

ASSIGNMENT NUMBER: A3

TITLE Connectivity and configuration of Raspberry-

PROBLEM STATEMENT /DEFINITION Study of Connectivity and configuration of Raspberry- Pi /Beagle board circuit with basic peripherals, LEDS. Understanding GPIO and its use in program.

OBJECTIVE

☐ Understand the connectivity and configuration of Raspberry pi/Beagle board

S/W PACKAGES AND HARDWARE APPARATUS USED Raspberry-pi/ Beagle board PC with the configuration as Latest Version of 64 bit Operating Systems, Open Source Fedora- GHz. 8 G.B. RAM, 500 G.B. HDD, 15"Color Monitor, Keyboard, Mouse

Aim: Study of Connectivity and configuration of Raspberry-Pi /Beagle board circuit with basic peripherals, LEDS. Understanding GPIO and its use in program.

Pre-requisite:

Basic knowledge of configuration.

Learning Objectives:

☐ To understand configuration of Raspberry-pi/Beagle board circuit with basic peripherals and its use in the program.

Learning Outcomes:

The students will be able to

☐ Connectivity of Raspberry-pi and Implement the program

Theory:

raspi-config

☐ The Raspberry Pi configuration tool in Raspbian, allowing you to easily enable features such as the camera, and to change your specific settings such as keyboard layout.

☐ config.txt

☐ The Raspberry Pi configuration file.

☐ Wireless

☐ Configuring your Pi to connect to a wireless network using the Raspberry Pi 3 and Pi Zero W's inbuilt wireless connectivity, or a USB wireless dongle.

☐ Wireless Access Point

☐ Configuring your Pi as a wireless access point using the Raspberry Pi 3 and Pi Zero W's inbuilt wireless connectivity, or a USB wireless dongle.

☐ Audio Config

☐ Switch your audio output between HDMI and the 3.5mm jack.

- ☐ Camera Config
- ☐ Installing and setting up the Raspberry Pi camera board.
- ☐ External Storage Config
- ☐ Mounting and setting up external storage on a Raspberry Pi.
- ☐ Localisation
- ☐ Setting up your Pi to work in your local language/timezone.
- ☐ Default pin configuration
- ☐ Changing the default pin states.
- ☐ Device Trees Config
- ☐ Device Trees, overlays, and parameters.
- ☐ Kernel Command line
- ☐ How to set options in the kernel command line.
- ☐ UART configuration
- ☐ How to set up the on-board UARTS.
- ☐ Firmware Warning Icons
- ☐ Description of warning icons displayed if the firmware detects issues.

raspi-config:

raspi-config is the Raspberry Pi configuration tool written and maintained by Alex Bradbury. It targets Raspbian.

Usage

You will be shown raspi-config on first booting into Raspbian. To open the configuration tool after this, simply run the following from the command line:

```
sudo raspi-config
```

The sudo is required because you will be changing files that you do not own as the pi user.

You should see a blue screen with options in a grey box in the centre, like so:

It has the following options available:

```
┌──────────────────────────┐ Raspberry Pi Software Configuration Tool (raspi-  
config) └──────────────────┘  
  
| |  
  
| 1 Change User Password Change password for the current user |  
  
| 2 Network Options Configure network settings |
```

```

| 3 Boot Options Configure options for start-up |
| 4 Localisation Options Set up language and regional settings to match your location |
| 5 Interfacing Options Configure connections to peripherals |
| 6 Overclock Configure overclocking for your Pi |
| 7 Advanced Options Configure advanced settings |
| 8 Update this tool to the latest version |
| 9 About raspi-config Information about this configuration tool |
| |
| |
| |
| <Select> <Finish> |
| |
|_____
|_____

```

Moving around the menu

Use the up and down arrow keys to move the highlighted selection between the options available. Pressing the right arrow key will jump out of the Options menu and take you to the <Select> and <Finish> buttons. Pressing left will take you back to the options. Alternatively, you can use the Tab key to switch between these.

Note that in long lists of option values (like the list of timezone cities), you can also type a letter to skip to that section of the list. For example, entering L will skip you to Lisbon, just two options away from London, to save you scrolling all the way through the alphabet.

What raspi-config does

Generally speaking, raspi-config aims to provide the functionality to make the most common configuration changes. This may result in automated edits to /boot/config.txt and various standard Linux configuration files. Some options require a reboot to take effect. If you changed any of those, raspi-config will ask if you wish to reboot now when you select the <Finish> button.

Menu options

Change User Password

The default user on Raspbian is pi with the password raspberry. You can change that here.

Network Options

From this submenu you can set the host name, your WiFi SSID, and pre-shared key, or enable/disable predictable network interface names.

Hostname

Set the visible name for this Pi on a network.

Boot Options

From here you can change what happens when your Pi boots. Use this option to change your boot preference to command line or desktop. You can choose whether boot-up waits for the network to be available, and whether the Plymouth splash screen is displayed at boot-up.

Localisation Options

The localisation submenu gives you these options to choose from: keyboard layout, time zone, locale, and WiFi country code. All options on these menus default to British or GB until you change them.

Change locale

Select a locale, for example en_GB.UTF-8 UTF-8.

Change time zone

Select your local time zone, starting with the region, e.g. Europe, then selecting a city, e.g. London. Type a letter to skip down the list to that point in the alphabet.

Change keyboard layout

This option opens another menu which allows you to select your keyboard layout. It will take a long time to display while it reads all the keyboard types. Changes usually take effect immediately, but may require a reboot.

Change WiFi Country

This option sets the country code for your WiFi network.

Interfacing Options

In this submenu there are the following options to enable/disable: Camera, SSH, VNC, SPI, I2C, Serial, 1-wire, and Remote GPIO.

Camera

Enable/disable the CSI camera interface.

SSH

Enable/disable remote command line access to your Pi using SSH.

SSH allows you to remotely access the command line of the Raspberry Pi from another computer. SSH is disabled by default. Read more about using SSH on the [SSH documentation page](#). If connecting your Pi directly to a public network, you should not enable SSH unless you have set up secure passwords for all users.

VNC

Enable/disable the RealVNC virtual network computing server.

SPI

Enable/disable SPI interfaces and automatic loading of the SPI kernel module, needed for products such as PiFace.

I2C

Enable/disable I2C interfaces and automatic loading of the I2C kernel module.

Serial

Enable/disable shell and kernel messages on the serial connection.

1-wire

Enable/disable the Dallas 1-wire interface. This is usually used for DS18B20 temperature sensors.

Overclock

It is possible to overclock your Raspberry Pi's CPU. The default is 700MHz but it can be set up to 1000MHz. The overclocking you can achieve will vary; overclocking too high may result in instability. Selecting this option shows the following warning:

Be aware that overclocking may reduce the lifetime of your Raspberry Pi. If overclocking at a certain level causes system instability, try a more modest overclock. Hold down the Shift key during boot to temporarily disable overclocking.

See http://elinux.org/RPi_Overclocking for more information.

Advanced Options

Expand Filesystem

If you have installed Raspbian using NOOBS, the filesystem will have been expanded automatically. There may be a rare occasion where this is not the case, e.g. if you have copied a smaller SD card onto a larger one. In this case, you should use this option to expand your installation to fill the whole SD card, giving you more space to use for files. You will need to reboot the Raspberry Pi to make this available. Note that there is no confirmation: selecting the option begins the partition expansion immediately. Overscan Old TV sets had a significant variation in the size of the picture they produced; some had cabinets that overlapped the screen. TV pictures were therefore given a black border so that none of the picture was lost; this is called overscan. Modern TVs and monitors don't need the border, and the signal doesn't allow for it. If the initial text shown on the screen disappears off the edge, you need to enable overscan to bring the border back. Any changes will take effect after a reboot. You can have greater control over the settings by editing config.txt. On some displays, particularly monitors, disabling overscan will make the picture fill the whole screen and correct the resolution. For other displays, it may be necessary to leave overscan enabled and adjust its values.

Memory split

Change the amount of memory made available to the GPU.

Audio

Force audio out through HDMI or a 3.5mm jack. Read more on the audio configuration documentation page.

Resolution

Define the default HDMI/DVI video resolution to use when the system boots without a TV or monitor being connected. This can have an effect on RealVNC if the VNC option is enabled.

Pixel Doubling

Enable/disable 2x2 pixel mapping.

GL Driver

Enable/disable the experimental GL desktop graphics drivers.

GL (Full KMS)

Enable/disable the experimental OpenGL Full KMS (kernel mode setting) desktop graphics driver.

GL (Fake KMS)

Enable/disable the experimental OpenGL Fake KMS desktop graphics driver.

Legacy

Enable/disable the original legacy non-GL videocore desktop graphics driver.

Update

Update this tool to the latest version.

About raspi-config

Selecting this option shows the following text:

This tool provides a straightforward way of doing initial configuration of the Raspberry Pi. Although it can be run at any time, some of the options may have difficulties if you have heavily customised your installation.

Conclusion: Hence the experiment was successfully performed.