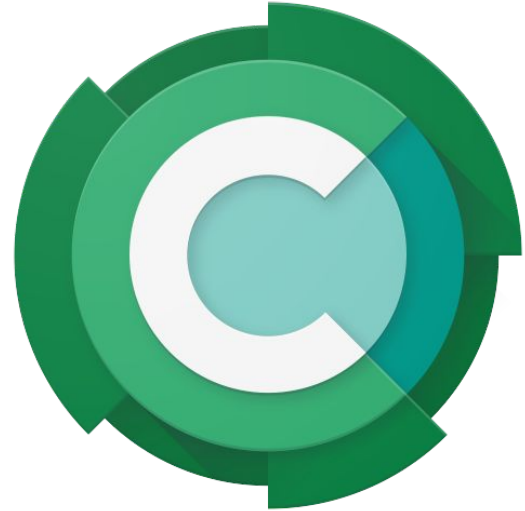


Cartographer Open House VIII

October 26, 2017



What landed on master? • cartographer

- Refactoring for life-long mapping, i.e. introduction of MapById ([#581](#), [#583](#), [#584](#), [#585](#), [#586](#), [#587](#), [#592](#), [#593](#), [#597](#), [#603](#))
- Support multiple trajectories in LoadMap. ([#567](#))
- Add TimedPointCloud and TimedRangeData. ([#601](#))
- Bug fixes, refactorings, performance.

What landed on master? • `cartographer_ros`

- Adds a `rosvag_validate` binary. ([#536](#), [#541](#))
- Visualize gaps in trajectories due to trimming. ([#500](#))
- Adds a `PointsProcessor` that can write ROS maps. ([#548](#))
- Bug fixes, refactorings, performance.

“Demo” • Unifying 2D and 3D Optimization

	2D	% rel to 2D	3D	% rel to 2D	3D.1	% rel to 2D	3D.2	% rel to 2D
user time (s)	4730.08	100.00%	6937.91	146.68%	6199.24	131.06%	5882.86	124.37%
system time (s)	248.51	100.00%	418.68	168.48%	309.3	124.46%	308.02	123.95%
wall time (s)	1055	100.00%	1861	176.40%	1402	132.89%	1375	130.33%
mem (kB)	2539888	100.00%	2840088	111.82%	2696612	106.17%	2692880	106.02%
optimization								
avg iterations	6.16667	100.00%	6.54639	106.16%	6.39394	103.69%	6.31959	102.48%
preprocessor	0.128515	100.00%	0.249896	194.45%	0.237507	184.81%	0.238067	185.24%
res eval	0.0331941	100.00%	0.100476	302.69%	0.136416	410.96%	0.122881	370.19%
Jacobian eval	0.147858	100.00%	0.787842	532.84%	0.742038	501.86%	0.629186	425.53%
Linear solver	0.817438	100.00%	3.25522	398.22%	1.33157	162.90%	1.30219	159.30%
Minimizer	1.11033	100.00%	4.50901	406.10%	2.46548	222.05%	2.30469	207.57%

3D: naive use of mapping_3d/optimization_problem.cc for 2D mapping (only translation reparametrization)

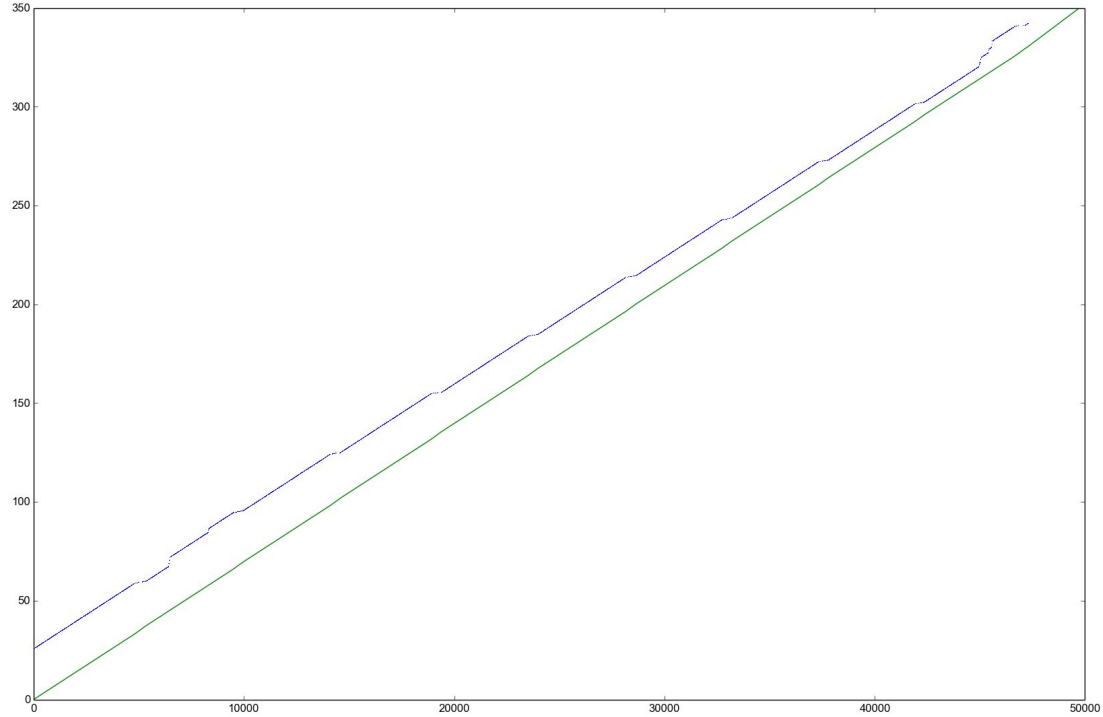
3D.1: naive use of mapping_3d/optimization_problem.cc for 2D mapping (both angular and translation reparametrization)

3D.2: optimized 3D cost function ($\sin \theta \rightarrow \theta$, for efficient quaternion inversion)

Demo • cartographer_rosbag_validate [#540](#)

```
$ rosruntime cartographer_ros cartographer_rosbag_validate -bag_filename ~/Downloads/2017-10-17-08-59-28.bag
I1019 11:23:49.507346 117476 rosbag_validate_main.cc:154] Time delta histogram for consecutive messages on topic "/imu/data"
(frame_id: "imu_link"):
Count: 4178 Min: 0.004978 Max: 0.014006 Mean: 0.010000
[0.004978, 0.005880) Count: 5 (0.119674%) Total: 5 (0.119674%)
[0.005880, 0.006783) Count: 0 (0.000000%) Total: 5 (0.119674%)
[0.006783, 0.007686) Count: 0 (0.000000%) Total: 5 (0.119674%)
[0.007686, 0.008589) Count: 0 (0.000000%) Total: 5 (0.119674%)
[0.008589, 0.009492) Count: 1 (0.023935%) Total: 6 (0.143609%)
[0.009492, 0.010394) ##### Count: 4166 (99.712784%) Total: 4172 (99.856392%)
[0.010394, 0.011297) Count: 1 (0.023935%) Total: 4173 (99.880325%)
[0.011297, 0.012200) Count: 0 (0.000000%) Total: 4173 (99.880325%)
[0.012200, 0.013103) Count: 0 (0.000000%) Total: 4173 (99.880325%)
[0.013103, 0.014006] Count: 5 (0.119674%) Total: 4178 (100.000000%)
I1019 11:23:49.507936 117476 rosbag_validate_main.cc:154] Time delta histogram for consecutive messages on topic "/fullscan"
(frame_id: "rslidar"):
Count: 418 Min: 0.000000 Max: 0.000000 Mean: 0.000000
```

Demo • cartographer_rosbag_validate [#540](#)



Discussion - RFCs

- Cartographer community growing with more and more PRs to review.
- Introduction of RFCs to make code contributions less time consuming for contributors and reviewers.
- Lightweight design review process through RFCs.
- Implementation tracking of agreed upon features through Github projects.

Current work

- Life-long mapping.
- Reuse more 3D components in 2D mapping pipeline.
- Initial pose implementation.
- Point cloud unwarping.
- Bug fixes, refactorings, performance.

Placeholder for other status reports

Thanks!

Next Open House:
November 9, 5pm CET (9am PST)

If you would like to present anything next meeting, please reach out to
cschuet@google.com