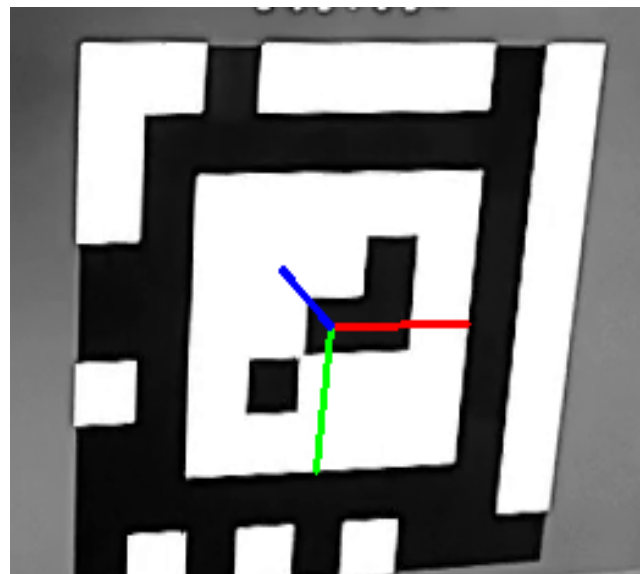
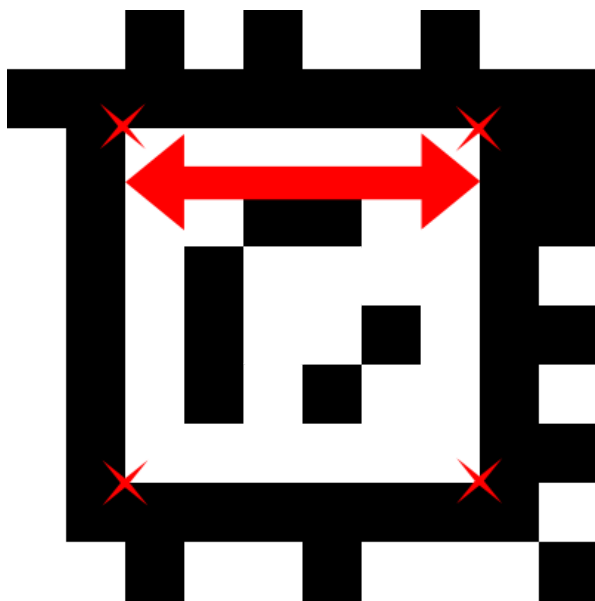




# AprilTag instructions for Spectacular AI SDK (beta)

## Getting started

1. First download pre-generated AprilTag images from here: <https://github.com/AprilRobotics/apriltag-imgs>, the AprilRobotics developers recommend using tagStandard41h12 layout.
2. The downloaded images are very small, and they need to be rescaled, e.g. use `convert <small_marker>.png -scale <scale_chosen_in_percent>% <big_marker>.png`
3. It is recommended to print the tags, instead of showing them from a screen since they easily become blurry in the captured images.
4. Measure the tag size in meters. Note that the tag size is defined as the distance between corners: <https://github.com/AprilRobotics/apriltag/wiki/AprilTag-User-Guide>
5. The tag's coordinate frame is centered at the center of the tag, with **x-axis to the right, y-axis down, and z-axis into the tag**, and [Spectacular AI world coordinates](#) use **right-handed, z-is-up** convention.





## Using AprilTags with the Spectacular AI SDK

The Spectacular AI SDK supports one, or more AprilTags, but in each case the id, size and pose of the AprilTags is assumed to be known in advance. These are given to the SDK using a .json file with the format:

```
# tags.json format
[
  {
    "id": tag id,
    "size": length of the tag's sides in meters,
    // AprilTag family, options:
    // "tag36h11", "tag25h9", "tag16h5", "tagCircle21h7", "tagCircle49h12",
    // "tagStandard41h12", "tagStandard52h13", "tagCustom48h12"
    "family": tag family,
    // Tag pose in world coordinates (right handed, z-is-up),
    // i.e. the tag->world transformation.
    "tagToWorld": 4x4 transformation matrix
  }, ...
]
```

For instance, if you've a single 10 centimeter image *tag41\_12\_00001.png* whose **y-axis is pointing towards gravity direction** (i.e. negative x-axis in world coordinates), then the corresponding .json file would be:

```
[
  {
    "id": 1,
    "size": 0.1,
    "family": "tagStandard41h12",
    "tagToWorld": [
      [1, 0, 0, 0],
      [0, 0, 1, 0],
      [0, -1, 0, 0],
      [0, 0, 0, 1]]
  }
]
```

Finally, just set [Configuration::aprilTagPath](#) to the .json file, and AprilTag detection should work out-of-the-box.

Note that SLAM gets automatically enabled when using AprilTag detection. In addition, [VioOutput::status](#) is [TrackingStatus::INIT](#) until AprilTags are detected. After initialization is successful, the status is changed to [TrackingStatus::TRACKING](#), and the output coordinates are transformed to match the AprilTag world coordinates.