

ADVANCED ELECTRONICS

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UNIT-II MICROPROCESSOR 8085

- ◉ Microprocessor
- ◉ Architecture of 8085
- ◉ Instruction Set
- ◉ Addressing Modes

WHAT IS A MICROPROCESSOR?

A **microprocessor** is an electronic component that is used by a computer to do its work.

It is a central processing unit on a single integrated circuit chip containing millions of very small components including transistors, resistors, and diodes that work together.



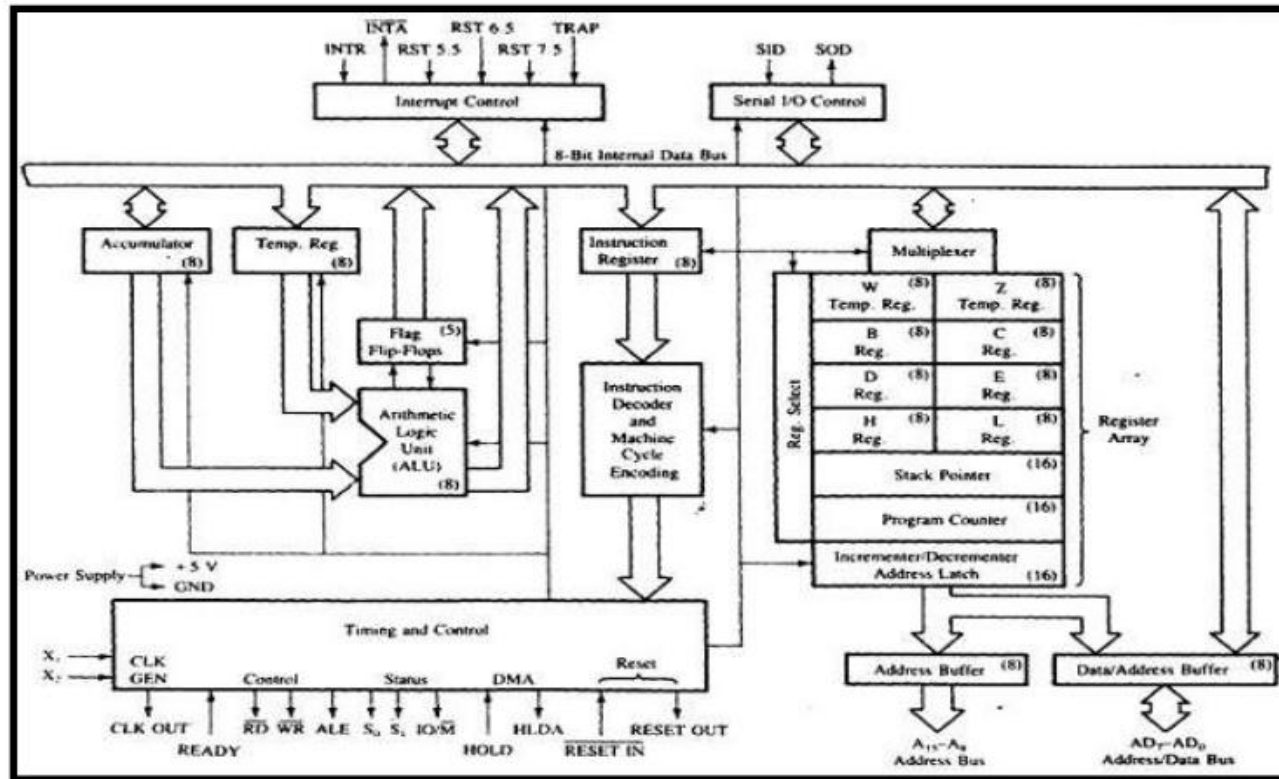
About 8085 MICROPROCESSOR

- An 8-bit microprocessor produced by Intel and introduced in 1976.
- Uses a single +5-volt (V) power supply by using depletion-mode transistors.
- Uses a multiplexed address/data bus.

Intel 8085	
	
An Intel 8085AH processor.	
Produced	From 1975 to 1990s
Common manufacturer (s)	Intel and several others
Max. CPU clock rate	3, 5 and 6 MHz
Min. feature size	3 μm
Instruction set	80
Transistors	6,500
Predecessor	Intel 8080
Successor	Intel 8086
Package(s)	40-pin DIP

Internal Architecture of 8085

Microprocessor



Control Unit

Generates signals within uP to carry out the instruction, which has been decoded. In reality causes certain connections between blocks of the uP to be opened or closed, so that data goes where it is required, and so that ALU operations occur.

Arithmetic Logic Unit

The ALU performs the actual numerical and logic operation such as 'add', 'subtract', 'AND', 'OR', etc. Uses data from memory and from Accumulator to perform arithmetic.

Always stores result of operation in Accumulator.

Registers

Registers are used to quickly accept, store, and transfer data and instructions that are being used immediately by the CPU, there are various types of Registers those are used for various purposes.

The 8085 uP includes:

- General Purpose Registers- B, C, D, E, H & L. They can work in pairs such as B-C, D-E, H-L to store 16-bit data.
- 1 Accumulator
- 1 Flag Register
- 2 16-bit registers: the stack pointer (SP) and the program counter (PC)

Accumulator

This register is used to store 8-bit data and to perform arithmetic and logical operations.

- Result is stored in the accumulator.

Flags

- Used to check the status of the result.

They are called Zero(Z), Carry (CY), Sign (S), Parity (P), and Auxiliary Carry (AC) flags.

Program Counter (PC)

The microprocessor uses this 16-bit register to sequence the execution of the instructions.

This register is a memory pointer. Memory locations have 16-bit addresses, and that is why this is a 16-bit register.

The function of the program counter is to point to the memory address from which the next byte is to be fetched.

Stack Pointer (SP)

The stack pointer is also a 16-bit register used as a memory pointer. It points to a memory location in R/W memory, called the stack. The beginning of the stack is defined by loading 16-bit address in the stack pointer.

Instruction Register/Decoder

Temporary store for the current instruction of a program. Latest instruction sent here from memory prior to execution. Decoder then takes instruction and 'decodes' or interprets the instruction. Decoded instruction then passed to next stage.

Timing and Control Unit

The timing and control unit synchronizes all the microprocessor operations with the clock and generates the control signals necessary for communication between the microprocessor and peripherals.

Interrupts in 8085

Interrupts are the signals generated by the external devices to request the microprocessor to perform a task. There are 5 interrupt signals, i.e. TRAP, RST 7.5, RST 6.5, RST 5.5, and INTR.

Serial Input / Output Control

8085 Microprocessor has two Serial input/output pins that are used to read/write one bit data to and from peripheral devices.

They are:-

- SID (Serial Input Data) line
- SOD (Serial Output Data) Line

Some basic applications of Microprocessor in general life

There are a lot of applications of Microprocessor in general life. Some of the applications are given below:-

- Mobile Phones
- Digital Watches
- Washing Machine
- Traffic Control
- Modems
- Power Stations
- Television
- CD Player
- Multimeter
- CRO



What is an Instruction?

- An instruction is a command given to the computer to perform a specified operation on given data.
- An instruction consists of two parts

OPCODE

OPRAND

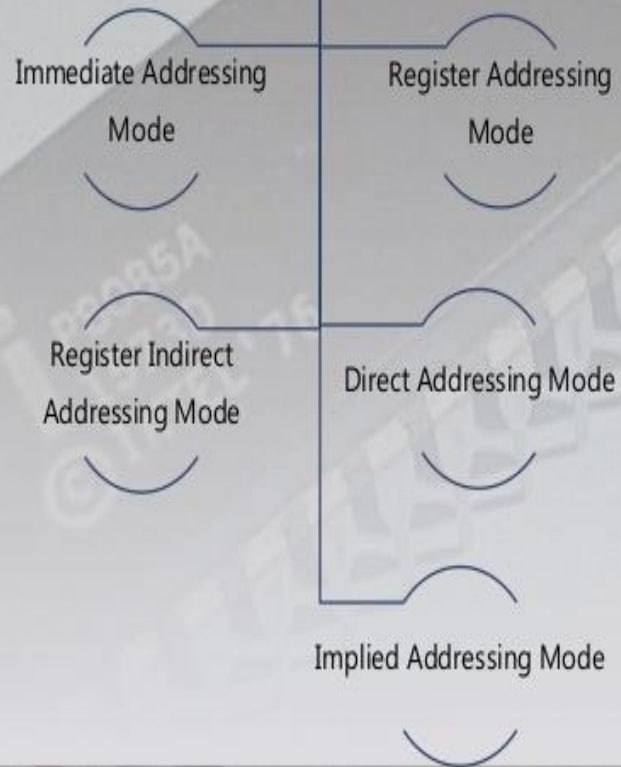
- An opcode is the portion of a machine language instruction that specifies the operation to be performed. Beside the opcode itself, most instructions also specify the data they will process, in the form of operands.
- E.g. MOV A,B //MOV is opcode & A,B are operands

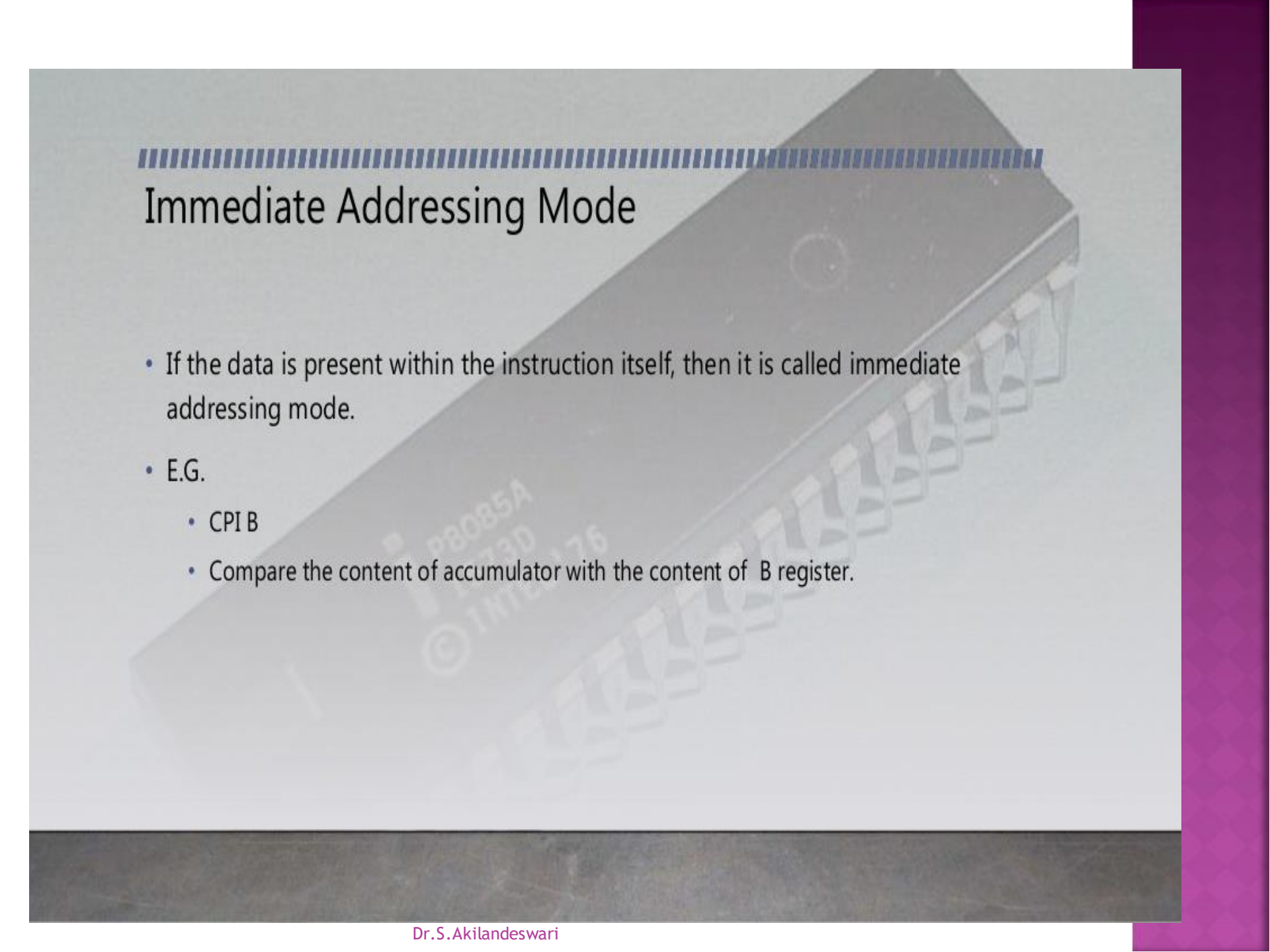
A grayscale image of an Intel 8085 microprocessor chip is shown diagonally across the slide. The chip is a square integrated circuit with a grid of pins on one side. Faint text on the chip includes '8085A', '1573D', and 'INTEL '76'.

8085 ADDRESSING MODES

- The ways by which operands are specified in an instruction are called addressing modes.
- Different addressing modes of 8085 are:
 - Immediate Addressing Mode
 - Register Addressing Mode
 - Direct Addressing Mode
 - Register Indirect Addressing Mode
 - Implied Addressing Mode

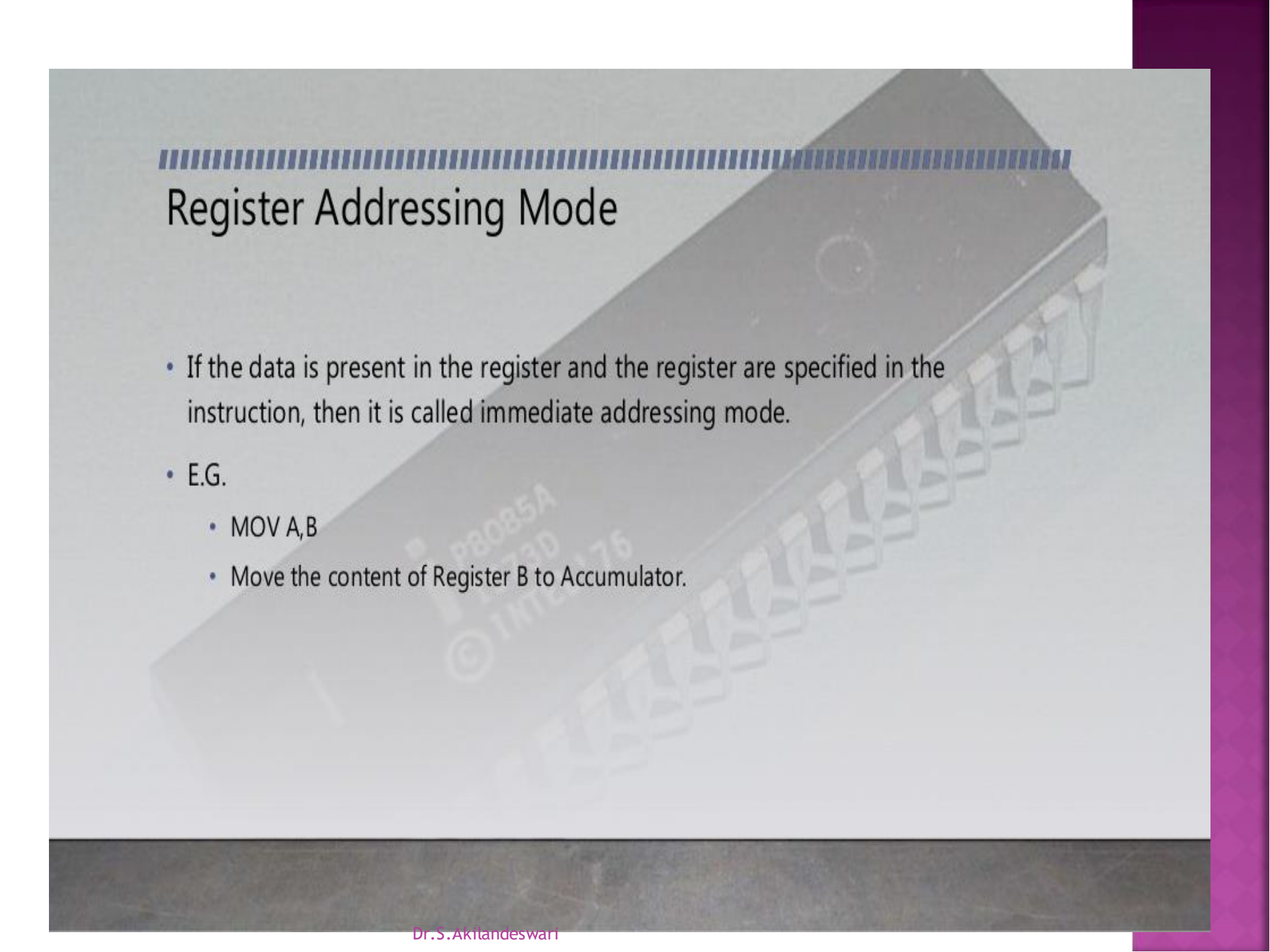
Addressing Modes





Immediate Addressing Mode

- If the data is present within the instruction itself, then it is called immediate addressing mode.
- E.G.
 - CPI B
 - Compare the content of accumulator with the content of B register.



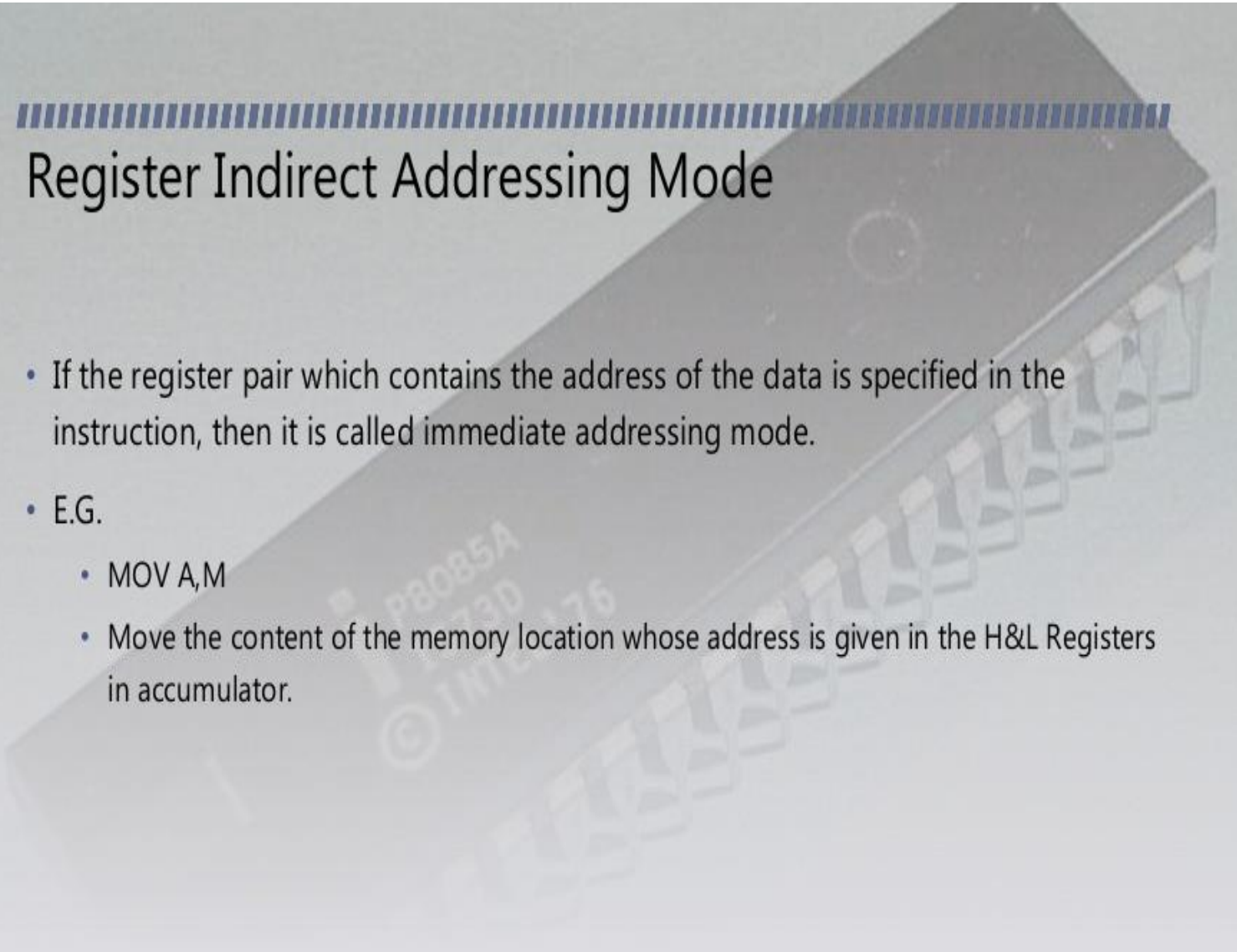
Register Addressing Mode

- If the data is present in the register and the register are specified in the instruction, then it is called immediate addressing mode.
- E.G.
 - MOV A,B
 - Move the content of Register B to Accumulator.



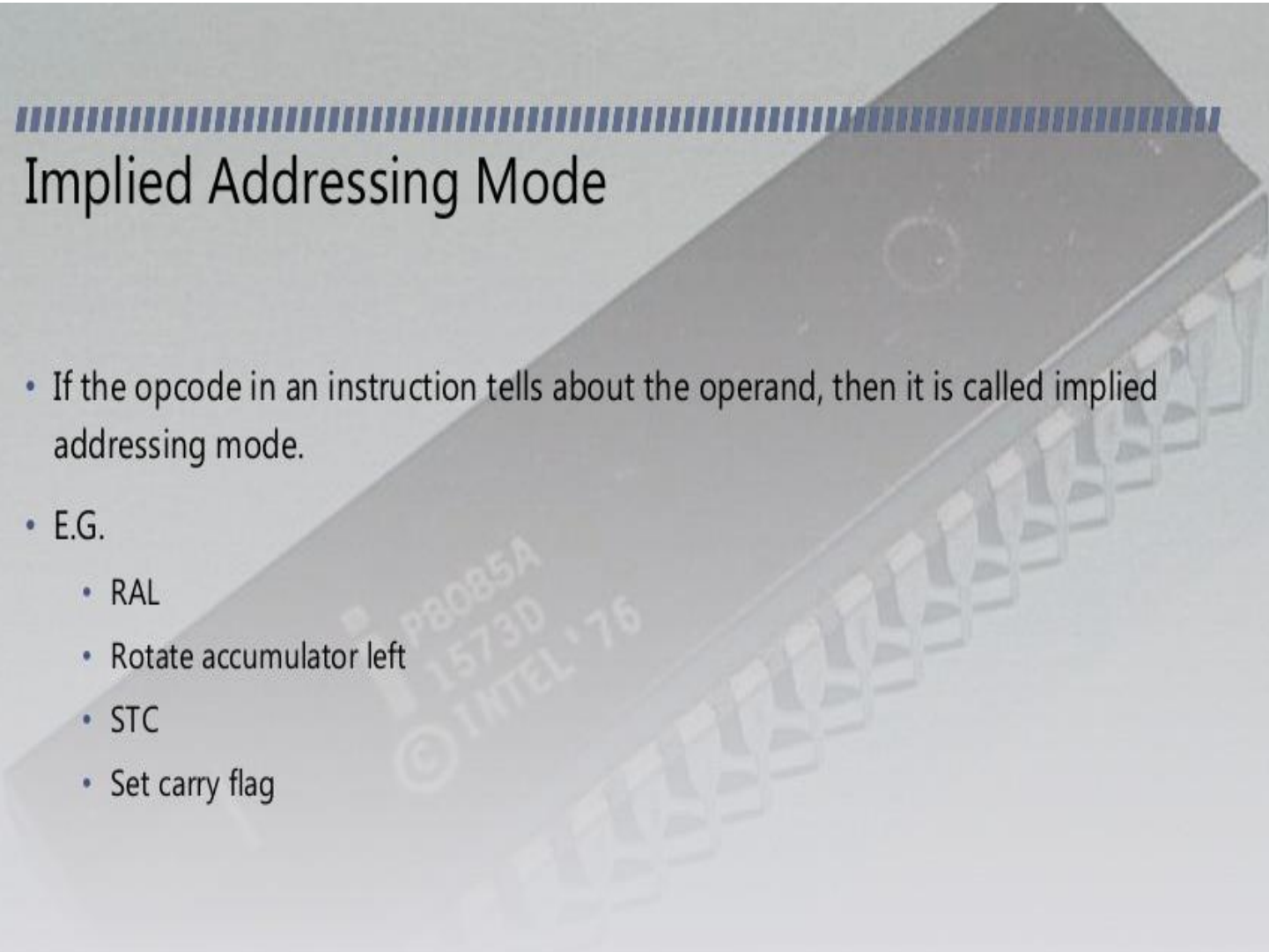
Direct Addressing Mode

- If the address of the data is specified in the instruction itself, then it is called direct addressing mode.
- E.G.
 - LDA 8000H
 - Loads the content of the memory location 8000H in accumulator.

A grayscale image of a microcontroller chip, likely an 8085, is shown diagonally across the slide. The chip has a grid of pins on one side and some text on its surface, including 'P8085A' and '© INTEL 76'.

Register Indirect Addressing Mode

- If the register pair which contains the address of the data is specified in the instruction, then it is called immediate addressing mode.
- E.G.
 - MOV A,M
 - Move the content of the memory location whose address is given in the H&L Registers in accumulator.

A grayscale image of an Intel 8085A microprocessor chip is shown diagonally across the slide. The chip is a square integrated circuit with a grid of pins on one side. Text on the chip includes '8085A', '1573D', and '© INTEL '76'.

Implied Addressing Mode

- If the opcode in an instruction tells about the operand, then it is called implied addressing mode.
- E.G.
 - RAL
 - Rotate accumulator left
 - STC
 - Set carry flag

THANK YOU

