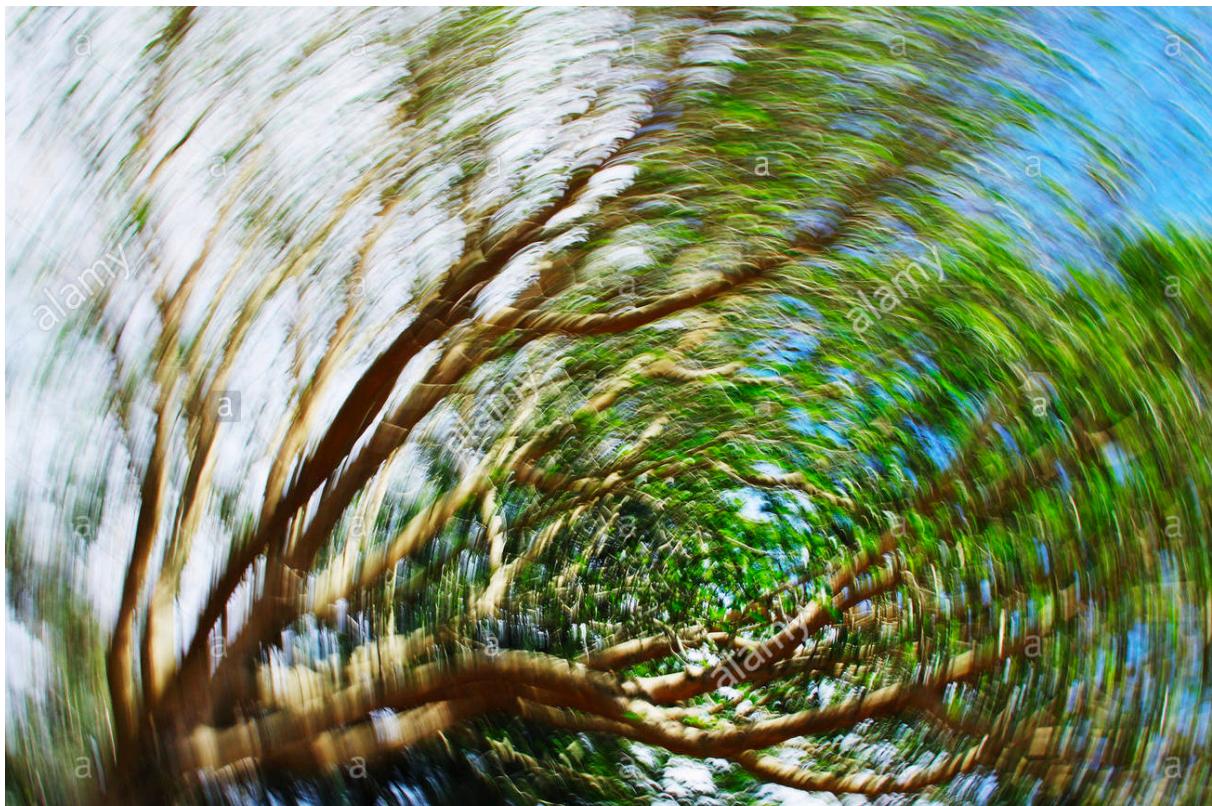


SPIN STABILIZED CAMERA

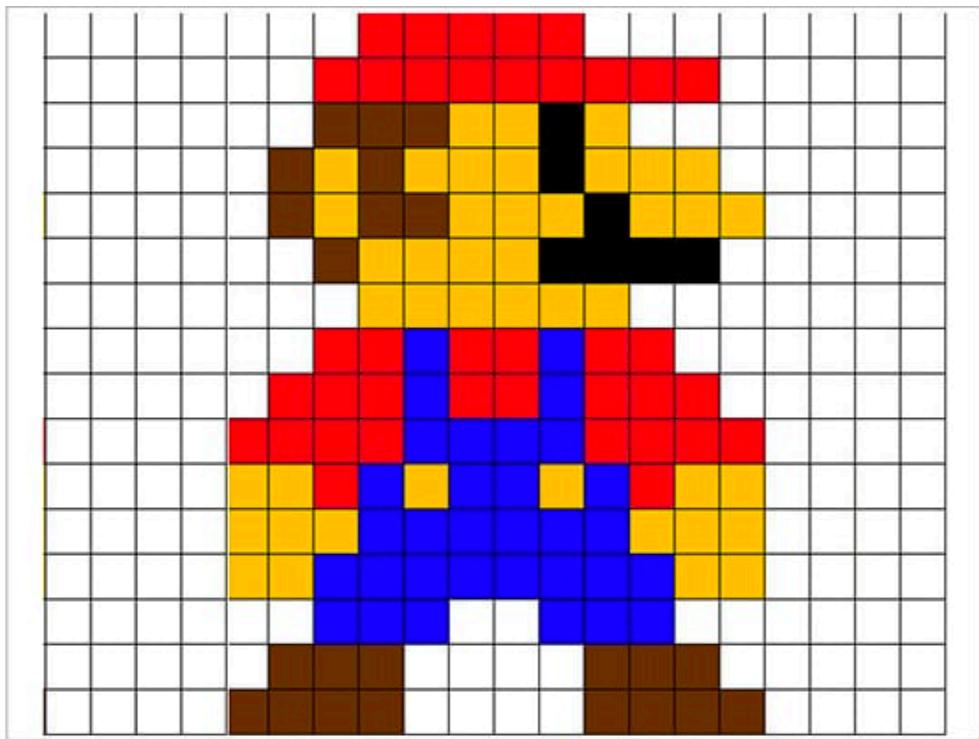
If you want to use a camera in your Cansat, you better be prepared for spinning video. Your Cansat will be spinning due to parachute and wind. There is nothing to stop it from spinning. So, what if you want to make it stabilized and don't want it to look something like this:



There are two ways to do that:

1) Software Stabilization

Firstly, videos are fast-played images. You basically show 30 photos in 1 second. In every frame you change the image little bit. It's super fast so a human eye can't see the interrupts(?). It looks like moving.



16 x 20 pixels photo.

If you want the Mario stand parallel to earth, you can shift the pixels to correct position. There are two ways to do that:

1.1) By selecting a point from image

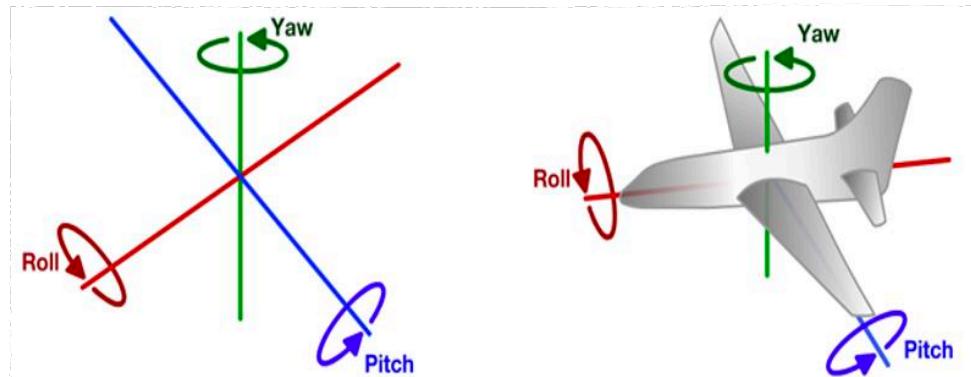
You can select something from the image. For example, you choose eye of the Mario and then you track it's position. Then you can position the other pixels.

But this method means lots of effort for small processor, you need some serious memory and processor.

1.2) By getting yaw value from sensors

If you put gyro sensor to your spinning system then get the yaw value, you can know how much you need to tilt your image (or 2D array). But you still have a lot of work. Let's calculate how much effort you need:

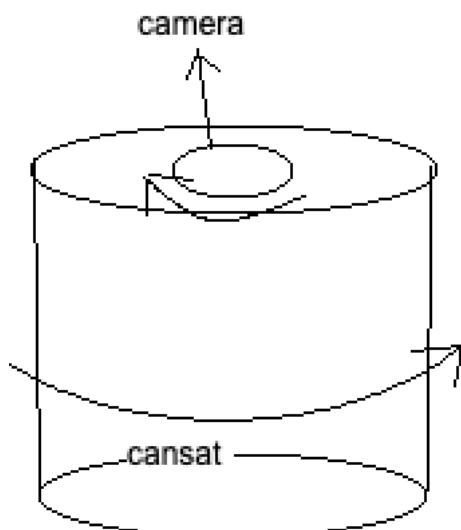
You have a **640 x 480** resolution. This means 640 dots horizontally by 480 vertically. If you multiply these you get **307.200 pixels**. $307,200 \times 24 \text{ bits per pixel} / 8 \text{ (bits per byte)} = 921,600 \text{ bytes per frame}$. If you want a acceptable video you should get at least 24 frames per second. This means **22.118.400 bytes**. These for **uncompressed** video. But if you compress it, you still get too much bytes for small processors.



2) Hardware Stabilization

You can turn the camera physically. If your Cansat spins in Clockwise direction, you can turn the camera to Counterclockwise direction so image doesn't moves.

For this method, you need to have gyro sensor so you can take yaw values from it. And you need an electric motor to spin camera. The camera needs to be unattached to Cansat with wires. If you try to spin with wires connected, they will tangle or break. That's why you need extra battery for the camera. You also need decoder for the motor because you probably want to turn the motor exactly same degree that Cansat has spun.



My awesome paint drawing