



UNIVERSITÀ  
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# ORB-SLAM

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# SLAM

- Simultaneous Localization And Mapping
- Various type of SLAM system
  - ORB-SLAM is a (stereo) RGB(D) camera SLAM system



# ORB-SLAM Example

## ORB-SLAM

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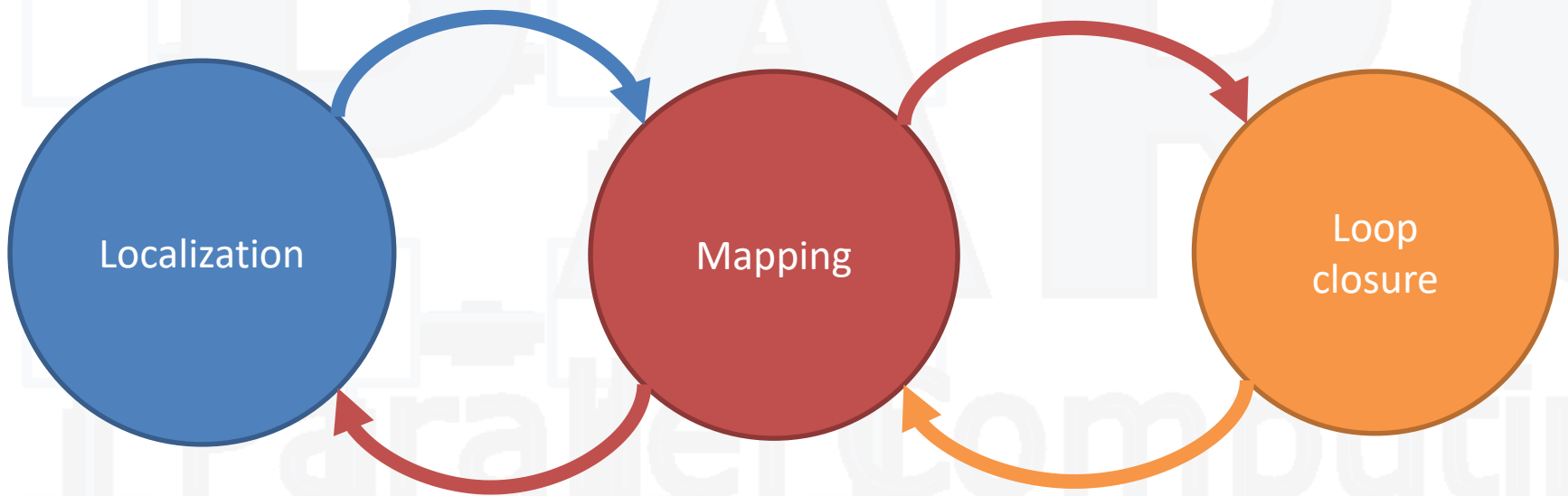


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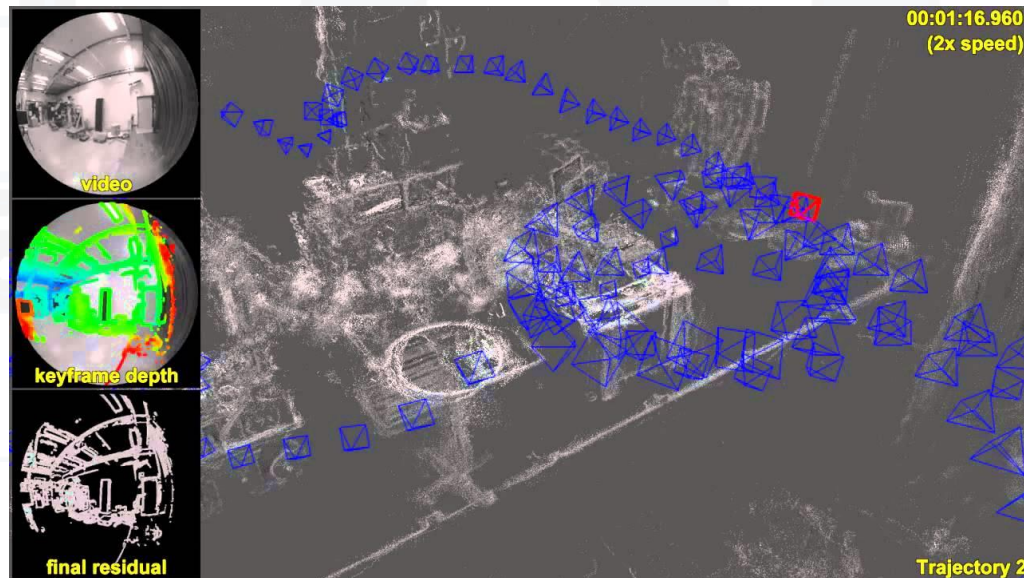
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# ORB-SLAM composition



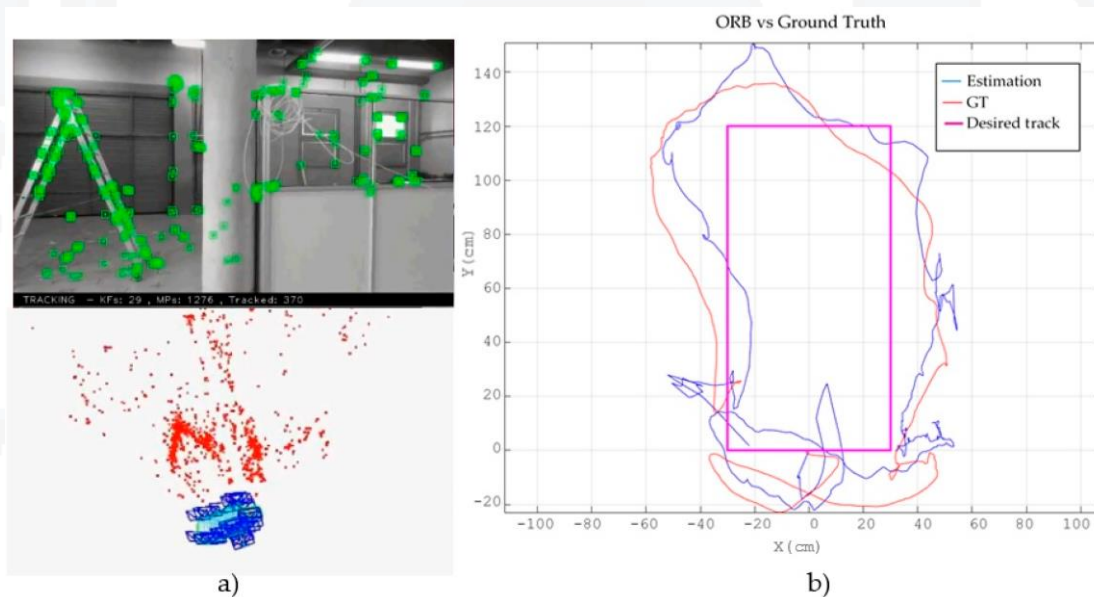
# Localization

- Identification in the map
- In the example below, red camera is where agent localize himself



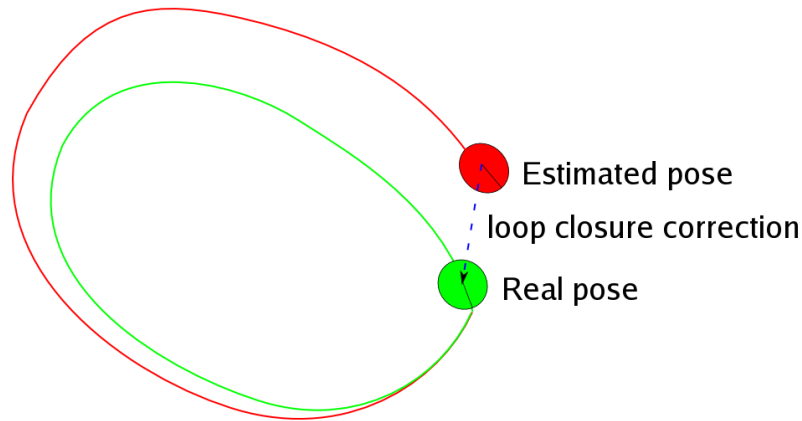
# Mapping

- 2D point  $\rightarrow$  3D point
- Add new points and associate it with image features



# Loop closure

- Parameter estimation implies error
- Fix unavoidable scale errors, especially on monocular camera



# Your turn

- Use commands on next slide to get basic ORB-SLAM working
- Don't worry on file/code size, we will focus on System, Tracking and folder under Examples/ROS



# Your turn

```
mkdir git  
cd git
```

```
sudo apt-get install -y libglew-dev cmake
```

```
git clone https://github.com/stevenlovegrove/Pangolin.git  
git clone https://github.com/raulmur/ORB_SLAM2.git
```

```
cd Pangolin  
mkdir build && cd build  
cmake ..  
make  
cd ../..
```

```
cd ORB_SLAM2  
chmod +x build.sh  
./build.sh
```

```
export ROS_PACKAGE_PATH=${ROS_PACKAGE_PATH}:${(pwd)}/Examples/ROS  
chmod +x build_ros.sh  
./build_ros.sh
```

# What can be done



# Your turn

- Point cloud visualization of map
  - Your main has a reference to a System object
  - System has a reference to the Map object
  - Map has `GetAllMapPoints` method
  - Connect the dots
- More on this: publish pose of the camera on ROS topic (hint: `mTCW` is the name member on Tracking class)
  - Bonus: list of keyframes too (again, `GetAllKeyFrames` is a method on Map class)
  - Ultrabonus: publish points with color

# Useful links

- Help
  - [https://github.com/raulmur/ORB\\_SLAM2](https://github.com/raulmur/ORB_SLAM2)
- Dataset download
  - KITTI (car):  
[http://www.cvlibs.net/datasets/kitti/eval\\_odometry.php](http://www.cvlibs.net/datasets/kitti/eval_odometry.php)
  - EuRoC (drone):  
<https://projects.asl.ethz.ch/datasets/doku.php?id=kmavvisualinertialdatasets>
- Point cloud visualization
  - [http://wiki.ros.org/pcl\\_ros](http://wiki.ros.org/pcl_ros)