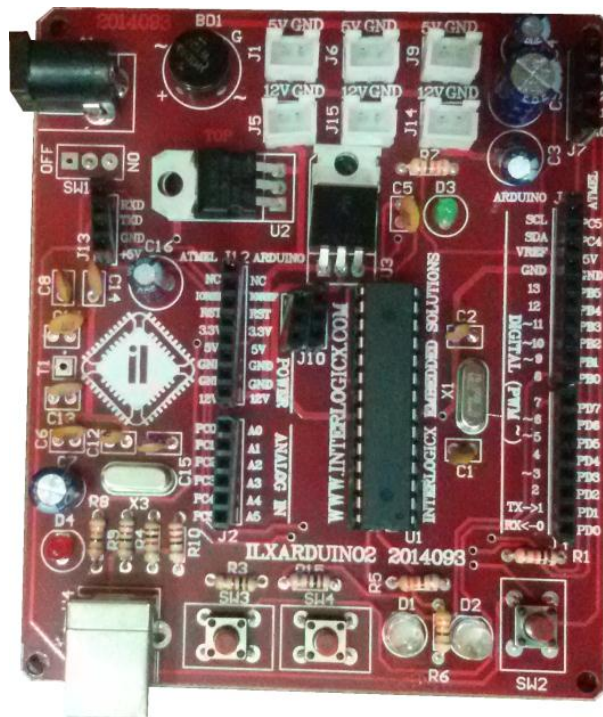
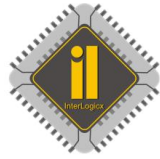


Training Schedule

Robotic System Design using **Arduino Platform**



InterLogic
Embedded Solutions

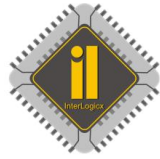


Embedded System Design Basics :

Scope : To introduce Embedded Systems hardware design fundamentals to students.

- Processor Selection Criteria
- Performance evaluation of Processor
- Processor Clock Selection
- Design of Power circuit
- Practical Issues in power circuit Design
- Glitch & Brown out Detection
- Design of reset circuit
- Types of Reset
- Significance of POR
- Design oscillator hardware
- Crystal selection criteria
- Choosing the right crystal for the processor
- Firmware locator – Its Significance
- Firmware Development options
- Significance of In-system programmable(ISP) ICs.





Session - 2

Introduction to Arduino Hardware and Software Platform

Scope : To introduce hardware features Arduino Embedded processors

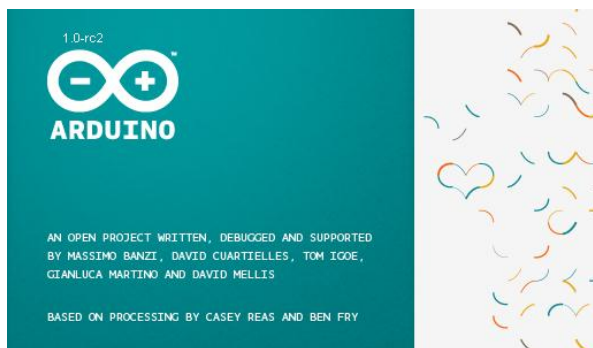
Session - 1

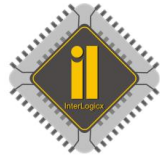
- Features of Arduino Embedded processors.
- Onboard peripheral list
- Functional Pin Detail
- Internal Memory Map
- Analog , PWM ,SPI, UART features
- Programming options.

Session - 2

- Introduction to Arduino Software platform.
- Using Arduino IDE for real time programming.
- Internal Architecture of Arduino Parallel Port
- Significance of Pull Up resistor
- Current Sourcing , Sinking
- Usage of Driver ICs for Parallel Port Operation
- Basic commands in Arduino.

Parallel Port Input and output operations & Functional Simulations





Session - 3

Digital Input and Outputs Using Arduino

Scope : To introduce software programming using Arduino along with digital input and output features of Arduino.

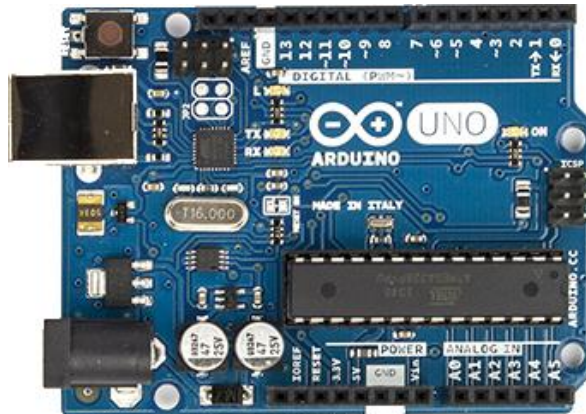
Session - 1

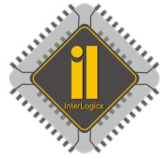
- Basic skeleton of an Arduino program.
- Functions of Arduino - Setup and Loop Functions
- Variables, Constants and their Scopes.
- Data Types in Arduino and their optimized usage.
- PinMode selection- Enabling Pull ups.
- List of functions for Digital input and Output
- Functions related to Timing – delay function.

Session - 2

- Laboratory for Digital input and Output.
- Generating Basic Arduino Sketch.
- Basic LED and Switch operations.
- Testing timing functions.

Hands on Lab session for I/O operations using Switch and LED Boards .





Session - 4

Serial Communications using Arduino

Scope : To introduce UART serial communication using Arduino.

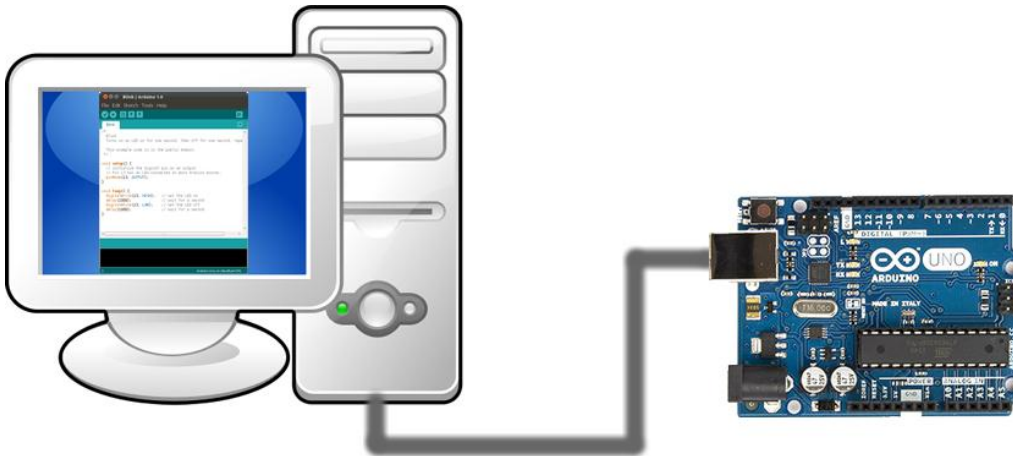
Session - 1

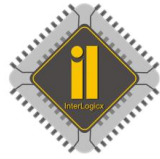
- Modes of Serial Communication
- Simplex & Duplex Communication
- Baud Rate Settings
- Significance of serial Transceiver
- Hardware details of serial I/O
- UART to USB conversion.

Session - 2

- Functions related to Serial Initialization, Transmission and Reception.
- Firmware Development for serial communication.
- Lab for Bidirectional communication with PC.

Hands on Lab session for Serial Communication.





Session - 5

PWM outputs and Design of Robotic System

Scope : To introduce PWM concepts and design of motion control systems.

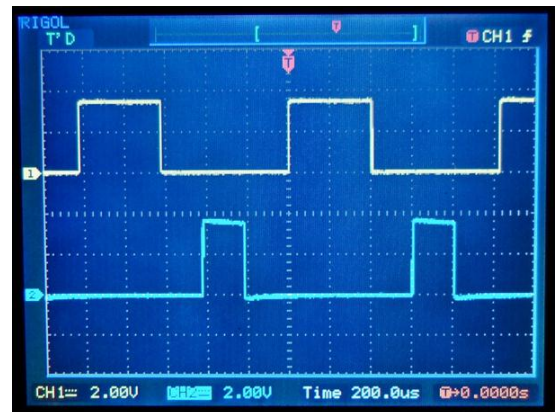
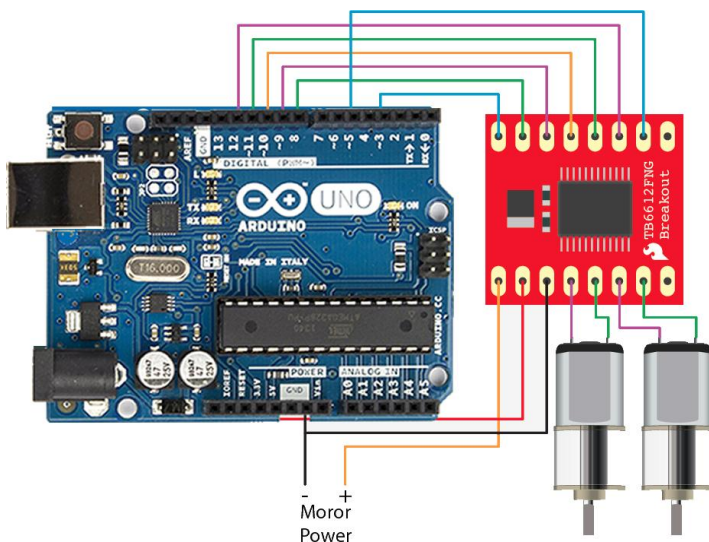
Session - 1

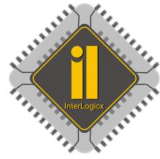
- Motion control fundamentals
- DC motor control using H-Bridge
- Operation of H-Bridge
- Direction control of DC motors.
- Construction of Basic Robot

Session - 2

- PWM fundamentals.
- Duty cycle and frequency of PWM output.
- Pins related to PWM output in Arduino.
- Built-in Functions for generating PWM output.
- Real time applications using PWM output.

Hands on Lab session on PWM output and Motion control systems.





Session - 6

Data Acquisition using Analog input & Gesture Control for Robot

Scope : To introduce the operation of ADC & Closed loop control systems and firmware development for the same

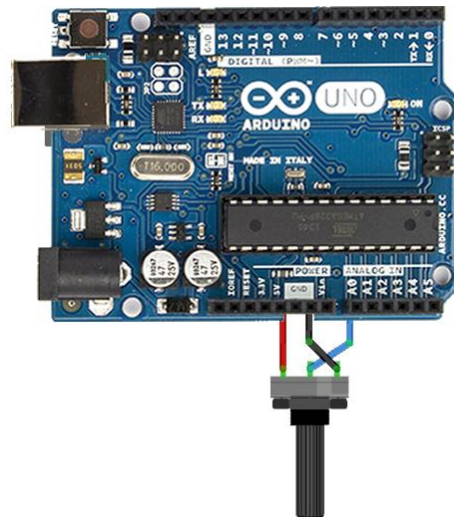
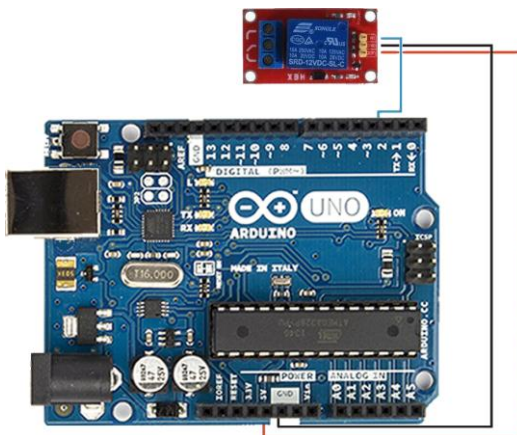
Session - 1

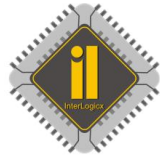
- Data acquisition Basics
- Sampling frequency, sampling requirements.
- Resolution of ADC
- Selection criteria for ADC.
- Using Analog input of Arduino for Data Acquisition.

Session - 2

- Functions for acquiring analog input from Arduino.
- Controlling sampling frequency through software.
- Implementation of closed loop control systems using set point.
- Using Accelerometer sensors for Gesture Controlled robot.

Hands on Lab on data acquisition system





Session-7

Wireless Communication using Arduino & Blue Tooth Control for Robot

Scope : To introduce Wireless communication using Arduino.

Session - 1

- Introduction to Blue tooth communications.
- Interfacing Bluetooth Hardware to Arduino.
- Schematic analysis
- Communicating with Arduino using Bluetooth.

Session - 2

- Firmware development for Bluetooth communication.
- Real time Applications using Bluetooth control.
- Controlling Robot Hardware from mobile Platform.



Hands on Lab session on Bluetooth Communication.

