Computer System Application: Design & Development

Instructor:
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Course Brief

- Microcomputer in Industrial Applications
- Measurement of Real World Quantities
- Analyze, Display and Control
- Data-Processing

Strategy

- The course should follow the well-known study cycle:
  Theory → Abstraction → Design
- More Emphasis on Hands-on Experience with Theory and Lab given equal weightage
Experiments (cont’d)

- Simple Input/Output 1
- Display Matrix 2
- A/D Conversion 3
- D/A Conversion 3
- Motor Speed Measurement 4
- Motor Speed Control 5
- Temperature Control 6
- Pendulum Position Sensor 7
- Interface using Plug-in Card 8
- PPI Programming 9&10

Experiments (Cont’d)

- Salient Features of Interface Board
  - Easy to Understand Circuit
  - Can be Connected to Any Computer
  - Can be Lent to Students for Homework
## Prerequisites

- Computer Organization & Assembly Language Programming (CS223)
- A Lot of Interest & Spare Time

## Executive Summary

<table>
<thead>
<tr>
<th>Topic</th>
<th>Week</th>
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<tbody>
<tr>
<td>Memory Interface (8, 16, 32, 64 bit)</td>
<td>1</td>
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<tr>
<td>Memory Read/Write Timing and Wait States</td>
<td>0.5</td>
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<tr>
<td>Discussion on I/O Types</td>
<td>1.5</td>
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<tr>
<td>Data Communication (Serial, Parallel, Modem)</td>
<td>1.5</td>
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<tr>
<td>Industrial Standard Buses</td>
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<tr>
<td>Instrumentation Bus (GPIB), Current Loops</td>
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<tr>
<td>Meas. Systems (A-A, A-D, D-D) and Process Variables</td>
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<tr>
<td>Measurement Electronics (OA, Signal Conditioning, Noise)</td>
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<tr>
<td>Transducers</td>
<td>0.5</td>
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<tr>
<td>Intro. To Micro Controller and PLCs</td>
<td>1</td>
</tr>
<tr>
<td>Case Studies and Industrial Visits</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
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Course Objectives

At the end of the course the student will be able to:

- Explain memory interfacing (C)
- Apply the knowledge of address decoding techniques (C)
- Explain industrial application of microcomputers (C)
- Design interface between microcomputer and real world (P)
- Use microcomputer to input and output data to I/O devices and understand timing constraints, advantages of polled versus Interrupt-driven I/O, DMA to store high speed information (P)
- Use microcomputer for automation and control (P)
- Design embedded and stand-alone systems (P)
Experiments

Physical Layout Of Experiments Board

POWER SUPPLY SECTION
(±5 & ±9)

25-PIN Parallel Interface

Digital to Analog Section

Variable Supply with Control

Prototyping

Analog to Digital Section

8-bit Input Port

8 x 8 Matrix

Temperature Sensor

Dr. Mohammad Jahangir Ikram