BTUI

Embedded Systems Work sheet

Version 1.0

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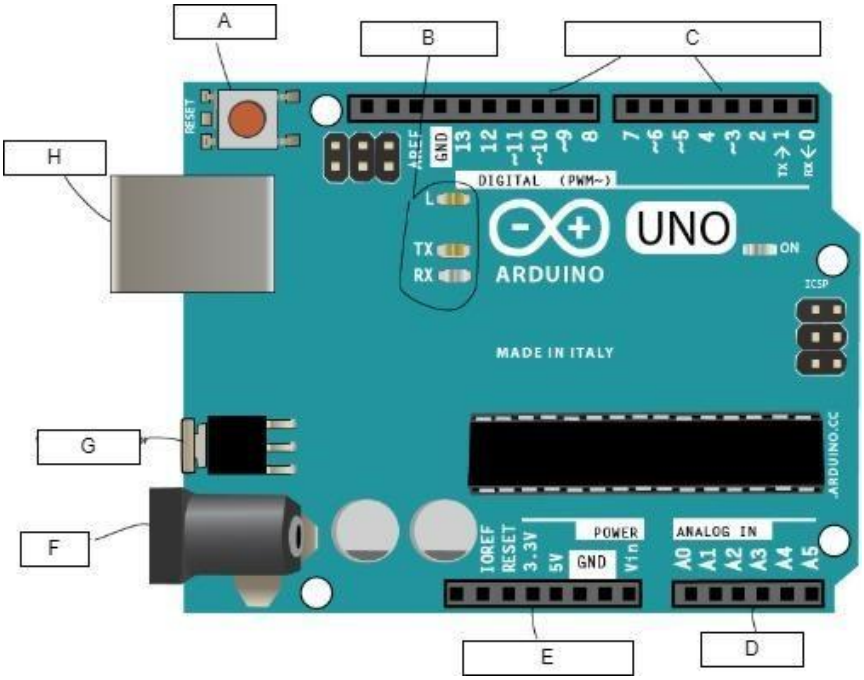
Worksheet 1

The Big Picture

Questions	Answers
What is Hardware?	The physical parts of a computer such as its mother board, hard disk, etc
What is Software?	Non-tangible executable parts of computers
Give three examples of input devices	Keyboard, Mouse, Touchscreen, Scanner,
Give three examples of output devices	Screen, Speakers, Printer, VR Goggles, Projector,
What is a Integrated Circuit / IC	A set of electronic circuits on a compact chip that performs a single task
What is a Micro-controller	A microcontroller (MCU for microcontroller unit) is a small computer on a single metal-oxide-semiconductor (MOS) integrated circuit (IC)
What is a Micro-processor	A microprocessor is a computer processor where the data processing logic and control is included on a single integrated circuit,

What is a Micro-computer	A microcomputer / personal computer is a small, relatively inexpensive computer with a microprocessor as its central processing unit
What is a development board	A microprocessor development board is a printed circuit board containing a microcontroller and the minimal support logic needed for an electronic engineer or any person that wants to become acquainted with the microcontroller on the board and to learn to program it.
What is an embedded system	An embedded system is a computer system—a combination of a computer processor, computer memory, and input/output peripheral devices—that has a dedicated function within a larger **mechanical or electronic system**
What is Arduino	Arduino is a development board built on top of an ATmega328 microcontroller that can be used to create embedded systems specially within the context of R&D, education / learning, and fast prototyping
True or False	Arduino is an IC [True / **False**] Arduino is a micro-controller **[True** / **False**] Arduino is a micro-processor [True / **False**] Arduino is a development board [**True** / False] Arduino is a microcomputer [True / **False**] Arduino is an embedded system [True / **False**]

Work sheet 2
Arduino – Basics

Questions	Answers
What are the different types of Arduino Boards?	Uno, Nano, Leonardo, Micro …
Lebel this Arduino Uno Board	
How can I power my Arduino?	USB 2.0 Type A/B Power port Vin and GND pins

True or False	Arduino needs power to operate [**True** / False] Arduino can take signals from input devices [**True** / False] Arduino can give signals to output devices [**True** / False] Arduino can perform logical operations on signals [**True** / False] Arduino has bult-in memory [**True** / False]

Work sheet 3

Arduino Outputs – Blink

1. Locate the **Blink** pre-built circuit in the **Arduino starters** section to blink the internal LED of your Arduino

2. Change your code to blink an LED connected to pin 12 of your Arduino

Work sheet 4

Arduino Outputs – Servo Control

1. Locate the **Servo** pre-built circuit in the **Arduino starters** section to rotate a servo motor 180^0 and back using your Arduino

2. Change the code to rotate the servo motor 90^0 and back instead

Work sheet 5

Arduino Inputs – Push Button

1. Locate the **Button** pre-built circuit in the **Arduino starters** section to control the internal LED of your Arduino using a push button

2. Use another push button and resistor to perform the following task:

   The LED is on when one button is pressed and off when the other button is pressed

Work sheet 6
Arduino Inputs – Ultra-Sonic Sensor

1. It's your schools' sports meet, and you are watching the school band marching across the ground. You notice that your friend Sherline is playing the clash cymbals. When you look closer, you notice that there is a delay between when you **see** her clap the cymbals and when you **hear** it. Using a magical timer you got as a Christmas gift, you manage to measure this delay to be 1 second. How far away is Sherline from you?

2. Did you know that animals like bats, dolphins and whales can navigate in the dark and find prey even if they are blind? How do you think they do that?

3. What is an Ultrasonic sensor and how does it work?

4. Locate the **Ultrasonic Range Finder** pre-built circuit in the **Arduino starter** section to print out the distance between the Ultrasonic Sensor and an object in the serial Monitor