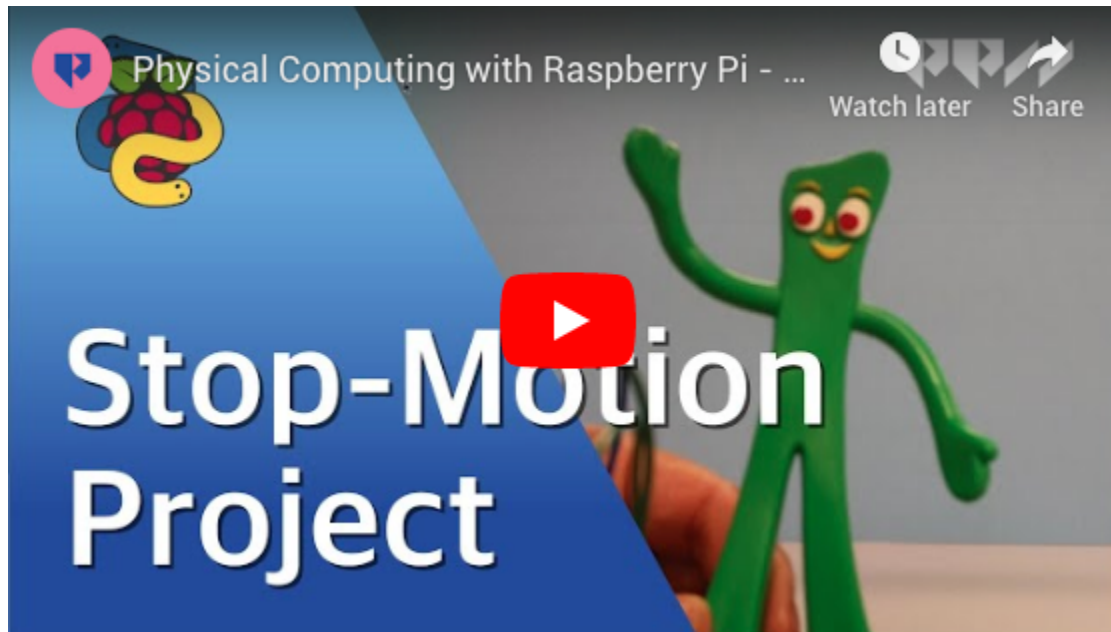


Stop motion project

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Stop motion has been viewed as a very difficult art form because of the complex network of cameras needed to pull it off. The Raspberry Pi and Picamera create an easy to use stop-motion experience that is perfect for beginners. Setting up your own stop-motion stage and coding the Pi in Python can make you the director of your very own short film.

Materials

- Raspberry Pi Model 3 B+ 8GB
- Micro SD Card
- Picamera
- Micro USB Power Supply
- Mouse
- LEGO or other items
- HDMI Cord
- Keyboard

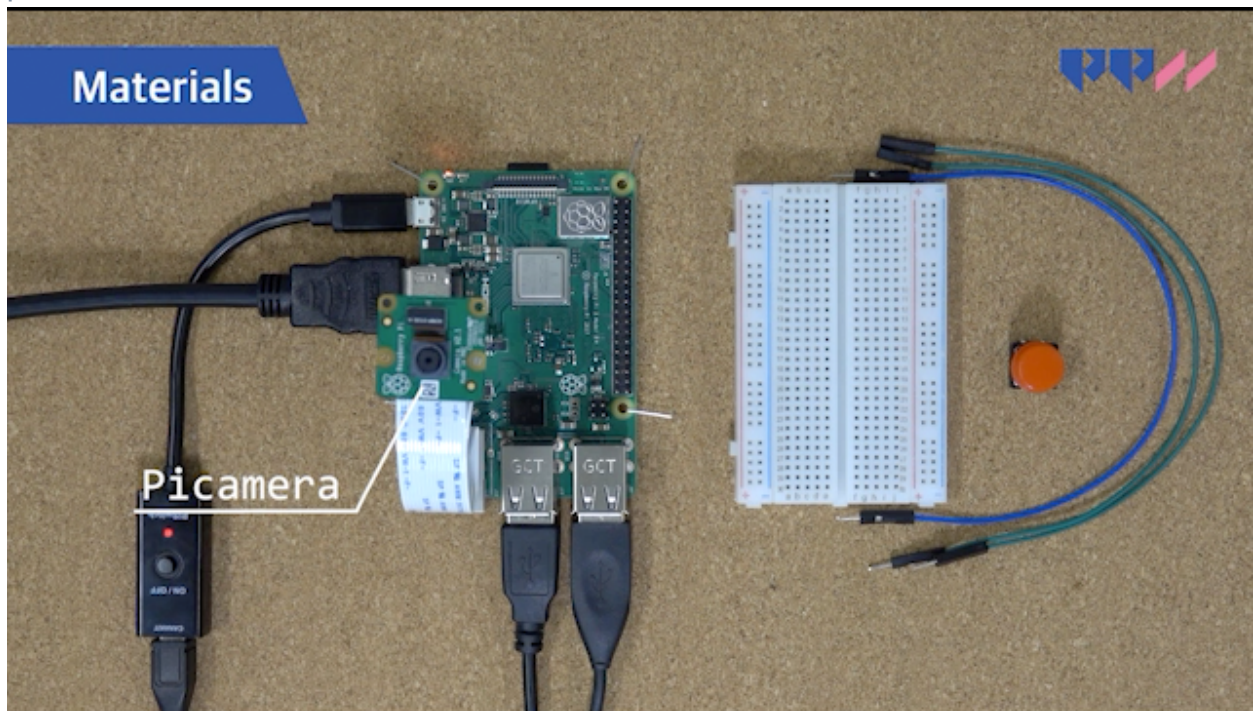
- HDMI Monitor Computer

Key Concepts

- Picamera
- Stop Motion
- Try and Except Function

Project: Stop Motion Project - the code

Running the code from the Thonny every time you want to take a picture is not very useful. By adding a button, you can take pictures when you want without starting the code over and over again. By wiring up the button on the breadboard as you did in the past.



The Code

Once that is done, add the following code to a new Thonny tab,

```
from picamera import PiCamera
from gpiozero import Button
from time import sleep
```

```
button = Button(2)
camera = PiCamera()
```

```
camera.start_preview()
button.wait_for_press()
camera.capture('/home/pi/picture1.jpg')
camera.stop_preview()
```

Make sure you wire the button to GPIO 17 or change the number to the GPIO you did attach to the button. This code is set up to allow for one button press to take one photo.

Project: Stop Motion Project - the code 2

1. Adding Wait Time

1. If you want a brief moment before the camera takes the picture, add `sleep(5)` after the `button.wait_for_press()`

2. Stop Motion

1. One of the cool things you can do with the Raspberry Pi and the Picamera is the ability to create a simple stop motion system. We need to create a folder for the pictures to live, so go to the terminal and type `mkdir stopmotion`. You will be keeping all the photos you take in this folder.
2. We need to tweak the code you have created by adding the following code,

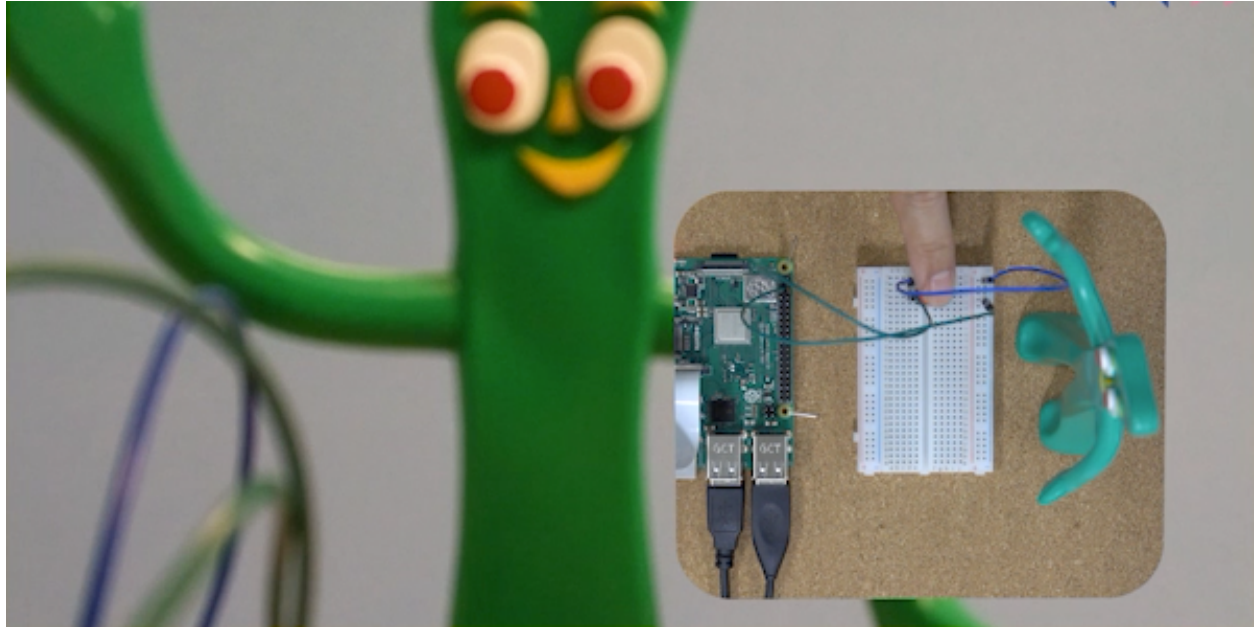
```
from picamera import PiCamera
from gpiozero import Button
from time import sleep

button = Button(2)
camera = PiCamera()

camera.start_preview()
frame = 1

while True:
    try:
        button.wait_for_press()
        camera.capture('/home/pi/stopmotion/frame%03d.jpg' % frame)
        frame += 1
    except KeyboardInterrupt:
        camera.stop_preview()
        break
```

We use a forever loop so we can push the button over and over again to get a new message. To exit the forever loop, we added `try` and `except`. This will allow you to hold control + C to end the loop and stop the program.



`frame%03` is used to name each photo taken. It will add 001, 002, 003, 004, etc to the name of each picture taken. They are all saved in the `stopmotion` folder we created earlier.

1. You should now set up the items you are going to use for your stop motion video. Remember to move each piece ever so slightly and take an image. For just 5 seconds of video, you can use over 100 photos.
2. Once you have all of your photos, we need to turn that into animation. Open up the terminal and type in the following,

```
avconv -r 10 -i stopmotion/frame%03d.jpg -qscale 2 stopmotion.h264
```

We are telling the Pi to convert the images we took into a video. The number 10 is how many frames per second. So, if you took ten pictures, you will have a 1-second video. You can change that number based on the pictures you have taken.

To play the video, type the following into the terminal,

```
omxplayer stopmotion.h264
```

The Challenge

Create a stop motion video on how to wire the different components you have explored in previous units.