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Practical Assignment

No - 1

* Title - Study of Rasperry-Pi, Beagle board, Arduino & other micro controller

* What is the diff. between raspeberry-pi, Beagle board, Arduino?

→ A Raspberry pi is a general purpose computer, usually with Linux OS, & the ability to run multiple programs. It is more complicated than an arduino.

The Beagle Board is a low power open source single board computer produced by texas Instruments in association with digi-key & Newark element14. The Beagle board was also designed with open software development in mind.

Arduino is a microcontroller motherboard. microcontroller is a simple computer that can run one program at a time, over & over again. It is easy to work on and understand

* Theory -

Rasperry Pi :- Though the raspberry pi doesn't offer internal storage, we can used SD cards as the flash memory in the total system, allowing you to quickly swap out diff. versions of the O.S or software updates to debug. Because of this device is independent network connectivity, you can also set it up to access via S.S.H, or transfer files to it. wing 512 MB RAM.

Advantages -
- It is very easy to the internet
- Entire Linux software stack is available
- can be programmed using a variety of programming language.

Disadvantage -
- Accessing hardware isn't a real tim If the CPU is busy ~~busy~~ ; busy, there interfacing with the hardware can be delayed
- Doesn't have enough power to drive inductive loads.
- There is no in built analog to dit digital converter available
- The hardware design isn't open source. Even though it is not a big deal, for some people it might a deal breaker.

* Arduino ⇒
An arduino ~~boa~~ board is best used for repetive task opening & closing a door, reading the outside temp & reporting it, driving a simple robot, etc.

Advantages -
- Very easy to get started
- Not much programming knowledge needed.
- Used for real time application for both software & hardware.

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Disadvantages =
- It isn't very powerful when compared to raspberry pi
- you need to program using arduino IDE or C++
- connecting to internet is slightly difficult.

Micro controller →

It's like a small computer on a single IC. It contains a processor core, ROM, RAM & I/O pins dedicated to program various tasks. Microcontroller are generally used in projects & applications that require direct control of use. A micro controller can be called the heart of embeded system.
Eg:- 8051, AVR, PIC series micro controller.

• Microprocessor =

Microprocessor has only a CPU inside them in one or few ICs. like microcontroller it doesn't have RAM, ROM & other peripheral s. They are dependent on external circuits of peripheral to work, Microprocessor are used for complex tasks like development of game or other application.

Eg = pentium 3, pentium 5, etc

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Assignment No. 2

* Title :- Study of different OS for raspberry Pi & arduino. Understanding the process of OS & installation

* Different between raspberry-Pi & Beagle board
- A raspberry Pi is a general purpose computer, usually with a linux O.S. & the ability to run multiple programs. It is more complicated to used then an arduino

- The Beagle board is a low open source single board computer produce by texas Instruments in association with digikey & Network element. The Beagle board was also designed with open source software development in mind & as a way for demonstrating

• Usage & installation of Raspberry Pi :-
- The raspberry pi is the ultimate affordable computer for anyone who likes to tinker & doesn't mind doing some legwork & get it up running.
- If you order a raspeberry Pi without an SD card preload with new out of Box software (NOOBS), you will need to provide your own sp card & manually install an OS.

- Begin by downloading the software that you want to install on raspberry pi. In this case we are using Raspbian, a raspberry pi optimised version of linux distribution, called debian which you can find by going to :-

① Raspberry.Pi.org/downloads, click raspbian instead of NOOBS & download the full Raspbian ~~[illegible]~~. Zip A file is approx 1.3 GB so it may take several minute to download depending on your internet speed.

② You'll also need a freshly formatted SD card. The format used by ~~pat~~ raspberry Pi is FAT32, not exFAT. If you haven an SD card larger than 32+ GB. make sure it is using proper format, as anything larger than 32 GB, default to exFAT.

③ Use ftcher software to upload the downloaded file

* Usage & Installation of Beagle Board:-
← Black bone black is a low cost, community supported developed platform for developers. Boot linux in under 10 seconds & get started on development in less than 5 minutes with just a single USB cable

Step-1 →
① Open terminal.
② Install minicom by using apt get install minicom

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Step 2 ⇒ Using minicom

1) — Start minicom on your bet machine in configuration mode. As root. =# minicom -s

2) - A. menu of configuration should appear. Use the down arrow key to scoll down & select the serial port setup option & press enter.

3) - verify that the listed serial port is the same one that is connected to the target board.

4) If it is not press A & enter the correct device. This is /dev/ACM on most linux distributions. & press enter.

5) - Set hardware flow control to No using F key.

6) - Set software flow control to Yes using G key.

7) - Press enter to return main configuration menu & then press Esc to exit the menu.

8) — Reset the board & wait for a moment. If you do not see output from the board press enter several times until you see the # prompt.

9) If you do not see any output from the beard & have verified that the serial terminal connection setup correctly, contact your ~~vend~~ board vendor.

10) Save setup as default & exit.
11) Target will boot & will ask login & password
12) After login switch to super user ($ su)
13) Create source file in the folder, use vi Text editor create source file
14) ~~Verify~~ Execute output file
15) Verify Output.

Conclusion - In this practical, we studied different OS for raspberry Pi & arduino.
& Understood the process of its installation

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Experiment no-3

Title :-

Study of different GATES, AND, OR, XOR sensor and basic binary operation.

Aim: Study of different Gates.

Objective :

- To learn basic concepts of different GATES operations
- learning to work with sensor
- To program a LED light simulation on the kit

Theory:

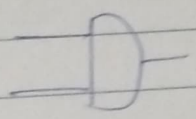
A logic gate is a device that acts as a building block for digital circuit. they perform basic digital function that are fundamental to digital circuit. Most electronic device we use today will have some of logic gates in them. for example - logic gate can be used in technologies such as smartphones tablets or written within memory device.

Basic logic gates :-

AND - The AND gate is named because, it is the same way as 'true'. The gate acts the same way as the logical "and" operates

The following illustration and table shows the circuit symbol and logical combination for an AND gate the output is 'True' when both input are 'True'. otherwise output is 'false'

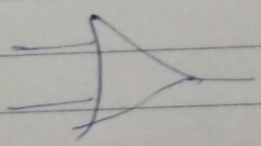
Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1



2) OR GATE

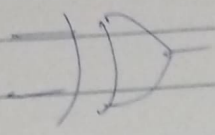
: The OR Gate gets its name from the fact that it behaves befor after the fashion of logical inclusive "or" its output is "True" if either or both of the inputs are "True". If both inputs are false. Then the output is "false"

Input 1	Input 2	Output
0	0	0
0	1	1
1	0	1
1	1	1



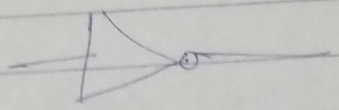
3) XOR Gate : The XOR Gate acts in the same way as the logical "either or". The output is true if either but not both of the inputs "True". another way of looking at this circuit is to observe that the output is if the input are different but if the inputs are same

XOR →



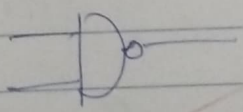
4) NOT Gate. : It reserve the logic state. If the input is 1, then the output is 0 if the input is 0, then output is 1. It has only 1 input.

Input	Output
0	1
1	0



5) NAND Gate:

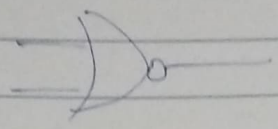
The NAND gate operates as an AND gate followed by a NOT Gate. It acts is the manner of logical operation "and" followed by negation.



Input 1	Input 2	Output
0	0	1
1	0	1
0	1	1
1	1	0

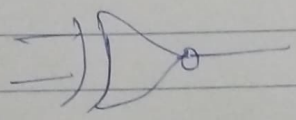
6) NOR GATE: It is a combination · OR GATE followed by an inverter. Its output is "True" if both input are false.

otherwise, the output is "false"



Input 1	Input-2	Output
0	0	
0	1	0
1	0	0
1	1	0

NOR Gate : It is a combination of XOR GATE followed by an inverted. Its output "True" if the input are the same and false if different input.



Input 1	Input2	output
0	0	1
0	1	0
1	0	0
1	1	1

Conclusion : Hence we have studied the various Gates and its truth table with symbols

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Experiment No. 4

Aim: Study of connectivity and configuration of Raspberry Arduino circuit with basic pheripherical, LEDs understanding and its use in program.

Understanding GPIO:

One powerful feature of the Raspberry Pi is the row GPIO pins along the top edge the bar board. These pins are physical interface between and ~~wo~~. A simplest level, you can think of them as ~~swi~~ switches that you can ~~then~~ or on off. or that the Pi can run on off of the 40 pins, 26 are GRPO pins and the other are ~~gro~~ power or ground pins. There are eight ground pins. There are eight ground pins and two + 5V pins and three +3.3r pins, which are not programmable. It is always good to have a descriptive pinout diagram printed out for quick referenc as well as a multimeter on the work disk.

Example.

```
Import Rp, GPIO as GIPO
# For the sleep method.
import time
led =8
```

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```
#set numbering mode for program
G2PO . setmode ( GIPO .board)
# setup led (pins) is output pin.

  G2PO  setup (led , GIPO , OUT , initial=0)
  try:
   while (True)
   GIPO . output (led , GIPO . High)
   print ("one")
   time . sleep (1)
  # turn off , set as low or 0.
   GIPO . output (led , G2PO . low)
   print ("off")
   time . sleep (1)
  except keyword Interupt
  # clean up GIPO settings before existing
    GIPO . Cleanup ()
    print ("Existing")
```

This code will print ON and Off alternatively on the screen, in sync with when LED is turned on and off. The little key combination can be used to terminate the exception of the program. The expect keyboard . Interrupt . Mechanism . used to detect the Ctrl + c key press . The sleeps method with make the process wait for given amount of time which is one - second here.

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GPIO#	2nd Func	Pin#	Pin#	2nd Func.	GIPO#
	+3.3r	1	2	+5V	
2	SDA(I²C)	3	4	+5V	
3	SCLI (I²C)	5	6	GND	
4	GCLK	7	8	TXDO(UART)	14
	GND	9	10	RXDO(UART)	15
17	GENO	11	12	GEN1	18
27	GEN2	13	14	GND	
22	GEN3	15	16	GEN4	23
	+3.3V	17	18	GEN5	24
10	MOSI(SPI)	19	20	GND	
9	MISO(SPI)	21	22	GND	
11	SCLK (SPI)	23	24	GEN6	25
	GND	25	26	CE1_(N SPI)	7

(Pi 1 Models A and B stopher)

EEPROM	ID_SD	27	28	ID_SC	CEPROM
5	N/A	29	30	GND	
6	N/A	31	32		12
13	N/A	33	34	GND	
19	N/A	35	36	N/A	16
26	N/A	37	38	Digital IN	20
	GND	39	40	Digital out	21