



# Build a PiFun

PiFun is a simple, easy to build accessory for your Raspberry Pi that turns everyday objects into touch inputs that you can incorporate into your programs. It's cheap to build, fun to use and you will wow friends and family.

To start building the PiFun you need to buy some components. So lets go shopping!

**Note:** these instructions are in beta, we welcome feedback and questions, so drop a line to [hello@picymru.org.uk](mailto:hello@picymru.org.uk) or tweet @PiCymru if you need help.

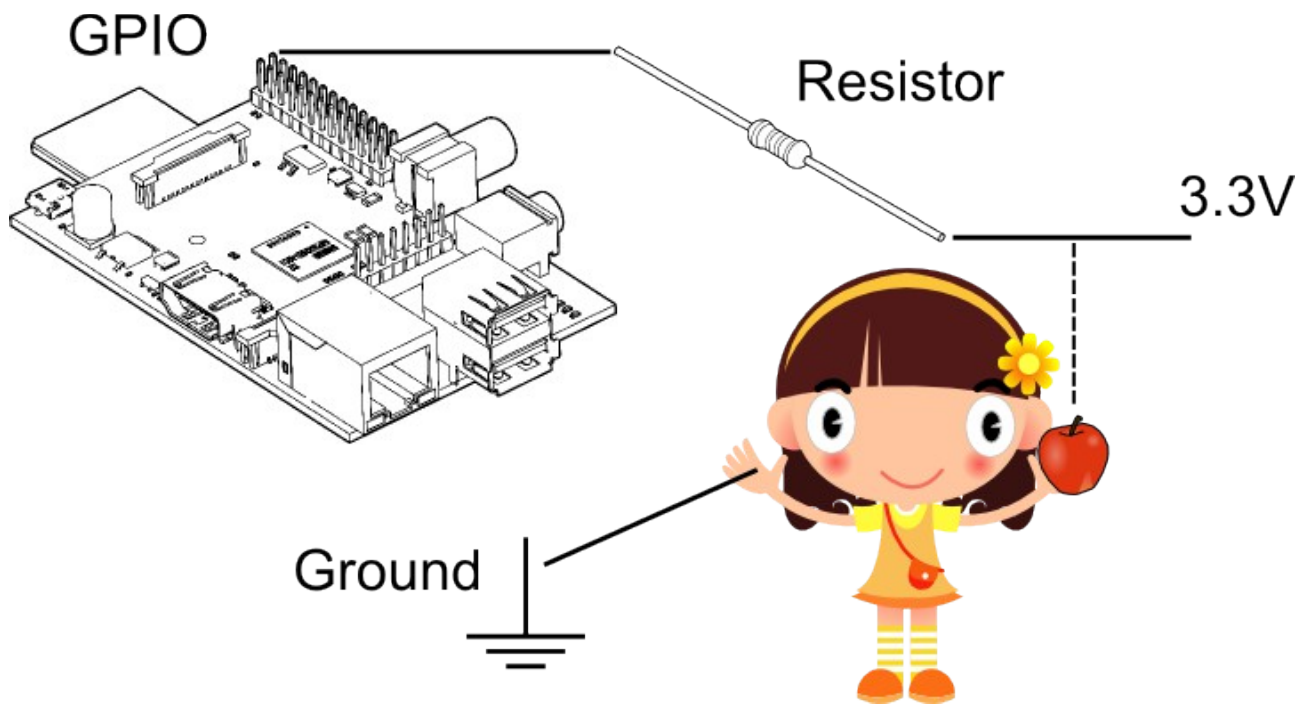
## Shopping list

Parts are available from many retailers. We have used 4tronix ([4tronix.co.uk](http://4tronix.co.uk)) and CPC ([cpc.farnell.com](http://cpc.farnell.com)) who offer free delivery over a certain order value. Most components came from 4tronix except for the crocodile clips and resistors.

- ☐ Large breadboard (4tronix BBD830)
- ☐ Jumper wires (4tronix JPR65)
- ☐ Adafruit Pi Cobbler [assembled] (4tronix #914)
- ☐ GPIO cable (included with the Pi Cobbler)
- ☐ Crocodile clip leads (CPC IN06348)
- ☐ 6 × 22MΩ (megaohm) resistors (RE07235)
- ☐ 1 litre ice cream tub for storage (optional)

## How does it work?

Before you continue, lets take a moment to understand how the PiFun works.



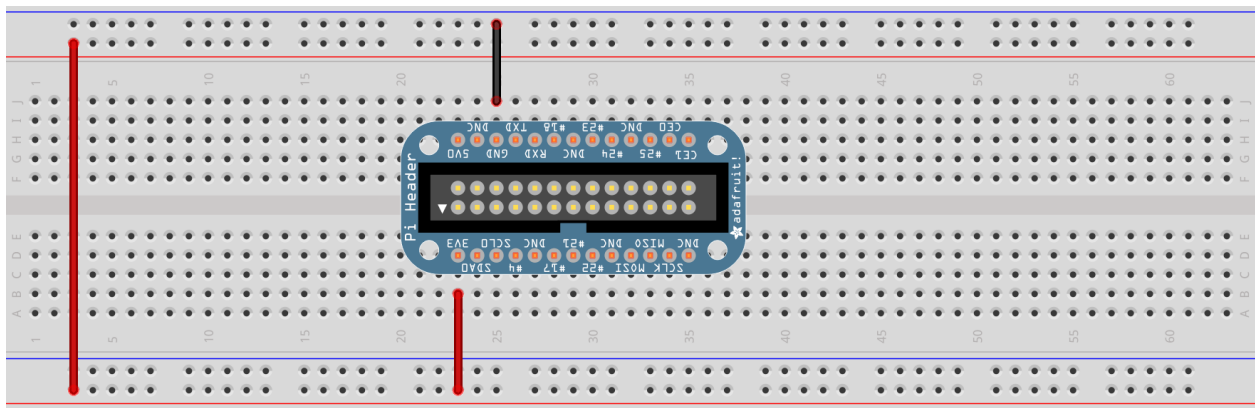
The concept is that electricity will flow from one of the Raspberry Pi's internal power lines to a GPIO pin on the Raspberry Pi. The resistor, called a pull up resistor will pull the voltage up to 3.3V. When you put yourself between the resistor and power rail while grounded you drain the electricity away causing the voltage to drop. This causes the GPIO input to read a low voltage input which the software running on the Pi will detect and convert to a key being held down. When you remove yourself from the circuit the voltage returns to 3.3 volts, and the software will release the key.

## Building the hardware

Start by placing the breadboard in front of you. Notice how numbers form the rows and letters form the columns. This numbering system will be used for placing wires and components.

Start by placing the Pi Cobbler with the “Pi Cobbler” text running along row 22, column d of the breadboard. Now we need to connect the power and ground rails which form an important part of the circuitry. The power rail is marked by a red line and a plus symbol and the ground rail is marked by the blue line and a minus symbol. Place the first three wires using the table and diagram below as a guide.

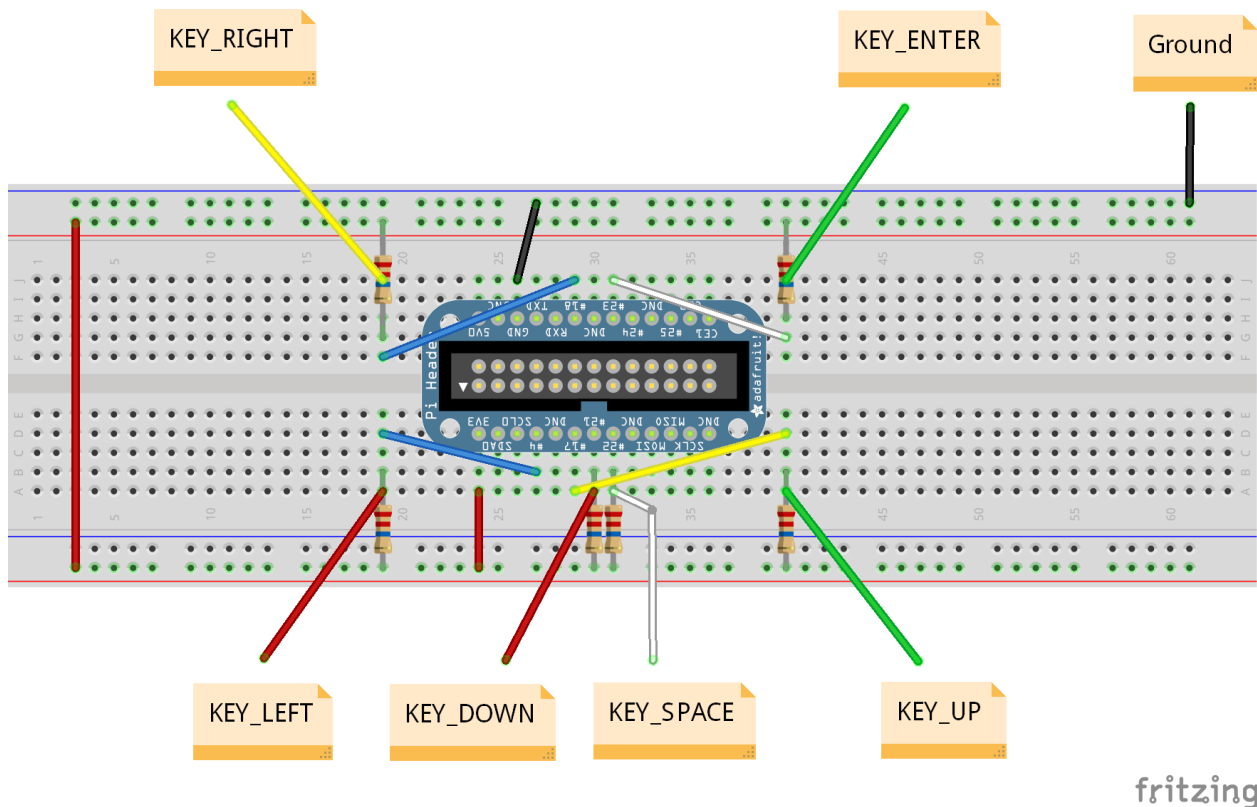
Purpose	Wire/component	From	To
Power	Red	24A	+
Link power	Red	Lower +	Upper +
Ground	Black	26J	-



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Your breadboard is now powered and grounded so you ready to start building the circuit. Use the table and diagram below as a reference to place the resistors and remaining wires, where a crocodile clip is mentioned simply use a jumper wire and connect one end of the appropriately coloured crocodile clip lead to the bare wire.

Purpose	Wire / component	From	To
GPIO #4	Blue	27B	19D
	Resistor	19B	+
	Red	19A	Crocodile clip
GPIO #17	Yellow	29A	40D
	Resistor	40B	+
	Green	40A	Crocodile clip
GPIO #18	Blue	29J	19F
	Resistor	19G	+
	Yellow	19J	Crocodile clip
GPIO #21	Resistor	30B	+
	Red	30A	Crocodile clip
GPIO #22	Resistor	31B	+
	White	31A	Crocodile clip
GPIO #23	White	31J	40G
	Resistor	40H	+
	Green	40J	Crocodile clip



The diagram above labels the functionality of each lead. When testing the set-up there is no need connect the crocodile clips to objects, you can simply touch the clips however it may make testing easier to have something conductive to touch such as a piece of fruit.

Once everything is wired up you can connect the GPIO cable to the Pi Cobbler and the Raspberry Pi making the PiFun hardware fully ready for use.

## Obtaining and installing the software

To download, build and run the PiFun, type the following commands into a terminal on the Raspberry Pi:

```
git clone https://github.com/PiCymru/pifun.git
cd pifun
make
sudo ./pifun
```

Everything should now be fully operational. If you find key press recognition to be unreliable you may need to edit the main.c file and adjust the KEY\_UP\_THRESHOLD and KEY\_DOWN\_THRESHOLD values at the top of file and run make again.

## Play time

Now you have built the PiFun it's time to play! The software once running acts like a keyboard input so is compatible with any application that will use the predefined keys.

To demonstrate this a Scratch project has been included to turn the 6 inputs into a piano. To build your very own banana piano take 6 bananas and connect the crocodile clips for the inputs to them. Take another item for example an apple and connect it to the ground crocodile clip. Start the Scratch program running and while touching the apple start touch the bananas and you should hear musical notes being played from the Raspberry Pi.

What you do with the PiFun is now up to you to experiment with how you use it. How about beats with some beets? You could change the software to use different keys or extend the hardware by lighting an LED when a key is pressed.

## Credits

This project has used the following Creative Commons licensed material:

- Raspberry Pi outline image  
(<http://graphicdesign.stackexchange.com/questions/35713/creating-a-technical-illustration-from-photo>) – by user “joojaa” CC-BY-SA 3.0

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