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# Arduino,Nodemcu and Raspberry

Arduino

Arduino and Nodemcu are basically development boards.It is actually made to learn how to program an MCU.We can tell the board what to do by sending a set of instructions to the microcontroller on the board.

Unlike a general purpose system such as PC a development board consist of little or no hardware for dedicates user interface.It has got only a memory to accept and run a user supplied program.

Program:C++,Embedded C.

IDE:ESPlorer,Arduino

Features:Inexpensive,simple,cheaper and opensource.

Applications:Toys,control Led brightness using PWM,Light sensor,Temperature sensor to monitor temperature of the room.

Example:remote controlled car.

Nodemcu

NodeMCU is an open source firmware for which open source prototyping board designs are available. The name "NodeMCU" combines "node" and "MCU" (micro-controller unit). The term "NodeMCU" strictly speaking refers to the firmware rather than the associated development kits.

Extra feature:Wifi connectivity

All other functions same as Arduino.

Raspberry Pi

It is a low cost ,small size computer in which a monitor,keyboard and mouse can be connected.Its capable of doing everything a normal PC can do.From browsing the internet and playing high definition video,to making spreadsheets,word processing and playing games.

Applications:Home automation,Machine learning,games,website.

Example:remote controlled car with live streaming using webcam

# Coding etiquette

1. Documentation
2. Use descriptive variable names
3. Use repeatitive codes-functions
4. Avoid multiple lines-Short handing
5. Convention(camel phrase)
6. Indenting

# Version control

1. GitHub
2. Bit bucket

Software used for version control operations is sourcetree

PCB design software used:**EAGLE**

# Edge connectors

Card edge connectors (also called edge card connectors) are embedded devices that mate with the edges of single-sided or double-sided printed circuit boards (PCBs) in order to provide an external electrical connection. Industry standards define power specifications such as voltage levels, power pin placements, and power requirements. For example, PICMG 1.0/1.2 standards define the power specifications for peripheral component interconnect (PCI) and industry standard architecture (ISA) buses.

## Contacts

The contacts are made of metal and are plated with a thin, metallic coating that improves conductivity and prevents rust and corrosion. Plating materials include:

* Gold
* Copper
* Nickel
* Silver

Contacts are housed in a termination assembly that is usually made of plastic. Card edge connectors are used widely in personal computers (PCs) and, depending on their components, are suitable for some lead-free applications and compliant with RoHS.

Rows

Typically, card edge connectors are available with one or two rows of contacts.

Contact Pitch

The distance between pins, can range from as small as 0.0197'' or 0.5 mm to as large as 0.111'' or 2.84 mm.

Geometry

There are straight and right angle card edge connectors. These distinctions simply refer to the way the card edge connector is bent.

## Performance Specifications

Includes the following; number of contacts, voltage rating, current rating, contact resistance, insulation resistance, dielectric withstanding voltage, and operating temperature.

* The voltage rating is the maximum operating voltage.
* The current rating is the maximum recommended continuous flow of electrical current.
* Contact resistance measures the electrical resistance of mated contacts that are assembled in a connector for typical service use.
* Insulation resistance is the electric resistance between two conductors separated by an insulating material.
* Dielectric withstanding voltage is the maximum potential gradient that a dielectric material can withstand without failure.
* Operating temperature is a full-required range. For specific performance specifications, contact one of the card edge connector manufacturers.

## Approval Organizations

Card edge connectors meet the requirements of a variety of national and international approval organizations. Examples include:

* Underwriters Laboratories (UL)
* The 'National Electrical Manufacturers' Association (NEMA)
* The International Electrotechnical Commission (IEC)
* TÜV Rheinland/Berlin-Brandenburg provides international approval services for product safety.
* The CSA mark indicates compliance with Canadian standards.
* CEE and VDE marks identify conformity with European guidelines.
* Japanese industrial standards (JIS)
* RoHS compliant

### RoHs complaint definition

RoHS is a product level compliance based on the European Union's Directive 2002/95/EC, the Restriction of the Use of certain Hazardous Substances in Electrical and Electronic Equipment (RoHS). Products compliant with this directive do not exceed the allowable amounts of the following restricted materials: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), with some limited exemptions.

This directive applies to manufacturers, authorized representatives, importers and distributors of products including large household appliances (refrigerators, etc.), small household appliances (vacuum cleaners, etc.), computing & communications equipment, consumer electronics, lighting, power tools, toys and sports equipment (videogames, electric trains, etc.) and automatic dispensers (vending machines, ATM machines, etc.).

Organizations often prove RoHS compliance with a letter of compliance issued by an employee of the company. There are third party testing services available that will test an organization's products for levels of the restricted materials.

## Standards

BS CECC 75100 - Quality assessment for electronic components: two-part and edge socket connectors for printed circuit board applications.

IEC 60603-5 - Connectors for frequencies below 3 MHz for use with printed circuit boards part 5: Edge-socket connectors and two-part connectors for double-sided printed boards with 2.54 mm (0.1 in) spacing.

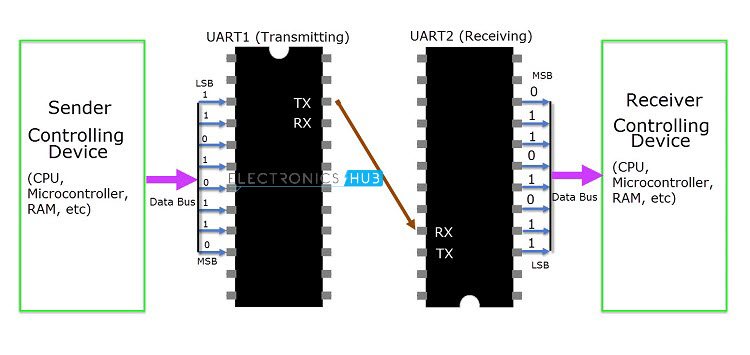
# Communication Protocol

## UART

* Parallel to serial communication,Two wire protocol(Rx,Tx)
* Parallel to serial conversion in transmitter side and serial to parallel in receiver side.
* Full duplex opertion
* Less transfer speed
* No clock signal.
* Multiple master or slave is not possible

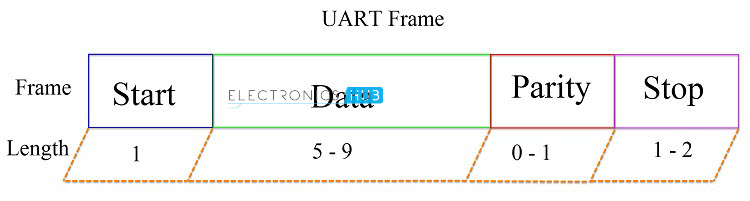
**Working:** In UART Serial Communication, the data is transmitted asynchronously i.e. there is no clock or other timing signal involved between the sender and receiver. Instead of clock signal, UART uses some special bits called Start and Stop bits.

These bits are added to the actual data packet at the beginning and end respectively. These additional bits allows the receiving UART to identify the actual data.



Structure of data frame:

The UART chip adds the start bit,stop bit and parity bit and converts serial data into parallel data using shift registers.



Rules of UART

* Synchronization bits(start bit,stop bit)
* Parity bits
* Data bits
* Baud rate: The speed at which the data is transmitted is mentioned using Baud Rate. Both the transmitting UART and Receiving UART must agree on the Baud Rate for a successful data transmission.

Baud Rate is measured in bits per second. Some of the standard baud rates are 4800 bps, 9600 bps, 19200 bps, 115200 bps etc. Out of these 9600 bps baud rate is the most commonly used one.