RELAY ATTENUATOR

USER MANUAL

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Introduction

Relay Attenuator (RA) is a hardware volume control. It takes input from the DAC shields and attenuates the output by relay switching.

Setup

Setup of RA involves SBC, DAC, Relay Attenuator and Amplifier shield.

- SBC can be RPi or Sparky boards.
- DAC shields can be Piano or Boss DAC shields.
- Amplifiers can be Volt AMP or Volt+ AMP.

RA gets sandwiched between DAC and Amplifier Shields.

Software

Relay Attenuator can be controlled using "r_attenu" application in three modes.

1. Audio Player control (using RA Client application, "r_attenuc")
2. IR remote control
3. Push-button switch on RA shield

r_attenu software requires 2 packages to be installed; WiringPi & LIRC.

Installation

WiringPi

ON RASPBERRY PI

This package is mandatory for r_attenu to function. Check if wiringPi package is already installed, using the below command (should be V2.32 or greater)

```
$ sudo apt-cache policy wiringPi
```

Execute the below command to install wiringPi, if not installed.

```
$sudo apt-get install wiringpi
```

Enable i2c using raspi-config & test hardware using i2cdetect. Please refer this link for more details;

http://www.raspberrypi-spy.co.uk/2014/11/enabling-the-i2c-interface-on-the-raspberry-pi/

ON SPARKY

Download wiringSparky package from https://github.com/sparkysbc/WiringSparky.git and follow the instructions

```
$git clone https://github.com/sparkysbc/WiringSparky.git
$cd WiringSparky/WiringSparky
$sudo ./build
```

Add below line to /etc/modules

```
i2c_dev
```

LIRC

ON RASPBERRY PI

This package is required if IR remote control is necessary. Check if LIRC package is already installed, using the below command

```
$ sudo apt-cache policy lirc
```

Execute the below command to install LIRC, if not installed.

```
$sudo apt-get install lirc
```

In /boot/config.txt file, update as shown below

```
dtoverlay=lirc-rpi,gpio_in_pin=17
```

See sections “LIRC config files” for details on config files.

ON SPARKY

LIRC package is required if IR remote control is necessary. Check if LIRC package is already installed, using the below command

```
$ sudo apt-cache policy lirc
```

Execute the below command to install LIRC, if not installed.

```
$sudo apt-get install lirc
```

If "libasound2" dependence error is displayed, try installing libasound2 using

```
$sudo apt-get install libasound2
```

Add these lines to /etc/modules file;

lirc_dev

lirc_sparky

See sections "LIRC config files" for details on config files.

r_attenu

Download the corresponding tar file (r_attenu_rpi.tgz or r_attenu_sparky.tgz) from https://github.com/sparkysbc/downloads/raw/master/r_attenu_rpi.tgz or https://github.com/sparkysbc/downloads/raw/master/r_attenu_sparky.tgz and extract under "/". Tar file contains the r_attenu (server software), r_attenuc (Client software), lircd.conf, lircrc & hardware.conf files. (Note: these config file are written to work with squeezelite player).

Start r_attenu program with –d option. Make sure the r_attenu program is always running.

```
$ sudo r_attenu –d
```

OR

Edit /etc/rc.local file and added below line to start the program automatically on boot up.

```
sudo /usr/bin/r_attenu –d > /dev/null 2>&1
```

Syntax for r_attenu:

```
Usage: r_attenu     [options] [config_file]
        -d --daemon             Run in background
        -h --help               Display usage summary
        -v --version            Display version
        -l --withoutLIRC        Program will work without IR control
        -n --name=progname      Use this program name for lircrc matching
        -c --lircdconfig=configfile     LIRCD config file
```

Telnet

LIRC works with telnet for Squeezelite. Install telnet using below cmd;

```
$sudo apt-get install expect telnet
```

Modes of Control

Audio Player control

Changing volume in the player GUI can control the Relay Attenuator, with the help of r_attenuc application.

r_attenuc communicates with r_attenu server, so make sure r_attenu is executed.

Available options are:

Usage: r_attenuc [options]

-h Display usage summary

-c Command to execute

Commands:

GET_VOLUME	Get volume
SET_VOLUME=[value]	Set volume. value = 0 to 63
GET_MUTE	Get mute status
SET_MUTE=[value]	Set mute. value = 0/1 (0=unmute 1=mute)

Example:

To set volume to level 50

```
$r_attenuc -c SET_VOLUME=50
```

To get current volume level

```
$r_attenuc -c GET_VOLUME
```

IR remote control

r_attenu program works with LIRC library to control the Relay attenuator with a remote control. Lircrc config provided, works for squeezelite player. Similar config can be written for other players.

Following are the pin details on the Relay Attenuator for connecting the IR senor (HS0038).

IR-pins	**J7 16-pin connector**
Pin 1 – OUT	Pin 8
Pin 2 - GND	pin 16

Pin 3 - VCC pin 2

For more details, refer to the technical manual.

Push-button switch

Relay Attenuator shield provides option to connect four push-button switches (not included with shield) which can be placed on the front panel of the casing. Switch functions are Volume increase, Volume decrease, Mute & Play/pause.

Push-button switches are connected to connector J10 on the relay attenuator shield. For more details on the connector, please refer to technical manual.

LIRC config files

hardware.conf file

Hardware.conf file defines the devices & modules used and the arguments required for lircd

Location: /etc/lirc/hardware.conf

ON RASPBERRY PI

```
# /etc/lirc/hardware.conf
#
# Arguments which will be used when launching lircd
LIRCD_ARGS="--uinput --allow-simulate"

#Don't start lircmd even if there seems to be a good config file
#START_LIRCMD=false

#Don't start irexec, even if a good config file seems to exist.
#START_IREXEC=false

#Try to load appropriate kernel modules
LOAD_MODULES=true

# Run "lircd --driver=help" for a list of supported drivers.
DRIVER="default"
```

```
# usually /dev/lirc0 is the correct setting for systems using udev
#DEVICE="/usr/share/doc/lirc/README.Debian"
DEVICE="/dev/lirc0"
MODULES="lirc_rpi"

# Default configuration files for your hardware if any
LIRCD_CONF="/etc/lirc/lircd.conf"
LIRCMD_CONF=""
```

ON SPARKY

```
# /etc/lirc/hardware.conf
#
# Arguments which will be used when launching lircd
LIRCD_ARGS="--uinput  --allow-simulate"
#LIRCD_ARGS=""
#Don't start lircmd even if there seems to be a good config file
#START_LIRCMD=false

#Don't start irexec, even if a good config file seems to exist.
#START_IREXEC=false

#Try to load appropriate kernel modules
LOAD_MODULES=true

# Run "lircd --driver=help" for a list of supported drivers.
DRIVER="default"
# usually /dev/lirc0 is the correct setting for systems using udev
DEVICE="/dev/lirc0"
MODULES="lirc_sparky"

# Default configuration files for your hardware if any
LIRCD_CONF="/etc/lirc/lircd.conf"
LIRCMD_CONF=""
```

lircd.conf file

lircd.conf file can be downloaded from http://lirc.sourceforge.net/remotes/ for individual remotes depending on the make & model. Make sure that copied file is renamed to “lircd.conf”.

OR

It can be generated for individual remotes using “irrecord” cmd. Example below shows the config file for Allo remote.

Location: /etc/lirc/lircd.conf

```
begin remote

  name  /etc/lirc/lircd.conf
  bits          16
  flags SPACE_ENC|CONST_LENGTH
  eps           30
  aeps          100

  header       9087  4492
  one           584  1686
  zero          584   558
  ptrail        597
  repeat       9086  2221
  pre_data_bits   16
  pre_data      0xC77
  gap          108399
  toggle_bit_mask 0x0

     begin codes
        KEY_PREVIOUS            0x609F
        KEY_NEXT                0xE01F
        KEY_PLAYPAUSE           0x50AF
         KEY_VOLUMEUP           0x10EF
        KEY_VOLUMEDOWN          0x906F
     end codes

end remote
```

lircrc files

This file defines the actions for each key defined in lircd.config & push-button switches of relay attenuator (BUTTON1, BUTTON2, BUTTON3 and BUTTON4). For more details about the field in lircrc file, please refer to http://www.lirc.org/html/configure.html. Along with the standard implementation of fields, "config" field can handle "hardware_control" option, which instructs r_attenu to handle the corresponding button's action. The 4 push-buttons (keys) on the relay attenuator is mapped as follows:

Push-buttons	Function
BUTTON1	Mute

BUTTON2	Play/Pause
BUTTON3	Volume down
BUTTON4	Volume up

Location: /etc/lirc/lircrc

```
begin
        button = KEY_POWER
        prog = r_attenu
        config = sudo echo "power" | telnet  127.0.0.1 9090
end

begin
        button = BUTTON1
        prog = r_attenu
        config = hardware_control
        #config = sudo echo "mute" | telnet  127.0.0.1 9090
end

begin
        button = BUTTON2
        prog = r_attenu
        config = KEY_PAUSE
        #config = sudo echo "pause" | telnet  127.0.0.1 9090
end

begin
        button = BUTTON3
        prog = r_attenu
        config = hardware_control
        #config = sudo echo "mixer volume -1" | telnet  127.0.0.1 9090
end

begin
        button = BUTTON4
        prog = r_attenu
        config = hardware_control
        #config = sudo echo "mixer volume +1" | telnet  127.0.0.1 9090
end
```