



**SHETH L.U.J. COLLEGE OF ARTS &
SIR M.V. COLLEGE OF SCIENCE & COMMERCE**

Department of Computer Science

IOT Practical No 1

Aim:- Preparing the IOT Hardware

Set up Raspberry Pi OS / Arduino IDE

Configure GPIO Settings and test basic connectivity

Demonstrate pin layout and on board peripherals.

1. Raspberry Pi Setup

Step 1:- Begin by placing your SD card slot on the Raspberry Pi. It will only fit one way.

Step 2:- Next, plug your keyboard and mouse into the USB ports on the Raspberry Pi

Step 3:- Make sure that your monitor or TV is turned on, and that you have selected the right input (eg. HDMI, DVI, etc)

Step 4:- Connect your HDMI cable from your Raspberry pi to your monitor or TV

Step 5:- If you intend to connect your Raspberry pi to the internet, plug an Ethernet cable into the Ethernet port, or connect a WiFi dongle to one of the USB ports

Step 6. When you're happy that you have plugged all the cables and SD card is correctly connected, connect the micro USB power supply.

LINUX Command

File system Command

LS:- Shows the list of files and folders in the current directory.

CD:- Changes the current directory.

PWD:- Shows the path of the directory you are currently in.

MKDIR Creates a new folder.

RMDIR:- Deletes an empty folder.

RM:- Deletes a file.

CP:- Copies a file or folder.

MV:- moves or renames a file or folder.

TOUCH:- Creates an empty file or updates the file's timestamp.

CAT:- Displays the entire content of a file.



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Permissions & Ownership.

(chmod) changes file or folder permissions
(chown) changes the owner of a file or folder

Network & Remote Access

SSH:- connects to another computer securely
SCP:- copies files between computers using SSH
SUDO:- runs a command as a superuser (admin/root)

file & Disk Utilities

DD:- creates a disk clone or backup.
DF:- shows disk space usage
UNZIP:- extracts files from a zip file
TAR compresses or extracts tar/tar.gz files

Pipes & Processes

Pipe:- sends output of one command into another command
TREE:- shows directory structure in a tree view
&:- runs a command in the background.

Web & Download Tools

WGET	Downloads file from the internet
CURL	uploads or downloads data from a server

Search Commands

GREP	Searches for text inside files
AWK	process, filters and formats text
FINO	searches for files or folder in directory
WHEREIS	finds the location of a command or program

Network Utilities

NMAP	Check Networks for devices and open ports
------	---

Hostnam	Shows or changes the system's hostname
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ifconfig	Shows network interface and IP information
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of 20/11/25



Raspberry Pi 3 Model B V1.2

© Raspberry Pi 2015

RUN

C97

EDAC



C57

R39

R34

R35

R32

R33

R46

C76

C70

C78

F05

C101

U13

R47

R48

D5

C102

R50

R51

R52

R53

R54

R55

R56

R57

R58

R59

R60

R61

R62

R63

R64

R65

R66

R67

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R3116

R3117

R3118

R3119

R3110

R3111

R3112

R3113

R3114

R3115

R3116

R3117

R3118

R3119

R3110

R3111

R3112

R3113

R3114



File Edit Tabs Help

```
-rw-r--r-- 1 pi pi 29 Feb 7 2023 blog1.avc
-rw-r--r-- 1 pi pi 9056677 Feb 7 2023 blog1.h264
-rw-r--r-- 1 pi pi 10236556 Feb 7 2023 blog1.h265
drwxr-xr-x 4 pi pi 4096 Sep 13 2024 blynk-library-python
drwxr-xr-x 3 root root 4096 Feb 9 2023 build
drwxr-xr-x 2 pi pi 4096 Aug 16 2018 dcrja
drwxr-xr-x 3 pi pi 4096 Nov 20 09:40 Desktop
drwxr-xr-x 2 root root 4096 Feb 9 2023 dist
drwxr-xr-x 7 pi pi 4096 Oct 6 2022 Documents
drwxr-xr-x 2 pi pi 4096 Sep 13 2024 Downloads
-rw----- 1 root root 1 Mar 20 2023 eadme.txt.save
-rw-r--r-- 1 pi pi 0 Oct 15 2024 img_name-
drwxr-xr-x 3 pi pi 4096 Mar 9 2024 ledwebserver
drwxr-xr-x 2 pi pi 4096 Jun 21 2017 Music
drwxr-xr-x 2 pi pi 4096 Nov 20 10:01 mvlu1
drwxr-xr-x 2 pi pi 4096 Nov 20 09:54 mvlucs
drwxr-xr-x 2 pi pi 4096 Nov 20 10:00 mvlucs1
-rw-r--r-- 1 pi pi 0 Nov 20 09:38 ong.zip
drwxr-xr-x 2 pi pi 4096 Jan 25 2024 Pictures
drwxr-xr-x 2 pi pi 4096 Jun 21 2017 Public
drwxr-xr-x 2 pi pi 4096 Aug 29 2019 __pycache__
drwxr-xr-x 2 pi pi 4096 Jun 21 2017 python_games
drwxr-xr-x 2 pi pi 4096 Mar 20 2023 qwerty
drwxr-xr-x 2 pi pi 4096 Nov 20 09:19 skibidi
drwxr-xr-x 2 pi pi 4096 Nov 20 10:00 sycs
drwxr-xr-x 2 pi pi 4096 Jun 21 2017 Templates
drwxr-xr-x 2 root root 4096 Feb 9 2023 UNKNOWN.egg-info
drwxr-xr-x 2 pi pi 4096 Jan 31 2023 Videos
pi@raspberrypi:~$ sudo chown pi:root sycs
pi@raspberrypi:~$ sudo chown pi: root sycs
chown: cannot access 'root': No such file or directory
pi@raspberrypi:~$ ls -l
total 18956
```

```
-rw-r--r-- 1 pi pi 1580 Jul 10 10:56 2nccode.py
drwxr-xr-x 2 pi pi 4096 Sep 26 2019 amal
drwxr-xr-x 2 pi pi 4096 Jan 12 2023 amitpate1
-rw-r--r-- 1 pi pi 29 Feb 7 2023 blog1.avc
-rw-r--r-- 1 pi pi 9056677 Feb 7 2023 blog1.h264
-rw-r--r-- 1 pi pi 10236556 Feb 7 2023 blog1.h265
drwxr-xr-x 4 pi pi 4096 Sep 13 2024 blynk-library-python
drwxr-xr-x 3 root root 4096 Feb 9 2023 build
drwxr-xr-x 2 pi pi 4096 Aug 16 2018 dcrja
```



LXTerminal

File Edit Tabs Help

```
wombats.png
└── tutorial.html
Scratch Projects
├── Asteroid Blaster.sb
├── Pacman for Scratch.sb
└── Scratch Invaders.sb
Wolfram Mathematica
youtube
Downloads
├── google-chrome-stable_current_amd64 (1).deb
├── google-chrome-stable_current_amd64 (2).deb
├── google-chrome-stable_current_amd64 (3).deb
├── google-chrome-stable_current_amd64.deb
├── google-chrome-stable_current_x86_64.rpm
├── html_code.html
└── prac.py
putty-64bit-0.72-installer.msi
eadme.txt.save
file.txt
img_name-
ledwebserver
└── led.js
page
└── webpage.html
Music
mvlst1
mvlucs
mvlucs1
ong.zip
Pictures
Public
__pycache__
python_games
├── 4row_arrow.png
├── 4row_black.png
├── 4row_board.png
├── 4row_computerwinner.png
├── 4row_humanwinner.png
├── 4row_red.png
├── 4row_tie.png
└── badswap.wav
beep1.ogg
```



LXTerminal

File Edit Tabs Help

```
[ -Q cipher | cipher-auth | mac | kex | key]
[ -R [bind_address:]port:host:hostport] [-S ctl_path] [-W host:port]
[ -w local_tun[:remote_tun]] [user@]hostname [command]
```

pi@raspberrypi:~\$ scp sysc
usage: scp [-12346Cpqrv] [-c cipher] [-F ssh_config] [-i identity_file]
[-l limit] [-o ssh_option] [-P port] [-S program]
[[user@]host:]file1 ... [[user@]host2:]file2

pi@raspberrypi:~\$ sudo -s
root@raspberrypi:/home/pi# dd
0+0 records in
0+0 records out
0 byte (0 b) copied
^Z

[1]+ Stopped dd
root@raspberrypi:/home/pi# scp sysc
usage: scp [-12346Cpqrv] [-c cipher] [-F ssh_config] [-i identity_file]
[-l limit] [-o ssh_option] [-P port] [-S program]
[[user@]host:]file1 ... [[user@]host2:]file2

root@raspberrypi:/home/pi# sudo -s
root@raspberrypi:/home/pi# df -h

Filesystem	Size	Used	Avail	Use%	Mounted on
/dev/root	15G	5.0G	9.0G	33%	/
devtmpfs	438M	0	438M	0%	/dev
tmpfs	438M	0	438M	0%	/dev/shm
tmpfs	438M	6.1M	432M	2%	/run
tmpfs	5.0M	4.0K	5.0M	1%	/run/lock
tmpfs	438M	0	438M	0%	/sys/fs/cgroup
/dev/mmcblk0p1	41M	23M	19M	55%	/boot
tmpfs	88M	0	88M	0%	/run/user/1000

root@raspberrypi:/home/pi# unzip
UnZip 6.00 of 20 April 2009, by Debian. Original by Info-ZIP.

Usage: unzip [-Z] [-opts[modifiers]] file[.zip] [list] [-x xlist] [-d exdir]
Default action is to extract files in list, except those in xlist, to exdir;
file[.zip] may be a wildcard. -Z => ZipInfo mode ("unzip -Z" for usage).

-p extract files to pipe, no messages -l list files (short format)
-f freshen existing files, create none -t test compressed archive data
-u update files, create if necessary -z display archive comment only
-v list verbosely/show version info -T timestamp archive to latest
-x exclude files that follow (in xlist) -d extract files into exdir
modifiers:



File Edit Tabs Help

```
└── ScratchInvaders.sb
    └── Wolfram Mathematica
        └── youtube
            └── DownloadScratchInvaders
                ├── google-chrome-stable_current_amd64_(1).deb
                ├── google-chrome-stable_current_amd64_(2).deb
                ├── google-chrome-stable_current_amd64_(3).deb
                ├── google-chrome-stable_current_amd64.deb
                ├── google-chrome-stable_current_x86_64.rpm
                ├── html_code.html
                ├── stable_current_amd64_(1).deb
                ├── pmaclpy
                ├── putty-64bit-0.72-installer.msi
                └── README.txt
    └── save
        └── chrome-stable_current_x86_64.rpm
    └── file
        └── webpage.html
    └── img_name~code.html
    └── ledwebserver
        └── ledjs64bit-0.72-installer.msi
    └── tempage
    └── file
        └── webpage.html
    └── Musicame
    └── mduibserver
    └── mvlucesd.js
    └── mvlucese
    └── ong.zip
    └── webpage.html
    └── Pictures
    └── Public
    └── mypycache_
    └── python_games
        ├── 4row_arrow.png
        ├── 4row_black.png
        ├── 4row_board.png
        └── 4row_computerwinner.png
    └── 4row_humanwinner.png
        ├── 4row_sedopng
        ├── 4row_tiepng
        ├── badswapandvpng
        ├── beep1cogguterwinner.png
        ├── beep2boggernwinner.png
        ├── beep3coggng
        ├── beep4toggng
        └── blankpygame.py
    └── beypngegg
```



File Edit Tabs Help

```
— setup.py  
build  
— bdist.linux-armv7  
dcrja  
Desktop  
— bro.tar  
— IMLUfr?  
— ong.zip -> /home/pi/ong.zip  
sheth  
skibidifr  
— led.py  
— skibidi -> /home/pi/skibidi  
dist  
— UNKNOWN-0.0.0-py2.7.egg  
Documents  
— BlueJ Projects  
— appletdemo  
— CaseConverter.java  
— package.bluej  
— README.TXT  
— debugdemo  
— Car.java  
— Demo.java  
— package.bluej  
— README.TXT  
— file-reader  
— FileReader.java  
— package.bluej  
— README.TXT  
— test.txt  
— hello  
— Hello.java  
— package.bluej  
— README.TXT  
— LED-Button  
— Button ctxt  
— Button.java  
— LED ctxt  
— LED.java  
— LEDTester ctxt  
— LEDTester.java  
— package.bluej
```



File Edit Tabs Help

UnZip 6.00 of 20 April 2009, by Debian. Original by Info-ZIP.

Usage: unzip [-Z] [-opts[modifiers]] file[.zip] [list] [-x xlist] [-d exdir]
Default action is to extract files in list, except those in xlist, to exdir;
file[.zip] may be a wildcard. -Z => ZipInfo mode ("unzip -Z" for usage).

-p extract files to pipe, no messages	-l list files (short format)
-f freshen existing files, create none	-t test compressed archive data
-u update files, create if necessary	-z display archive comment only
-v list verbosely/show version info	-T timestamp archive to latest
-x exclude files that follow (in xlist)	-d extract files into exdir

modifiers:

-n never overwrite existing files	-q quiet mode (-qq => quieter)
-o overwrite files WITHOUT prompting	-a auto-convert any text files
-j junk paths (do not make directories)	-aa treat ALL files as text
-U use escapes for all non-ASCII Unicode	-UU ignore any Unicode fields
-C match filenames case-insensitively	-L make (some) names lowercase
-X restore UID/GID info	-V retain VMS version numbers
-K keep setuid/setgid/tacky permissions	-M pipe through "more" pager

See "unzip -hh" or unzip.txt for more help. Examples:

unzip data1 -x joe => extract all files except joe from zipfile data1.zip
unzip -p foo | more => send contents of foo.zip via pipe into program more
unzip -fo foo ReadMe => quietly replace existing ReadMe if archive file newer

root@raspberrypi:/home/pi# man

What manual page do you want?

root@raspberrypi:/home/pi# man man
root@raspberrypi:/home/pi# grep pushpal sycs

grep: sycs: Is a directory

root@raspberrypi:/home/pi# awk

root@raspberrypi:/home/pi# touch file.txt

root@raspberrypi:/home/pi# cat > file.txt

mango

banana

rash berry

\

AZ
[1]+ Stopped cat > file.txt

root@raspberrypi:/home/pi# grep pushpal file.txt

root@raspberrypi:/home/pi# awk file.txt

awk: 1: unexpected character ''

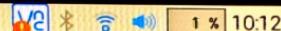
root@raspberrypi:/home/pi# tree



!

Warning

LXTerminal



1

10:12

-

x

LXTerminal

File Edit Tabs Help

```
└── setup.py
└── build
    └── bdist.linux-armv7l
└── derja
└── Desktop
    ├── bro.tar
    ├── MVLUfr?
    ├── ong.zip -> /home/pi/ong.zip
    └── sheth
        └── skibidif
            ├── led.py
            └── skibidi -> /home/pi/skibidi
└── dist
    └── UNKNOWN-0.0.0-py2.7.egg
Documents
└── BlueJ Projects
    ├── appletdemo
    │   ├── CaseConverter.java
    │   ├── package.bluej
    │   └── README.TXT
    ├── debugdemo
    │   ├── Car.java
    │   ├── Demo.java
    │   ├── package.bluej
    │   └── README.TXT
    ├── file-reader
    │   ├── FileReader.java
    │   ├── package.bluej
    │   └── README.TXT
    └── test.txt
    └── hello
        ├── Hello.java
        ├── package.bluej
        └── README.TXT
    └── LED-Button
        ├── Button ctxt
        ├── Button.java
        ├── LED ctxt
        ├── LED.java
        ├── LEDTester ctxt
        ├── LEDTester.java
        └── package.bluej
```



File Edit Tabs Help

```
krishna
shubham
adarsh
pushpal
pi@raspberrypi:~$ rm sy
pi@raspberrypi:~$ ls
2nccode.py      dcrja      Music      python_games
amal           Desktop    mvlut      qwerty
amitpatel     dist       mvlucs      skibidi
blog1.avc      Documents  mvlucs1     syscs
blog1.h264     Downloads  ong.zip     Templates
blog1.h265     eadme.txt.save Pictures  UNKNOWN.egg-info
blynk-library-python img_name- Public     Videos
build          ledwebserver _pycache_
pi@raspberrypi:~$ ls -l
total 18956
-rw-r--r-- 1 pi   pi      1580 Jul 10 10:56 2nccode.py
drwxr-xr-x 2 pi   pi      4096 Sep 26 2019 amal
drwxr-xr-x 2 pi   pi      4096 Jan 12 2023 amitpatel
-rw-r--r-- 1 pi   pi      29 Feb 7 2023 blog1.avc
-rw-r--r-- 1 pi   pi      9056677 Feb 7 2023 blog1.h264
-rw-r--r-- 1 pi   pi      10236556 Feb 7 2023 blog1.h265
drwxr-xr-x 4 pi   pi      4096 Sep 13 2024 blynk-library-python
drwxr-xr-x 3 root root  4096 Feb 9 2023 build
drwxr-xr-x 2 pi   pi      4096 Aug 16 2018 dcrja
drwxr-xr-x 3 pi   pi      4096 Nov 20 09:40 Desktop
drwxr-xr-x 2 root root  4096 Feb 9 2023 dist
drwxr-xr-x 7 pi   pi      4096 Oct 6 2022 Documents
drwxr-xr-x 2 pi   pi      4096 Sep 13 2024 Downloads
-rw----- 1 root root  1 Mar 20 2023 eadme.txt.save
-rw-r--r-- 1 pi   pi      0 Oct 15 2024 img_name-
drwxr-xr-x 3 pi   pi      4096 Mar 9 2024 ledwebserver
drwxr-xr-x 2 pi   pi      4096 Jun 21 2017 Music
drwxr-xr-x 2 pi   pi      4096 Nov 20 10:01 mvlut
drwxr-xr-x 2 pi   pi      4096 Nov 20 09:54 mvlucs
drwxr-xr-x 2 pi   pi      4096 Nov 20 10:00 mvlucs1
-rw-r--r-- 1 pi   pi      0 Nov 20 09:38 ong.zip
drwxr-xr-x 2 pi   pi      4096 Jan 25 2024 Pictures
drwxr-xr-x 2 pi   pi      4096 Jun 21 2017 Public
drwxr-xr-x 2 pi   pi      4096 Aug 29 2019 __pycache__
drwxr-xr-x 2 pi   pi      4096 Jun 21 2017 python_games
drwxr-xr-x 2 pi   pi      4096 Mar 20 2023 qwerty
```

[Warning] LXTerminal LXTerminal

File Edit Tabs Help

```
pi@raspberrypi:~$ ls
2nccode.py  blog1.avc  blynk-library-python  Desktop  Downloads  ledwebserver  mvlu1  Public  qwerty  Templates
amal        blog1.h264  build                 dist      Documents  img_name~  mvlu1  _pycache_  skibidi  UNKNOWN.egg-info
amitpatel   blog1.h265  dcrja                dist      Documents  img_name~  mvlu1  _pycache_  skibidi  Videos
pi@raspberrypi:~$ pwd
/home/pi
pi@raspberrypi:~$ ls
2nccode.py  blog1.avc  blynk-library-python  Desktop  Downloads  ledwebserver  mvlu1  Public  qwerty  Templates
amal        blog1.h264  build                 dist      Documents  img_name~  mvlu1  _pycache_  skibidi  UNKNOWN.egg-info
amitpatel   blog1.h265  dcrja                dist      Documents  img_name~  mvlu1  _pycache_  skibidi  Videos
pi@raspberrypi:~$ mkdir mvlu1
pi@raspberrypi:~$ cs cs
bash: cs: command not found
pi@raspberrypi:~$ mkdir sycs
mkdir: cannot create directory 'sycs': File exists
pi@raspberrypi:~$ mkdir sycs1
pi@raspberrypi:~$ ls
2nccode.py  blog1.avc  blynk-library-python  Desktop  Downloads  ledwebserver  mvlu1  Pictures  python_games  sycs  UNKNOWN.egg-info
amal        blog1.h264  build                 dist      Documents  img_name~  mvlu1  Public    _pycache_  sycs1  Videos
amitpatel   blog1.h265  dcrja                dist      Documents  img_name~  mvlu1  _pycache_  qwerty  skibidi
pi@raspberrypi:~$ rmdir sycs1
pi@raspberrypi:~$ ls
2nccode.py
dcrja      Desktop  Music     python_games
amitpatel  dist      mvlu1    qwerty
blog1.avc  Documents mvlu1    skibidi
blog1.h264  Downloads mvlu1    sycs
blog1.h265  img_name~  mvlu1    _pycache_
blynk-library-python  README.txt.save  Pictures  UNKNOWN.egg-info
build      ledwebserver  Public   Videos
pi@raspberrypi:~$ touch sy
pi@raspberrypi:~$ cat > sy
gazala
purvi
krishna
shubham
adarsh
pushpal
6 member^Z
[1]+ Stopped
pi@raspberrypi:~$ ls
2nccode.py  cat > sy
dcrja      Music     python_games
```

```
└── tetrominoe*oridiets.py
    ├── tetrominoe.py
    ├── Tree_Short.png
    ├── Tree_Tall.png
    ├── Tree_Ugly.png
    ├── wall_Block_Tall.png
    ├── wood_Block_Tall.png
    └── wormy.py
    ├── qwerty
    ├── skibidi
    │   └── mvlu
    ├── sycs
    ├── Templates
    ├── UNKNOWN.egg-info
    │   ├── dependency_links.txt
    │   ├── PKG-INFO
    │   ├── SOURCES.txt
    │   └── top_level.txt
    ├── Videos
    │   ├── test.h264
    │   └── test.mp4
```

60 directories, 267 files

```
root@raspberrypi:/home/pi# files
bash: files: command not found
root@raspberrypi:/home/pi# find sy
find: 'sy': No such file or directory
root@raspberrypi:/home/pi# find sycs
sycs
```

```
root@raspberrypi:/home/pi# ping
Usage: ping [-aAbBdDfhLn0qrRUVV] [-c count] [-i interval] [-I interface]
            [-m mark] [-M pmtdisc_option] [-l preload] [-p pattern] [-Q tos]
            [-s packetsize] [-S sndbuf] [-t ttl] [-T timestamp_option]
            [-w deadline] [-W timeout] [hop1 ...] destination
root@raspberrypi:/home/pi# ping rashberrypi.org
```

```
^Z
[2]+  Stopped                  ping rashberrypi.org
root@raspberrypi:/home/pi# hostname
raspberrypi
root@raspberrypi:/home/pi# ipconfig
bash: ipconfig: command not found
root@raspberrypi:/home/pi#
```



File Edit Tabs Help

```
shubham
adarsh
pushpal
6 member's
[1]+ Stopped                  cat > sy
pi@raspberrypi:~$ ls
2nccode.py      dcrja      Music      python_games
amal           Desktop    mvlu1      qwerty
amitpatel     dist       mvlucs    skibidi
blog1.avc      Documents  mvlucs1   sy
blog1.h264     Downloads  ong.zip   sycs
blog1.h265     eadme.txt.save Pictures  Templates
blynk-library-python img_name- Public   UNKNOWN.egg-info
build          ledwebserver __pycache__ Videos
pi@raspberrypi:~$ cd sy syg
bash: cd: sy: Not a directory
pi@raspberrypi:~$ ls
2nccode.py      dcrja      Music      python_games
amal           Desktop    mvlu1      qwerty
amitpatel     dist       mvlucs    skibidi
blog1.avc      Documents  mvlucs1   sy
blog1.h264     Downloads  ong.zip   sycs
blog1.h265     eadme.txt.save Pictures  Templates
blynk-library-python img_name- Public   UNKNOWN.egg-info
build          ledwebserver __pycache__ Videos
pi@raspberrypi:~$ head sy
gazala
purvi
krishna
shubham
adarsh
pushpal
pi@raspberrypi:~$ tail sy
gazala
purvi
krishna
shubham
adarsh
pushpal
pi@raspberrypi:~$ rm sy
pi@raspberrypi:~$ ls
2nccode.py      dcrja      Music      python_games
```

