Session 01

Introduction
to
Microprocessors and Microcontrollers

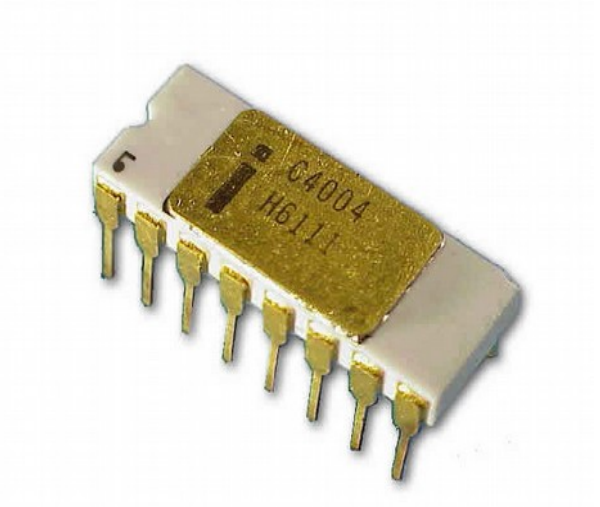
Objective

For students of electronics design and computing, this course will introduce the concept of computing using machine level instructions on very large-scale integrated circuits (aka bare metal programming).

Unlike courses on electronic circuits that work with signal levels and circuits, this course will expose students to over 600 instructions dealing with arithmetic, logic and moving data into and out of computing devices, sensors and actuators.

This course assumes knowledge of binary arithmetic, boolean logic and digital circuits like logic gates, registers, timers.

This course involves 5 hours per week including lab work.



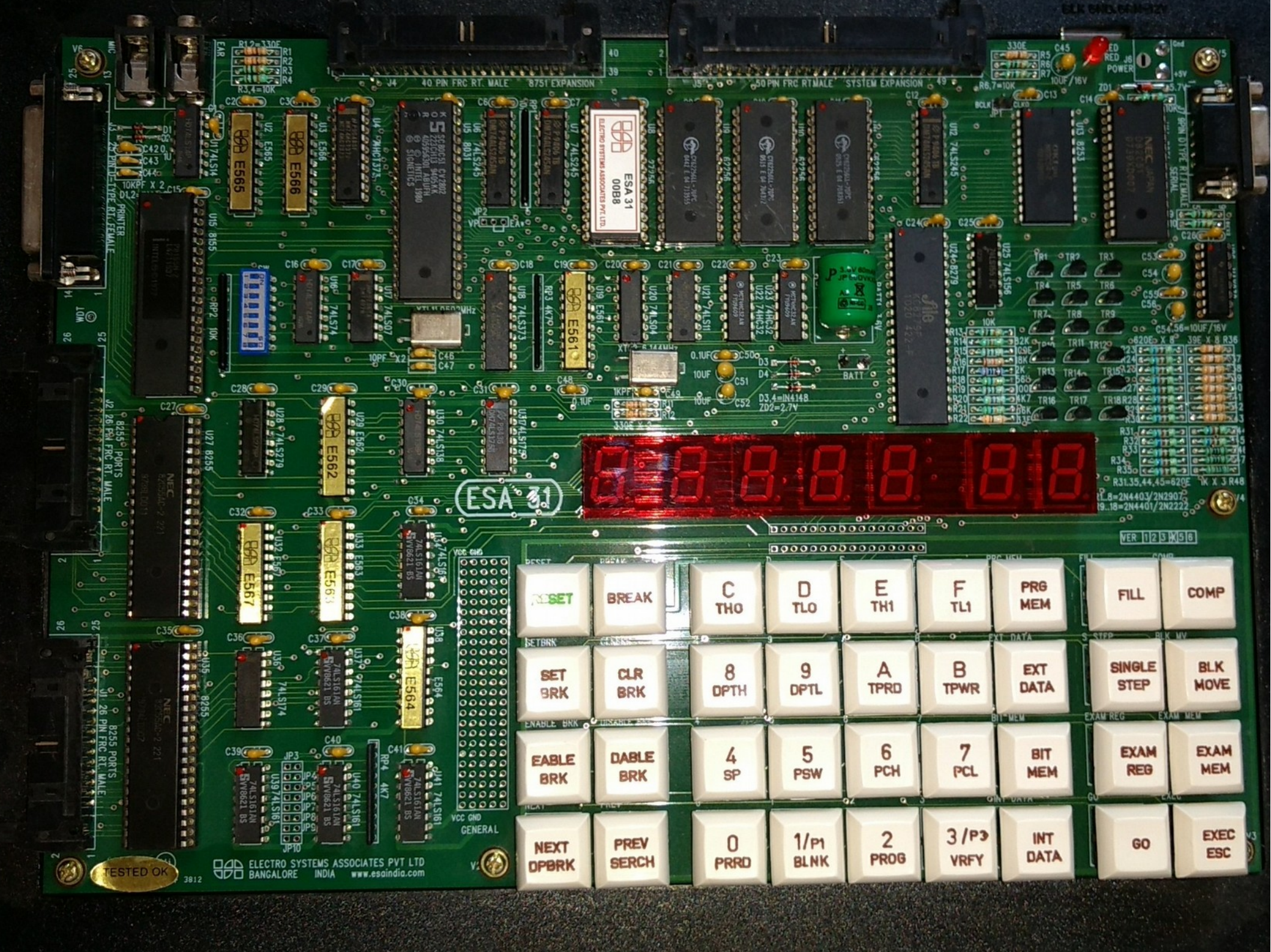
Overview

- Introduction to Microprocessing
- Architecture of 8085
- Instruction Set (aka x86)
- Memory and Data transfer
- I/O Devices
- Interrupt Controllers
- DMA Controllers
- Programmable Timers
- Design aspects
- Modern Processors

- Introduction to Microcontrollers
- Instruction Set of 8051
- Interfacing Memory
- Programmable Timers/Clocks
- Serial Communication
- Signal conditioning
- Digital Sensors, Actuators
- Analog Sensors, Actuators
- Applications
- Real-time operating system

History

- 1960s – bipolar to MOSFET transistors
  - slower, cheaper, lower power
  - 1964 - D200 by Autonetics first microcomputer -> Avionics
- 1970s – TI's TMX 1795, Intel 4004->4040->8008
  - Intel first to establish in mass market with 4004
  - 4004('71), 4040, 8008->8080, 8085/8051, 8086, 80186->80286->80386->Pentium->Core
  - 6502 (Mostech), BBC Acorn, Acorn Risc Machine, ARM
- Moore's “Law”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B TPWR
EXT DATA
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BLK MOVE
EABLE BRK
DABLE BRK
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5 PSW
6 PCH
7 PCL
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