

VIII. BENCHMARK

TABLE V: *DiscoFuzzer*’s benchmarks. The first two columns enumerate the names of the benchmarks. The third and fourth columns show the URLs of the code and the lists of the ids of each benchmark’s vulnerabilities. An exception occurs for the benchmarks number 5 (*carla*) and 6 (*carla-bis*): they require other code running to be tested, namely *carla-core*, introducing in the above-mentioned benchmarks two new vulnerabilities. We added the URL of *carla-core* in the table. We also added the previously unknown vulnerabilities in bold (*cfr.* §V-C).

	name	URL	vulnerabilities
1	apm-planner	https://github.com/ArduPilot/apm_planner/tree/dfc1865a82	[1, 2, 3, 4, 5, 6, 90]
2	ardupilot	https://github.com/AutonomyLab/ardrone_autonomy/tree/2e3b75a	[7, 8, 9, 10, 11, 12, 13]
3	autoware	https://github.com/autowarefoundation/autoware/tree/31f4bfb	[14, 15, 16, 17, 18, 19, 20]
4	autoware-bis	https://github.com/autowarefoundation/autoware/tree/e625625	[21]
5	carla	https://github.com/carla-simulator/ros-bridge/tree/8e468ca	[22, 23]
6	carla-bis	https://github.com/carla-simulator/ros-bridge/tree/625960e	[24]
	carla-core	https://github.com/carla-simulator/carla/tree/ec3bb90	[25, 26]
7	cartographer-ros	https://github.com/googlecartographer/cartographer_ros/tree/2538ac3	[27, 28, 29, 30, 31, 32]
8	cartographer-ros-bis	https://github.com/googlecartographer/cartographer_ros/tree/7bcd44	[33, 34, 91]
9	cob-driver	https://github.com/ipa320/cob_driver/tree/7a5d7c8	[35, 36, 37, 38, 39, 40]
10	image-pipeline	https://github.com/ros-perception/image_pipeline/tree/d11edf3	[41, 42, 43, 44, 45, 46, 47, 48, 92]
11	lsd-slam	https://github.com/tum-vision/lsd_slam/tree/bb82258	[49, 50, 51, 52, 53, 93]
12	moveit	https://github.com/ros-planning/moveit/tree/ece11fe	[54, 55, 56, 57, 58, 59, 60, 94 , 95]
13	mrpt	https://github.com/mrpt/mrpt/tree/f564006	[61, 62]
14	mrpt-bis	https://github.com/mrpt/mrpt/tree/a4bcb08	[63]
15	mrpt-tris	https://github.com/mrpt/mrpt/tree/31e853f	[64, 96]
16	navigation	https://github.com/ros-planning/navigation/tree/48323b0	[65, 66, 67, 68, 69, 70, 71, 72, 73]
17	open-source-rover	https://github.com/nasa-jpl/osr-rover-code/tree/33f072e	[74, 75, 76, 97]
18	rtabmap	https://github.com/introlab/rtabmap/tree/173bd49	[77, 78, 79, 80, 81]
19	rtabmap-bis	https://github.com/introlab/rtabmap/tree/344dc16	[82, 83, 84]
20	universal-robot	https://github.com/ros-industrial/universal_robot/tree/8c912d4	[85, 86, 87, 88, 89]

TABLE VI: Results of the statistical analyses on vulnerability detection times

ID	$p_{s,mc}$	$A_{s,mc}$	$p_{s,c}$	$A_{s,c}$	$p_{mc,c}$	$A_{mc,c}$
1	0.007	0.17	0.001	0.90	0.000	1.00
2	0.000	0.00	0.000	1.00	0.000	1.00
7	0.013	0.20	0.058	0.30	0.001	0.90
8	0.001	0.08	0.009	0.20	0.001	0.80
9	0.339	0.56	0.484	0.50	0.221	0.40
10	0.339	0.08	0.009	0.20	0.221	0.20
11	0.002	0.88	-	-	-	-
12	0.000	0.04	0.000	0.00	0.000	0.00
13	0.003	0.87	0.001	0.90	0.058	0.70
14	0.016	0.11	-	-	-	-
16	0.070	0.70	0.001	0.90	0.001	0.90
17	0.236	0.60	0.058	0.30	0.009	0.20
18	-	-	0.000	0.00	-	-
19	-	-	-	-	0.484	0.50
20	0.000	0.95	-	-	-	-
21	0.485	0.50	0.009	0.20	0.009	0.20
23	0.016	0.79	0.009	0.80	0.009	0.80
24	-	-	0.000	1.00	-	-
25	0.485	0.07	-	-	-	-
26	0.007	0.73	0.000	0.90	0.000	1.00
27	0.044	0.73	0.221	0.60	0.058	0.30
28	-	-	-	-	0.000	0.00
29	0.425	0.53	-	-	-	-
31	0.001	0.12	-	-	-	-
33	0.013	0.80	-	-	-	-
34	0.000	0.00	0.000	0.00	0.000	0.00
35	0.455	0.14	0.221	0.00	0.001	0.00
36	0.002	0.89	-	-	-	-
37	0.172	0.63	-	-	-	-
38	0.000	0.00	0.000	0.00	0.221	0.30
39	0.367	0.35	0.484	0.40	0.484	0.50
40	0.019	0.22	-	-	-	-
41	0.396	0.36	-	-	-	-
42	0.023	0.77	-	-	-	-
43	0.002	0.89	-	-	-	-
44	0.485	0.50	-	-	-	-
45	0.001	0.07	-	-	-	-
49	0.027	0.76	-	-	-	-
50	0.081	0.31	-	-	-	-
51	0.485	0.49	-	-	-	-
52	0.005	0.85	0.009	0.80	0.001	0.10
54	0.485	0.31	0.484	0.30	0.221	0.60
55	0.038	0.74	0.009	0.80	0.000	1.00
56	0.023	0.77	0.000	1.00	0.001	0.90
58	0.061	0.29	0.058	0.30	0.058	0.70
59	0.016	0.07	0.009	0.00	0.221	0.00
60	0.339	0.44	0.058	0.70	0.000	1.00
61	0.013	0.11	0.009	0.10	0.058	0.10
62	0.285	0.58	0.058	0.70	0.001	0.90
63	0.339	0.56	0.000	1.00	0.001	0.90
64	0.000	1.00	0.000	1.00	0.001	0.90
66	0.485	0.51	0.058	0.30	0.000	0.00
67	0.003	0.67	0.221	0.40	0.000	0.00
68	0.121	0.66	0.001	0.90	0.000	1.00
70	0.192	0.62	-	-	-	-
71	-	-	0.058	0.30	-	-
72	0.425	0.25	0.221	0.30	0.221	0.30
73	0.000	1.00	0.000	1.00	0.000	0.00
74	0.038	0.26	0.221	0.40	0.221	0.60
75	0.023	0.77	0.000	1.00	0.000	1.00
80	-	-	-	-	0.221	0.40
81	0.001	0.91	0.221	0.40	0.000	0.00
82	0.052	0.72	0.058	0.70	0.058	0.70
83	0.016	0.79	-	-	-	-
85	-	-	0.000	0.00	-	-
86	0.070	0.70	0.001	0.90	0.000	1.00
87	0.016	0.21	0.000	0.00	0.000	0.00
89	0.006	0.84	0.000	1.00	0.484	0.50
90	0.000	1.00	0.000	1.00	0.001	0.90
91	0.019	0.78	-	-	-	-
92	0.038	0.74	0.058	0.30	0.000	0.00
93	0.396	0.00	0.221	0.00	0.221	0.30
96	0.005	0.85	0.000	1.00	0.221	0.60
97	0.002	0.88	0.000	1.00	0.001	0.90