBEDDED SYSTEM (ES)

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NUMBER OF STUDENTS

- Ph.D : 1 students
- Master: 4 students
- Bachelor: 6 students

RESEARCH KEYWORDS

- Digital Systems Design
- Design-for-Testability
- FPGA
- IoT-enabled System

OUTLINE OF IKOHZA

Embedded systems are everywhere in our daily lives. Now they are connected and networked to build IoT (Internet of Things). While embedded systems and IoT make our lives easier, they cause several concerns such as security, privacy, and so-called big brothers. Our Embedded System Research Laboratory (ES iKohza) covers very wide engineering field including algorithm, S/W, electronic circuits, I/F, LSIs, computer architecture, communication and networks

to provide solutions for these concerns. Current research topics include H/W Trojans, 3D-Integration, Application of Block Chain, and/or PUF (Physically Unclonable Functions) to IoT, and so on. Laboratory members are encouraged to have at least one expertise in some engineering field and collaborate with other members to provide a solution for certain application/ requirement with embedding technology.

CURRENT RESEARCH

• RESEARCH1: UTM ENCOURAGEMENT RESEARCH

Lightweight Secure RISC-V Processor for Smart Home in Internet of Things (Total: RM20 , 000)

• RESEARCH 2: FRGS MOHE GRANT

Unravelling the Effect of Gold Nanoparticles with Chitosan Nanobubbles through Double Emulsion Technique as Anticancer Drug Delivery System (Total: RM116,098)



MERIT OF THE TECHNOLOGY

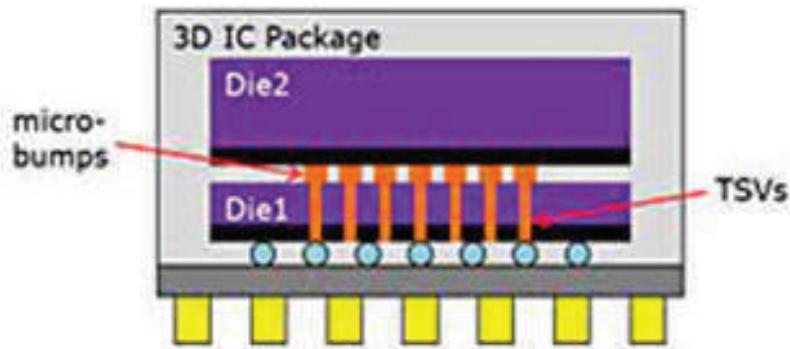
1) FIELD PROGRAMMABLE GATE ARRAY (FPGA)

Our research involves many aspects of FPGA including hardware acceleration of various algorithms such as machine learning, utilizing physical unclonable function (PUF) of FPGA for security purpose and development of reconfigurable processors.



2) DESIGN-FOR-TESTABILITY TECHNIQUES

Our research covers Design-for-Testability solutions for conventional 2D IC to 2.5D IC and 3D IC, which involves perspectives of test structures such as scan and built-in self-test, test planning which could utilize IEEE standards P1500, 1149 and 1687, and test data analysis using machine learning techniques.



3) IOT- ENABLED EMBEDDED SYSTEMS

Embedded systems and IoT are pervasive technology in today's realm. Our research tries to explore building embedded system solution in daily application that could enhance work and quality of living of focused population e.g. aged, limited mental health condition. We are open for the platform to leverage from simple IoT-based wearables to high-tech FPGAs.

4) ADVANCE HARDWARE ARCHITECTURE

Our research explore the possibility of applying RISC-V architecture, to implement systems that can support several communication protocols which are essential for IoT applications. Since IoT smart home systems usually require a lot of sensors and connected nodes for various purposes, it is better to have as many different communication protocols as possible. Different communication protocols being used in IoT systems include both wired and wireless ones, such as WiFi, Bluetooth, ZigBee, SPI, I2C and so on.

POSSIBLE INDUSTRY APPLICATION

- Evaluation of material strength and functional characteristics
- Structural analysis
- Development of embedded microcomputer
- Improving the quality of software documentation etc.
- Intel

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