



**VLSI Circuit Design**  
**For**  
**Energy Harvesting Systems**

Training Programme  
by  
Faculty of Engineering  
Multimedia University

## Overview

The subject discusses VLSI system design such as number systems, switching algebra, simplification of Boolean functions, combinational logic, sequential logic, state machines including their design and implementation, timing considerations, implementation technologies, Programmable Array Logic (PALs), design methodology, CAD system, design for testability (DFT) and overview concept on energy harvesting circuits design and applications.

## Objective

- To give a more enhanced view about the topics in question to the design engineers.
- To better equip the design engineers with an architectural knowledge on IC/VLSI circuit design & testability fundamental / background.
- To give overview/concept on energy harvesting circuits design.

## Target Audience

VLSI system / IC design engineer.

## Prerequisite

Basic knowledge of digital logic design and microelectronics.

## Training Methodology

Classroom.

## Course Duration

2 days (Day-1: 7 hours; and Day-2: 7 hours).

## Content/Outline

### Day 1:

#### Hardware & software aspects of digital design:

Design entries, Design methodologies, Design flow, Design abstraction levels, Register transfer level design, Implementation platforms, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex Programmable Logic Devices (CPLD), and Field Programmable Gate Arrays (FPGA), and Computer-aided digital design tools.

#### Register transfers & Datapaths:

Register transfer operations, Datapaths, Micro operation, Arithmetic/logic unit, Shifter, Pipelining techniques, and Pipelined datapath.

#### Control unit design:

Finite state machine, Mealy model FSM, Moore model FSM, State diagram, Microcode control, and Hardwired control.

### Day 2:

#### Testability:

Design for Testability, Test approaches: Ad-Hoc Test, Scan-Based Test, and Built-In Self-Test (BIST); Test Generation – ATPG, Fault Models - Stuck-at Fault.

#### Devices & Circuits for Energy Harvesting –Overview:

Energy harvesting overview, Energy autonomous systems (EAS), Energy from vibrations, Energy from light, Energy from temperature, Energy from radio-frequency, Industrial applications & some market Perspective and other applications.

## Course Instructor

### Prof. Dr. Md. Shabiul Islam.

Dr. Md. Shabiul Islam is a Professor at the Faculty of Engineering (FOE) in Multimedia University (MMU), Cyberjaya, Selangor, Malaysia. Previously, he served (2009-2016) as an Associate Professor at The Institute of Microengineering & Nanoelectronics (IMEN) in Universiti Kebangsaan Malaysia (UKM), Bangi, Selangor, where he led Micro and Nano System Laboratory under IMEN, UKM. He served (1999-2009) as Lecturer at FOE in MMU. He served (1993-1999) as Research Assistant at the department of Electrical, Electronics & System Engineering (ESEE), UKM, Malaysia. He served (1991-1993) as a Scientific Officer at The Institute of Electronics and Material Science (IEMS) in Bangladesh Atomic Energy Commission (BAEC), Saver, Dhaka, Bangladesh.

He pursued his Ph.D. degree (2008) in VLSI design from Faculty of Engineering, MMU, Cyberjaya, Malaysia. He received his M.Sc. degree (1997) in the area of

Microcontroller Based System Design from EESE, UKM, Malaysia. Previously he obtained B.Sc. (1985) and M.Sc. degree (1986) from the Department of Applied Physics & Electronics, Rajshahi University, Bangladesh. His research expertise covers a wide range of engineering disciplines. They include Micro/Nano System Design, VLSI design, Micro-powering harvesting and Microcontroller based system design, and FPGA Realization based on Fuzzy Logic (FL) Algorithm etc. He has been serving as the project leader in TM R&D (Malaysia) funded projects. He has authored more than 185 peer-reviewed publications, a few books and book chapters. He was appointed (2010-2012) as an "Associate Fellow" at EESE, UKM. Currently he has been appointed (2017-2020) as an "Associate Fellow " at IMEN, UKM.

## Administrative Details

### Programme Logistics

Duration: 2 days.

Dates, registration deadline and registration form:

Please refer to: <https://www.mmu.edu.my/foe/short-courses/>

### Your Investment

| Condition      |                       | Price per Pax |
|----------------|-----------------------|---------------|
| Regular Fee    | Students / MMU Alumni | RM700         |
|                | Public                | RM1200        |
|                | Public (Group >5 pax) | RM1000        |
|                | IEM/IEEE Members      | RM1100        |
| Early Bird Fee | Students / MMU Alumni | RM500         |
|                | Public                | RM1000        |
|                | Public (Group >5 pax) | N/A           |
|                | IEM/IEEE Members      | RM900         |

### Method of Payment

Please refer to the next page.

| Type of Payment                             | Method                     | Details   |
|---|----------------------------|---|
| Local Transaction / Payment within Malaysia | Online Payment with JomPay | <ul style="list-style-type: none"> <li>To get started, login to any preferred internet banking.</li> <li>Look for JomPay to begin the payment process.</li> <li>Enter Ref 1 &amp; Ref 2.</li> </ul> <div style="border: 1px solid black; padding: 5px; width: fit-content;">  <p><b>Billor Code :</b> 22202<br/> <b>Ref-1 :</b> &lt;Participant IC/Passport&gt;<br/> <b>Ref-2 :</b> Event Name*</p> </div> <p>JomPAY online at Internet and Mobile Banking with your Current, Savings or Credit Card account</p> <p>*Ref. 2: FOEVLISl</p>  |
|   |                            | <ul style="list-style-type: none"> <li>To get started, go to <b>MMU website</b> (<a href="https://www.mmu.edu.my/">https://www.mmu.edu.my/</a>) &gt; <b>Admission &gt; Financial Info &gt; Payment Channel &gt; Non Student</b> ;</li> </ul> <div style="border: 1px solid gray; padding: 5px; background-color: #f0f0f0;"> <p><b>E-Payment</b><br/>         To begin the payment process, please click Student or Non Students</p> <p>  </p> <p>Student   <b>Non-Student</b></p> </div> <p>or scan the QR code below to begin the process:</p> <div style="text-align: center;">  <p><b>SCAN ME</b></p> </div> <ul style="list-style-type: none"> <li>Choose Category: <b>Public Training</b></li> <li>Workshop Name</li> <li>Choose Your Participant Type:             <ul style="list-style-type: none"> <li>✓ STUDEN (MMU, IEEE, IEM, Other Higher Learning Institution )</li> <li>✓ PUBLIC</li> <li>✓ GROUP ( Group &gt; 5 Pax )</li> <li>✓ IEEE/M (IEEE/IEM Members)</li> </ul> </li> </ul> |

| Type of Payment                                  | Method   | Details  |
|--|--|--|
| International Payment / Payment outside Malaysia | Online payment with Flywire<br> | <ul style="list-style-type: none"> <li>To get started, go to <a href="http://mmulanding.flywire.com">mmulanding.flywire.com</a>; or scan the QR code to begin the payment process:<br/></li> <li>Choose Conference for Non-students related</li> </ul> |

**Note:**

Please submit the proof of payment to organizer for clearance updating purposes within 2 working days.

**Refund and Cancellation**

Any refunds will be processed in 60 days. Should there be any cancellation, it may be due to the organizer not getting the minimum participants or the participant failing to attend the workshop due to unavoidable reason.

**Disclaimer**

Faculty of Engineering, Multimedia University reserves the right to change the instructors, date and to vary/cancel the programme should unavoidable circumstances arise. All effort will be taken to inform participants of the changes. Upon submission of the registration form, you are deemed to have read and accepted the terms.

**Enquiries**

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