2BA4

2BA4 Computer Architecture and Microprocessor Systems

- Part I in Semester I
  - Microprocessor Systems
    - Lecturer: Michael Manzke
- Part II in Semester II
  - Computer Architecture
    - Lecturer: Michael Manzke

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Lecturer:

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Microprocessor Systems (Part 1)

- Course Aims
  - Hardware design and construction
  - Design and build a working microprocessor system from IC components.
  - The course describes:
    - How such components are brought together to produce a functioning system.
    - Low-level software necessary to support the hardware for basic I/O and monitor services.

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Key Hurdles

- Understanding the general principles used to get the different components to work together.
- Gaining experience at the diagnostic and testing skills needed to solve the problems that will inevitably arise.
- Coping with the documentation provided by the device manufacturer.

2BA4 Course Overview for Part 1

- Duration:
  - Half year.
- Number of Lectures per Week:
  - Two
- Number of Tutorials per Week:
  - One, but tutorials could be lectures or lab demos.
- Number of Lab Hours per Week:
  - One

2BA4 Course Overview (two)

- Hardware and Software used:
  - asm68k cross assembler
  - SPRINT EPROM & PAL programmer
  - VHDL (XILINX - ISE Logic Design Tools)
  - Mentor Graphics
    - Design Capture
    - Expedition
  - M68008 projects kits
  - more
- Prerequisites:
  - Digital Logic (1BA4)
  - Electro technology (1BA5)
  - 68XXX Assembly Language Programming (1BA3)

2BA4 General Contents

- 1st Quarter:
  - Intro to 68008.
  - Clock and Reset Circuitry.
  - Memory Map Design.
- 2nd Quarter:
  - Serial I/O Design.
  - Exceptions and Interrupts.
  - Monitor Design.

2BA4 Course Work

- Working is Groups of four:
  - A working microprocessor system is designed and build.
  - A basic monitor is also produced.

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Report

- Each group member must hand up a description of their project.
  - The report should include:
    - Design of microprocessor system hardware + circuit diagram.
    - Description of construction and initial testing.
    - Discuss any interesting problems encountered
    - Design of monitor program + fully documented monitor listing.

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Course Requirements

- Pass 2BA4 ->
  - You must pass the Exam and Course Work
- Pass the 2BA4 Exam ->
  - Exam Marks >= 40%
- Pass the 2BA4 Course Work ->
  - Part I Course Work >= 40% and
  - Part II Course Work >= 40%

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2BA4 Exam

- 8 Questions
  - 4 Questions from Microprocessor Systems
  - 4 Questions from Computer Architecture
- You must answer 5 questions
  - At least 2 from Part I and 2 from Part II

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Useful Books

- "The Motorola M68000" Jean Bacon.
- "Computer Eng. – Hardware Design" Mano.
- "Introductory VHDL: From Simulation to Synthesis"
- "Logic and Computer Design Fundamentals" 2nd Edition updated, Mano (includes Xilinx Student Edition 4.2i software)

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Laboratory Sessions

- Used for:
  - Issuing and explaining equipment.
  - Providing assistance.
  - Assessing Project Work.
- Takes place in LG35/36

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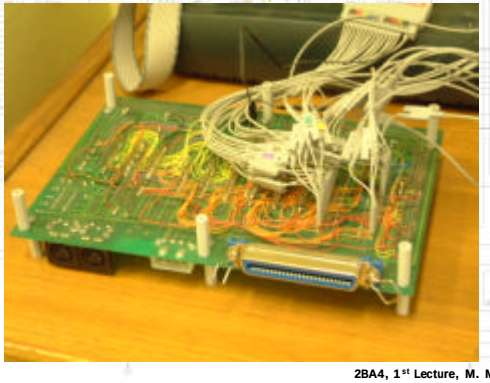
Partially complete 68008 microprocessor systems project board



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Components List (One)

- Integrated Circuits:
  - 1 x MC68008 - microprocessor (MOS)
  - 2 x R6551 (2 off) - serial interface (MOS)
  - 1 x 2764 - 8K x 8 EPROM (MOS)
  - 2 x HM6116P - 2K x 8 static RAM (MOS)
  - 2 x GAL22V10 - GAL (GAL6001 also available)
  - 1 x 7404 - hex inverter
  - 1 x 7407 - Hex buffer/driver with open collector outputs
  - 1 x 7414 - Hex Schmitt trigger inverters
  - 1 x 74LS73 - Dual J-K flip-flop
  - 1 x 74LS193 - 4-bit synchronous binary up/down counter
  - 1 x 74LS393 - Dual 4-bit binary counters
  - 1 x MAX232 - Dual 5V only RS232 driver/receiver
  - 1 x Resistor Pack - 12 x 4K7 resistors

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Components List (Two)

- Sockets:
  - 1 x 48 pin
  - 3 x 28 pin
  - 2 x 24 pin
  - 2 x 24 pin skinny DIP
  - 2 x 16 pin
  - 6 x 14 pin
- Miscellaneous Hardware:
  - Project printed circuit board (PCB) with crystal oscillator, reset circuitry etc.
  - 1 x power supply 5v @ 5AMP