Nav2 Beam Skipping Feature Evaluation

Release 0.1.0-alpha

Ekumen Inc.

Dec 06, 2024

CONTENTS:

DATASET: MAGAZINO DATASETS

1.1 hallway_localization

Bagfile metadata:

```
Files:              hallway_localization.db3
Bag size:           44.9 MiB
Storage id:         sqlite3
Duration:           137.740324342s
Start:              Feb 19 2018 15:56:41.703421877 (1519055801.703421877)
End:                Feb 19 2018 15:58:59.443746219 (1519055939.443746219)
Messages:           79024
```

Evaluation results:

Table 1: APE metrics aggregated across all iterations of `hallway_localization` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.052 m	0.058 m	0.042 m	0.194 m
Likelihood Prob	0.044 m	0.045 m	0.029 m	0.169 m
Beam Skip	0.042 m	0.044 m	0.030 m	0.150 m

Table 2: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	18.2%	73 MB
Likelihood Prob	18.4%	72 MB
Beam Skip	18.0%	72 MB

1.2 hallway_return

Bagfile metadata:

```
Files:              hallway_return.db3
Bag size:           74.7 MiB
Storage id:         sqlite3
Duration:           230.480762482s
Start:              Dec 18 2017 13:03:12.517244048 (1513602192.517244048)
End:                Dec 18 2017 13:07:02.998006530 (1513602422.998006530)
Messages:           132179
```

Evaluation results:

Table 3: APE metrics aggregated across all iterations of `hallway_return` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.055 m	0.062 m	0.039 m	0.222 m
Likelihood Prob	0.040 m	0.048 m	0.033 m	0.191 m
Beam Skip	0.039 m	0.048 m	0.031 m	0.179 m

Table 4: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.5%	43 MB
Likelihood Prob	17.7%	43 MB
Beam Skip	17.5%	44 MB

DATASET: OPENLORIS OFFICE

2.1 office1-1

Bagfile metadata:

```
Files:             output_0.db3
Bag size:          5.2 MiB
Storage id:
Duration:          26.997654728s
Start:             Jun  8 2019 13:21:23.918949750 (1560000083.918949750)
End:               Jun  8 2019 13:21:50.916604478 (1560000110.916604478)
Messages:          8628
```

Evaluation results:

Table 1: APE metrics aggregated across all iterations of `office1-1` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.029 m	0.028 m	0.013 m	0.061 m
Likelihood Prob	0.021 m	0.027 m	0.019 m	0.076 m
Beam Skip	0.022 m	0.027 m	0.018 m	0.069 m

Table 2: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.9%	33 MB
Likelihood Prob	12.8%	33 MB
Beam Skip	13.0%	35 MB

2.2 office1-2

Bagfile metadata:

```
Files:             output_0.db3
Bag size:          5.7 MiB
Storage id:
Duration:          29.995833000s
Start:             Jun  8 2019 13:22:02.920771478 (1560000122.920771478)
End:               Jun  8 2019 13:22:32.916604478 (1560000152.916604478)
Messages:          9241
```

Evaluation results:

Table 3: APE metrics aggregated across all iterations of `office1-2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.030 m	0.033 m	0.013 m	0.065 m
Likelihood Prob	0.012 m	0.013 m	0.008 m	0.032 m
Beam Skip	0.013 m	0.014 m	0.009 m	0.040 m

Table 4: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.4%	33 MB
Likelihood Prob	13.4%	33 MB
Beam Skip	13.4%	35 MB

2.3 office1-3

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       2.4 MiB
Storage id:
Duration:       11.995833000s
Start:          Jun  8 2019 13:21:50.920771478 (1560000110.920771478)
End:            Jun  8 2019 13:22:02.916604478 (1560000122.916604478)
Messages:       3840
```

Evaluation results:

Table 5: APE metrics aggregated across all iterations of `office1-3` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.016 m	0.016 m	0.008 m	0.034 m
Likelihood Prob	0.016 m	0.018 m	0.011 m	0.049 m
Beam Skip	0.016 m	0.018 m	0.011 m	0.049 m

Table 6: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.4%	33 MB
Likelihood Prob	13.1%	33 MB
Beam Skip	13.1%	34 MB

2.4 office1-4

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       5.6 MiB
Storage id:
Duration:       29.050849820s
Start:          Jun  9 2019 03:44:45.942452430 (1560051885.942452430)
End:            Jun  9 2019 03:45:14.993302250 (1560051914.993302250)
Messages:       9227
```

Evaluation results:

Table 7: APE metrics aggregated across all iterations of `office1-4` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.052 m	0.060 m	0.029 m	0.110 m
Likelihood Prob	0.030 m	0.035 m	0.022 m	0.082 m
Beam Skip	0.029 m	0.034 m	0.022 m	0.084 m

Table 8: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.5%	34 MB
Likelihood Prob	13.4%	34 MB
Beam Skip	13.3%	35 MB

2.5 office1-5

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       10.1 MiB
Storage id:
Duration:       53.014892474s
Start:          Jun  9 2019 21:46:48.847149610 (1560116808.847149610)
End:            Jun  9 2019 21:47:41.862042084 (1560116861.862042084)
Messages:       16825
```

Evaluation results:

Table 9: APE metrics aggregated across all iterations of `office1-5` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.060 m	0.058 m	0.016 m	0.087 m
Likelihood Prob	0.026 m	0.033 m	0.021 m	0.092 m
Beam Skip	0.025 m	0.031 m	0.021 m	0.093 m

Table 10: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.9%	34 MB
Likelihood Prob	13.5%	34 MB
Beam Skip	13.4%	35 MB

2.6 office1-6

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       6.9 MiB
Storage id:
Duration:       36.467247415s
Start:          Jun 11 2019 09:11:25.799431085 (1560244285.799431085)
End:            Jun 11 2019 09:12:02.266678500 (1560244322.266678500)
Messages:       11453
```

Evaluation results:

Table 11: APE metrics aggregated across all iterations of `office1-6` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.038 m	0.036 m	0.012 m	0.063 m
Likelihood Prob	0.034 m	0.036 m	0.014 m	0.073 m
Beam Skip	0.033 m	0.036 m	0.014 m	0.073 m

Table 12: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.8%	34 MB
Likelihood Prob	12.8%	34 MB
Beam Skip	12.8%	35 MB

2.7 office1-7

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       7.2 MiB
Storage id:
Duration:       38.543811527s
Start:          Jun 11 2019 09:22:36.581972837 (1560244956.581972837)
End:            Jun 11 2019 09:23:15.125784364 (1560244995.125784364)
Messages:       12158
```

Evaluation results:

Table 13: APE metrics aggregated across all iterations of `office1-7` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.045 m	0.049 m	0.027 m	0.103 m
Likelihood Prob	0.036 m	0.042 m	0.035 m	0.153 m
Beam Skip	0.038 m	0.049 m	0.038 m	0.159 m

Table 14: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.3%	34 MB
Likelihood Prob	12.3%	34 MB
Beam Skip	12.0%	36 MB

DATASET: TORWIC MAPPING

3.1 1-1_top_row_shift

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           46.9 MiB
Storage id:
Duration:           279.956217527s
Start:              Feb 13 2020 20:54:53.714098453 (1581627293.714098453)
End:                Feb 13 2020 20:59:33.670315980 (1581627573.670315980)
Messages:           26669
```

Evaluation results:

Table 1: APE metrics aggregated across all iterations of `1-1_top_row_shift` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.027 m	0.032 m	0.021 m	0.128 m
Likelihood Prob	0.023 m	0.027 m	0.020 m	0.105 m
Beam Skip	0.022 m	0.026 m	0.020 m	0.110 m

Table 2: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.2%	35 MB
Likelihood Prob	12.5%	35 MB
Beam Skip	12.4%	37 MB

3.2 1-2_larger_shift

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           24.3 MiB
Storage id:
Duration:           144.920010567s
Start:              Feb 13 2020 21:01:33.670312881 (1581627693.670312881)
End:                Feb 13 2020 21:03:58.590323448 (1581627838.590323448)
Messages:           13807
```

Evaluation results:

Table 3: APE metrics aggregated across all iterations of `1-2_larger_shift` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.033 m	0.040 m	0.026 m	0.132 m
Likelihood Prob	0.024 m	0.035 m	0.028 m	0.130 m
Beam Skip	0.025 m	0.035 m	0.028 m	0.119 m

Table 4: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	14.3%	35 MB
Likelihood Prob	15.2%	35 MB
Beam Skip	15.0%	37 MB

3.3 1-3_longitudinal_shift

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       50.6 MiB
Storage id:
Duration:       302.256923676s
Start:          Feb 13 2020 21:05:39.393397569 (1581627939.393397569)
End:            Feb 13 2020 21:10:41.650321245 (1581628241.650321245)
Messages:       28793
```

Evaluation results:

Table 5: APE metrics aggregated across all iterations of `1-3_longitudinal_shift` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.025 m	0.029 m	0.018 m	0.088 m
Likelihood Prob	0.020 m	0.024 m	0.018 m	0.111 m
Beam Skip	0.020 m	0.024 m	0.018 m	0.105 m

Table 6: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.1%	35 MB
Likelihood Prob	12.7%	35 MB
Beam Skip	12.6%	37 MB

3.4 1-4_all_boxes_shift

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           32.8 MiB
Storage id:
Duration:           196.278304815s
Start:              Feb 13 2020 21:12:21.292006254 (1581628341.292006254)
End:                Feb 13 2020 21:15:37.570311069 (1581628537.570311069)
Messages:           18687
```

Evaluation results:

Table 7: APE metrics aggregated across all iterations of `1-4_all_boxes_shift` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.030 m	0.037 m	0.024 m	0.117 m
Likelihood Prob	0.029 m	0.035 m	0.021 m	0.122 m
Beam Skip	0.028 m	0.033 m	0.022 m	0.122 m

Table 8: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.3%	36 MB
Likelihood Prob	14.0%	35 MB
Beam Skip	13.6%	37 MB

3.5 1-5_all_boxes_rotate

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           51.4 MiB
Storage id:
Duration:           307.465037823s
Start:              Feb 13 2020 21:19:41.885270833 (1581628781.885270833)
End:                Feb 13 2020 21:24:49.350308656 (1581629089.350308656)
Messages:           29283
```

Evaluation results:

Table 9: APE metrics aggregated across all iterations of `1-5_all_boxes_rotate` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.041 m	0.044 m	0.026 m	0.144 m
Likelihood Prob	0.031 m	0.042 m	0.030 m	0.130 m
Beam Skip	0.033 m	0.043 m	0.030 m	0.129 m

Table 10: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.1%	36 MB
Likelihood Prob	12.4%	37 MB
Beam Skip	12.4%	38 MB

3.6 1-6_inner_shrink

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       69.6 MiB
Storage id:
Duration:       413.976923943s
Start:          Feb 13 2020 18:50:24.370308637 (1581619824.370308637)
End:            Feb 13 2020 18:57:18.347232580 (1581620238.347232580)
Messages:       39454
```

Evaluation results:

Table 11: APE metrics aggregated across all iterations of `1-6_inner_shrink` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.030 m	0.033 m	0.017 m	0.088 m
Likelihood Prob	0.022 m	0.028 m	0.019 m	0.110 m
Beam Skip	0.022 m	0.028 m	0.019 m	0.112 m

Table 12: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	11.8%	36 MB
Likelihood Prob	12.2%	35 MB
Beam Skip	12.1%	37 MB

3.7 1-7_all_shrink

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       25.5 MiB
Storage id:
Duration:       152.719948768s
Start:          Feb 13 2020 21:28:14.550314903 (1581629294.550314903)
End:            Feb 13 2020 21:30:47.270263671 (1581629447.270263671)
Messages:       14541
```

Evaluation results:

Table 13: APE metrics aggregated across all iterations of `1-7_all_shrink` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.040 m	0.045 m	0.028 m	0.134 m
Likelihood Prob	0.028 m	0.035 m	0.024 m	0.153 m
Beam Skip	0.027 m	0.034 m	0.024 m	0.112 m

Table 14: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.7%	35 MB
Likelihood Prob	14.9%	35 MB
Beam Skip	14.4%	37 MB

3.8 1-8_alternating_in_and_out

Bagfile metadata:

```
Files:           output_0.db3
Bag size:        63.9 MiB
Storage id:
Duration:        377.910564899s
Start:           Feb 13 2020 19:10:18.859743595 (1581621018.859743595)
End:             Feb 13 2020 19:16:36.770308494 (1581621396.770308494)
Messages:        35978
```

Evaluation results:

Table 15: APE metrics aggregated across all iterations of `1-8_alternating_in_and_out` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.025 m	0.029 m	0.016 m	0.079 m
Likelihood Prob	0.023 m	0.027 m	0.018 m	0.100 m
Beam Skip	0.022 m	0.026 m	0.017 m	0.089 m

Table 16: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	11.5%	35 MB
Likelihood Prob	11.9%	35 MB
Beam Skip	11.8%	37 MB

3.9 1-9_stepping_outward

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         57.6 MiB
Storage id:
Duration:         342.789340257s
Start:            Feb 13 2020 19:20:34.920978069 (1581621634.920978069)
End:              Feb 13 2020 19:26:17.710318326 (1581621977.710318326)
Messages:         32630
```

Evaluation results:

Table 17: APE metrics aggregated across all iterations of 1-9_stepping_outward for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.031 m	0.034 m	0.021 m	0.122 m
Likelihood Prob	0.023 m	0.028 m	0.018 m	0.108 m
Beam Skip	0.024 m	0.027 m	0.018 m	0.112 m

Table 18: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.3%	35 MB
Likelihood Prob	12.9%	36 MB
Beam Skip	12.7%	37 MB

3.10 2-1_remove_top_row

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         50.4 MiB
Storage id:
Duration:         313.565676212s
Start:            Feb 13 2020 20:41:22.245529651 (1581626482.245529651)
End:              Feb 13 2020 20:46:35.811205863 (1581626795.811205863)
Messages:         25151
```

Evaluation results:

Table 19: APE metrics aggregated across all iterations of 2-1_remove_top_row for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.037 m	0.041 m	0.026 m	0.158 m
Likelihood Prob	0.027 m	0.033 m	0.023 m	0.121 m
Beam Skip	0.027 m	0.033 m	0.024 m	0.123 m

Table 20: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.8%	35 MB
Likelihood Prob	13.0%	35 MB
Beam Skip	13.0%	37 MB

3.11 2-2_remove_corners

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         35.1 MiB
Storage id:
Duration:         220.220010519s
Start:            Feb 13 2020 21:35:14.850309133 (1581629714.850309133)
End:              Feb 13 2020 21:38:55.070319652 (1581629935.070319652)
Messages:         17651
```

Evaluation results:

Table 21: APE metrics aggregated across all iterations of
2-2_remove_corners for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.053 m	0.061 m	0.035 m	0.161 m
Likelihood Prob	0.043 m	0.046 m	0.026 m	0.155 m
Beam Skip	0.041 m	0.046 m	0.025 m	0.127 m

Table 22: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.1%	36 MB
Likelihood Prob	13.6%	37 MB
Beam Skip	13.4%	38 MB

3.12 2-3_remove_all_boxes

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         23.9 MiB
Storage id:
Duration:         145.908367157s
Start:            Feb 13 2020 21:41:54.045733451 (1581630114.045733451)
End:              Feb 13 2020 21:44:19.954100608 (1581630259.954100608)
Messages:         11693
```

Evaluation results:

Table 23: APE metrics aggregated across all iterations of `2-3_remove_all_boxes` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.381 m	0.393 m	0.122 m	0.762 m
Likelihood Prob	0.347 m	0.359 m	0.119 m	0.722 m
Beam Skip	0.357 m	0.367 m	0.118 m	0.748 m

Table 24: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	14.8%	37 MB
Likelihood Prob	16.0%	37 MB
Beam Skip	15.4%	38 MB

3.13 2-4_remove_fences

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       47.4 MiB
Storage id:
Duration:       284.713482380s
Start:          Feb 13 2020 22:01:19.776827812 (1581631279.776827812)
End:            Feb 13 2020 22:06:04.490310192 (1581631564.490310192)
Messages:       22801
```

Evaluation results:

Table 25: APE metrics aggregated across all iterations of `2-4_remove_fences` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.061 m	0.070 m	0.044 m	0.279 m
Likelihood Prob	0.066 m	0.082 m	0.058 m	0.307 m
Beam Skip	0.648 m	3.157 m	3.311 m	8.825 m

Table 26: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.3%	38 MB
Likelihood Prob	12.8%	38 MB
Beam Skip	12.3%	39 MB

3.14 3-1_top_row_shift_with_fences

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         60.1 MiB
Storage id:
Duration:         370.885192394s
Start:            Feb 13 2020 19:31:42.545128107 (1581622302.545128107)
End:              Feb 13 2020 19:37:53.430320501 (1581622673.430320501)
Messages:         29783
```

Evaluation results:

Table 27: APE metrics aggregated across all iterations of 3-1_top_row_shift_with_fences for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.028 m	0.030 m	0.017 m	0.107 m
Likelihood Prob	0.021 m	0.026 m	0.020 m	0.136 m
Beam Skip	0.021 m	0.026 m	0.020 m	0.134 m

Table 28: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	11.3%	35 MB
Likelihood Prob	12.0%	35 MB
Beam Skip	11.8%	37 MB

3.15 3-2_top_row_shift_with_sides

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         31.8 MiB
Storage id:
Duration:         196.878990889s
Start:            Feb 13 2020 19:41:24.310406684 (1581622884.310406684)
End:              Feb 13 2020 19:44:41.189397573 (1581623081.189397573)
Messages:         15807
```

Evaluation results:

Table 29: APE metrics aggregated across all iterations of 3-2_top_row_shift_with_sides for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.033 m	0.039 m	0.026 m	0.143 m
Likelihood Prob	0.025 m	0.034 m	0.026 m	0.188 m
Beam Skip	0.024 m	0.033 m	0.027 m	0.197 m

Table 30: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.6%	35 MB
Likelihood Prob	13.2%	35 MB
Beam Skip	13.0%	37 MB

3.16 3-3_fences_move_outward

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         39.0 MiB
Storage id:
Duration:         242.583094120s
Start:            Feb 13 2020 19:58:49.687229633 (1581623929.687229633)
End:              Feb 13 2020 20:02:52.270323753 (1581624172.270323753)
Messages:         19453
```

Evaluation results:

Table 31: APE metrics aggregated across all iterations of 3-3_fences_move_outward for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.045 m	0.049 m	0.027 m	0.124 m
Likelihood Prob	0.042 m	0.050 m	0.037 m	0.189 m
Beam Skip	0.040 m	0.049 m	0.038 m	0.185 m

Table 32: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.3%	37 MB
Likelihood Prob	12.7%	37 MB
Beam Skip	12.6%	38 MB

3.17 4-1_cover_the_fences_with_boxes

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         42.7 MiB
Storage id:
Duration:         265.470810413s
Start:            Feb 13 2020 20:24:41.303243875 (1581625481.303243875)
End:              Feb 13 2020 20:29:06.774054288 (1581625746.774054288)
Messages:         21291
```

Evaluation results:

Table 33: APE metrics aggregated across all iterations of `4-1_cover_the_fences_with_boxes` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.035 m	0.038 m	0.021 m	0.122 m
Likelihood Prob	0.027 m	0.033 m	0.021 m	0.128 m
Beam Skip	0.027 m	0.033 m	0.021 m	0.131 m

Table 34: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	12.1%	35 MB
Likelihood Prob	12.4%	35 MB
Beam Skip	12.1%	37 MB

3.18 baseline

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       25.6 MiB
Storage id:
Duration:       158.579435349s
Start:          Feb 13 2020 20:49:25.470874309 (1581626965.470874309)
End:            Feb 13 2020 20:52:04.050309658 (1581627124.050309658)
Messages:       12727
```

Evaluation results:

Table 35: APE metrics aggregated across all iterations of `baseline` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.032 m	0.041 m	0.028 m	0.142 m
Likelihood Prob	0.027 m	0.037 m	0.026 m	0.133 m
Beam Skip	0.027 m	0.037 m	0.027 m	0.134 m

Table 36: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	13.3%	35 MB
Likelihood Prob	14.9%	35 MB
Beam Skip	14.3%	37 MB

DATASET: TORWIC SLAM

4.1 2022-06-15_aisle_ccw_run_1

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         38.1 MiB
Storage id:
Duration:         113.713397838s
Start:            Jun 15 2022 15:42:10.485268546 (1655307730.485268546)
End:              Jun 15 2022 15:44:04.198666384 (1655307844.198666384)
Messages:         25047
```

Evaluation results:

Table 1: APE metrics aggregated across all iterations of `2022-06-15_aisle_ccw_run_1` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.081 m	0.094 m	0.056 m	0.275 m
Likelihood Prob	0.045 m	0.051 m	0.034 m	0.156 m
Beam Skip	0.044 m	0.051 m	0.034 m	0.149 m

Table 2: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	18.9%	48 MB
Likelihood Prob	20.9%	47 MB
Beam Skip	20.2%	48 MB

4.2 2022-06-15_aisle_ccw_run_2

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         41.5 MiB
Storage id:
Duration:         123.885211192s
Start:            Jun 15 2022 15:46:17.521010020 (1655307977.521010020)
```

```
End:                Jun 15 2022 15:48:21.406221212 (1655308101.406221212)
Messages:           27291
```

Evaluation results:

Table 3: APE metrics aggregated across all iterations of `2022-06-15_aisle_ccw_run_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.073 m	0.083 m	0.048 m	0.256 m
Likelihood Prob	0.046 m	0.055 m	0.037 m	0.172 m
Beam Skip	0.045 m	0.053 m	0.036 m	0.169 m

Table 4: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	18.6%	48 MB
Likelihood Prob	20.2%	48 MB
Beam Skip	19.8%	48 MB

4.3 2022-06-15_aisle_cw_run_1

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           37.3 MiB
Storage id:
Duration:           111.582702411s
Start:              Jun 15 2022 15:44:21.769187396 (1655307861.769187396)
End:                Jun 15 2022 15:46:13.351889807 (1655307973.351889807)
Messages:           24544
```

Evaluation results:

Table 5: APE metrics aggregated across all iterations of `2022-06-15_aisle_cw_run_1` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.063 m	0.074 m	0.048 m	0.249 m
Likelihood Prob	0.047 m	0.055 m	0.036 m	0.208 m
Beam Skip	0.045 m	0.054 m	0.036 m	0.199 m

Table 6: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.4%	49 MB
Likelihood Prob	20.5%	49 MB
Beam Skip	19.8%	49 MB

4.4 2022-06-15_aisle_cw_run_2

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           37.6 MiB
Storage id:
Duration:           112.590496975s
Start:              Jun 15 2022 15:40:13.918738084 (1655307613.918738084)
End:                Jun 15 2022 15:42:06.509235059 (1655307726.509235059)
Messages:           24775
```

Evaluation results:

Table 7: APE metrics aggregated across all iterations of `2022-06-15_aisle_cw_run_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.062 m	0.072 m	0.046 m	0.223 m
Likelihood Prob	0.042 m	0.050 m	0.033 m	0.149 m
Beam Skip	0.045 m	0.050 m	0.033 m	0.147 m

Table 8: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.2%	49 MB
Likelihood Prob	20.9%	49 MB
Beam Skip	20.5%	49 MB

4.5 2022-06-15_hallway_full_ccw_parts_1_and_2

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           85.2 MiB
Storage id:
Duration:           254.113221440s
Start:              Jun 15 2022 13:43:01.978389654 (1655300581.978389654)
End:                Jun 15 2022 13:47:16.091611094 (1655300836.091611094)
Messages:           56055
```

Evaluation results:

Table 9: APE metrics aggregated across all iterations of `2022-06-15_hallway_full_ccw_parts_1_and_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.076 m	0.085 m	0.050 m	0.284 m
Likelihood Prob	0.045 m	0.055 m	0.036 m	0.203 m
Beam Skip	0.046 m	0.055 m	0.036 m	0.222 m

Table 10: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.9%	66 MB
Likelihood Prob	21.2%	66 MB
Beam Skip	20.7%	66 MB

4.6 2022-06-15_hallway_full_cw_parts_1_and_2

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       84.1 MiB
Storage id:
Duration:       251.275269399s
Start:          Jun 15 2022 15:48:53.281282057 (1655308133.281282057)
End:            Jun 15 2022 15:53:04.556551456 (1655308384.556551456)
Messages:       55237
```

Evaluation results:

Table 11: APE metrics aggregated across all iterations of `2022-06-15_hallway_full_cw_parts_1_and_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.111 m	0.177 m	0.233 m	1.269 m
Likelihood Prob	0.066 m	0.083 m	0.069 m	0.544 m
Beam Skip	0.063 m	0.077 m	0.060 m	0.488 m

Table 12: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	20.1%	68 MB
Likelihood Prob	21.9%	68 MB
Beam Skip	21.5%	68 MB

4.7 2022-06-15_hallway_straight_ccw_parts_1_and_2

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       73.6 MiB
Storage id:
Duration:       219.926794633s
Start:          Jun 15 2022 15:57:30.947287779 (1655308650.947287779)
End:            Jun 15 2022 16:01:10.874082412 (1655308870.874082412)
Messages:       48337
```

Evaluation results:

Table 13: APE metrics aggregated across all iterations of `2022-06-15_hallway_straight_ccw_parts_1_and_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.085 m	0.099 m	0.063 m	0.336 m
Likelihood Prob	0.064 m	0.082 m	0.067 m	0.472 m
Beam Skip	0.063 m	0.081 m	0.066 m	0.452 m

Table 14: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.1%	55 MB
Likelihood Prob	21.4%	55 MB
Beam Skip	20.9%	55 MB

4.8 2022-06-23_aisle_ccw_run_1

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       33.6 MiB
Storage id:
Duration:       106.728548099s
Start:          Jun 23 2022 12:56:22.698086939 (1655988982.698086939)
End:            Jun 23 2022 12:58:09.426635038 (1655989089.426635038)
Messages:       20942
```

Evaluation results:

Table 15: APE metrics aggregated across all iterations of `2022-06-23_aisle_ccw_run_1` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.069 m	0.080 m	0.048 m	0.229 m
Likelihood Prob	0.046 m	0.051 m	0.031 m	0.156 m
Beam Skip	0.042 m	0.049 m	0.031 m	0.154 m

Table 16: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.4%	47 MB
Likelihood Prob	21.6%	47 MB
Beam Skip	21.2%	48 MB

4.9 2022-06-23_aisle_ccw_run_2

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         36.4 MiB
Storage id:
Duration:         115.786959959s
Start:            Jun 23 2022 12:41:23.977667314 (1655988083.977667314)
End:              Jun 23 2022 12:43:19.764627273 (1655988199.764627273)
Messages:         22722
```

Evaluation results:

Table 17: APE metrics aggregated across all iterations of 2022-06-23_aisle_ccw_run_2 for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.067 m	0.078 m	0.049 m	0.268 m
Likelihood Prob	0.045 m	0.050 m	0.029 m	0.174 m
Beam Skip	0.045 m	0.050 m	0.029 m	0.151 m

Table 18: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.2%	47 MB
Likelihood Prob	20.9%	47 MB
Beam Skip	20.4%	48 MB

4.10 2022-06-23_aisle_cw_run_1

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         32.7 MiB
Storage id:
Duration:         103.821932330s
Start:            Jun 23 2022 12:39:18.023720952 (1655987958.023720952)
End:              Jun 23 2022 12:41:01.845653282 (1655988061.845653282)
Messages:         20329
```

Evaluation results:

Table 19: APE metrics aggregated across all iterations of 2022-06-23_aisle_cw_run_1 for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.075 m	0.082 m	0.050 m	0.207 m
Likelihood Prob	0.045 m	0.052 m	0.034 m	0.168 m
Beam Skip	0.046 m	0.051 m	0.034 m	0.165 m

Table 20: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.7%	48 MB
Likelihood Prob	21.5%	48 MB
Beam Skip	21.1%	49 MB

4.11 2022-06-23_aisle_cw_run_2

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         33.4 MiB
Storage id:
Duration:         106.006626068s
Start:            Jun 23 2022 12:54:33.756801434 (1655988873.756801434)
End:              Jun 23 2022 12:56:19.763427502 (1655988979.763427502)
Messages:         20790
```

Evaluation results:

Table 21: APE metrics aggregated across all iterations of `2022-06-23_aisle_cw_run_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.072 m	0.081 m	0.053 m	0.284 m
Likelihood Prob	0.053 m	0.059 m	0.035 m	0.165 m
Beam Skip	0.052 m	0.058 m	0.036 m	0.175 m

Table 22: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.2%	47 MB
Likelihood Prob	20.4%	47 MB
Beam Skip	20.0%	47 MB

4.12 2022-06-23_hallway_full_cw_parts_1_and_2

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         73.0 MiB
Storage id:
Duration:         232.166055211s
Start:            Jun 23 2022 12:50:14.994451405 (1655988614.994451405)
End:              Jun 23 2022 12:54:07.160506616 (1655988847.160506616)
Messages:         45452
```

Evaluation results:

Table 23: APE metrics aggregated across all iterations of `2022-06-23_hallway_full_cw_parts_1_and_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.094 m	0.103 m	0.065 m	0.333 m
Likelihood Prob	0.059 m	0.066 m	0.043 m	0.227 m
Beam Skip	0.058 m	0.066 m	0.042 m	0.222 m

Table 24: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	20.2%	67 MB
Likelihood Prob	21.9%	67 MB
Beam Skip	21.4%	67 MB

4.13 2022-06-23_hallway_straight_ccw_parts_1_and_2

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       62.1 MiB
Storage id:
Duration:       197.272330068s
Start:          Jun 23 2022 12:46:41.908335690 (1655988401.908335690)
End:            Jun 23 2022 12:49:59.180665758 (1655988599.180665758)
Messages:       38605
```

Evaluation results:

Table 25: APE metrics aggregated across all iterations of `2022-06-23_hallway_straight_ccw_parts_1_and_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.146 m	0.172 m	0.111 m	0.507 m
Likelihood Prob	0.106 m	0.127 m	0.087 m	0.414 m
Beam Skip	0.106 m	0.127 m	0.088 m	0.416 m

Table 26: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	20.1%	54 MB
Likelihood Prob	21.6%	54 MB
Beam Skip	21.1%	54 MB

4.14 2022-06-23_hallway_straight_cw_parts_1_and_2

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         60.9 MiB
Storage id:
Duration:         193.668035417s
Start:            Jun 23 2022 12:43:24.114137649 (1655988204.114137649)
End:              Jun 23 2022 12:46:37.782173066 (1655988397.782173066)
Messages:         37886
```

Evaluation results:

Table 27: APE metrics aggregated across all iterations of `2022-06-23_hallway_straight_cw_parts_1_and_2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.103 m	0.110 m	0.065 m	0.335 m
Likelihood Prob	0.060 m	0.065 m	0.035 m	0.186 m
Beam Skip	0.058 m	0.064 m	0.035 m	0.190 m

Table 28: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.9%	55 MB
Likelihood Prob	23.1%	55 MB
Beam Skip	22.5%	55 MB

4.15 2022-10-12_aisle_ccw

Bagfile metadata:

```
Files:            output_0.db3
Bag size:         28.5 MiB
Storage id:
Duration:         108.674478714s
Start:            Oct 12 2022 15:05:42.591046494 (1665587142.591046494)
End:              Oct 12 2022 15:07:31.265525208 (1665587251.265525208)
Messages:         21060
```

Evaluation results:

Table 29: APE metrics aggregated across all iterations of `2022-10-12_aisle_ccw` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.076 m	0.089 m	0.052 m	0.240 m
Likelihood Prob	0.043 m	0.049 m	0.031 m	0.158 m
Beam Skip	0.044 m	0.050 m	0.031 m	0.166 m

Table 30: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	18.0%	46 MB
Likelihood Prob	19.4%	46 MB
Beam Skip	18.9%	47 MB

4.16 2022-10-12_aisle_cw

Bagfile metadata:

```
Files:           output_0.db3
Bag size:        37.0 MiB
Storage id:
Duration:        109.436421603s
Start:           Oct 12 2022 15:03:44.213784857 (1665587024.213784857)
End:             Oct 12 2022 15:05:33.650206460 (1665587133.650206460)
Messages:        27349
```

Evaluation results:

Table 31: APE metrics aggregated across all iterations of `2022-10-12_aisle_cw` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.075 m	0.084 m	0.050 m	0.219 m
Likelihood Prob	0.055 m	0.064 m	0.044 m	0.275 m
Beam Skip	0.053 m	0.063 m	0.044 m	0.256 m

Table 32: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	19.9%	48 MB
Likelihood Prob	21.9%	48 MB
Beam Skip	21.6%	49 MB

4.17 2022-10-12_hallway_full_cw_run1

Bagfile metadata:

```
Files:           output_0.db3
Bag size:        78.6 MiB
Storage id:
Duration:        232.040493812s
Start:           Oct 12 2022 14:52:48.158511543 (1665586368.158511543)
End:             Oct 12 2022 14:56:40.199005355 (1665586600.199005355)
Messages:        57967
```

Evaluation results:

Table 33: APE metrics aggregated across all iterations of `2022-10-12_hallway_full_cw_run1` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.090 m	0.097 m	0.060 m	0.268 m
Likelihood Prob	0.055 m	0.065 m	0.042 m	0.245 m
Beam Skip	0.055 m	0.063 m	0.041 m	0.241 m

Table 34: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	21.5%	67 MB
Likelihood Prob	22.7%	67 MB
Beam Skip	22.4%	67 MB

4.18 2022-10-12_hallway_full_cw_run2

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       73.0 MiB
Storage id:
Duration:       1707.031916364s
Start:          Jun 23 2022 12:25:40.224631785 (1655987140.224631785)
End:            Jun 23 2022 12:54:07.256548149 (1655988847.256548149)
Messages:       45452
```

Evaluation results:

Table 35: APE metrics aggregated across all iterations of `2022-10-12_hallway_full_cw_run2` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.094 m	0.105 m	0.069 m	0.347 m
Likelihood Prob	0.059 m	0.065 m	0.041 m	0.224 m
Beam Skip	0.057 m	0.065 m	0.042 m	0.230 m

Table 36: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	9.9%	67 MB
Likelihood Prob	10.1%	67 MB
Beam Skip	10.0%	67 MB

4.19 2022-10-12_hallway_straight_ccw

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       63.9 MiB
Storage id:
Duration:       188.479484581s
Start:          Oct 12 2022 14:57:06.209387381 (1665586626.209387381)
End:            Oct 12 2022 15:00:14.688871962 (1665586814.688871962)
Messages:       47158
```

Evaluation results:

Table 37:   APE metrics aggregated across all iterations of `2022-10-12_hallway_straight_ccw` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.084 m	0.094 m	0.056 m	0.262 m
Likelihood Prob	0.051 m	0.060 m	0.040 m	0.318 m
Beam Skip	0.050 m	0.059 m	0.038 m	0.253 m

Table 38: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	21.2%	54 MB
Likelihood Prob	23.1%	54 MB
Beam Skip	22.7%	54 MB

4.20 2022-10-12_hallway_straight_cw

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       61.1 MiB
Storage id:
Duration:       181.271632962s
Start:          Oct 12 2022 15:00:28.105728604 (1665586828.105728604)
End:            Oct 12 2022 15:03:29.377361566 (1665587009.377361566)
Messages:       45319
```

Evaluation results:

Table 39:   APE metrics aggregated across all iterations of `2022-10-12_hallway_straight_cw` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.120 m	0.129 m	0.059 m	0.315 m
Likelihood Prob	0.077 m	0.084 m	0.046 m	0.319 m
Beam Skip	0.078 m	0.083 m	0.044 m	0.257 m

Table 40: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	21.5%	54 MB
Likelihood Prob	23.5%	53 MB
Beam Skip	23.0%	53 MB

DATASET: WILLOW GARAGE

5.1 2011-08-03-20-03-22

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           447.7 MiB
Storage id:
Duration:           1179.865735690s
Start:              Aug  4 2011 03:03:22.249050964 (1312427002.249050964)
End:                Aug  4 2011 03:23:02.114786654 (1312428182.114786654)
Messages:           90936
```

Evaluation results:

Table 1: APE metrics aggregated across all iterations of `2011-08-03-20-03-22` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.048 m	0.059 m	0.041 m	0.294 m
Likelihood Prob	0.030 m	0.035 m	0.024 m	0.206 m
Beam Skip	0.030 m	0.035 m	0.025 m	0.203 m

Table 2: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.8%	67 MB
Likelihood Prob	18.5%	65 MB
Beam Skip	18.2%	67 MB

5.2 2011-08-04-12-16-23

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           415.2 MiB
Storage id:
Duration:           1071.353156193s
Start:              Aug  4 2011 19:16:24.006902194 (1312485384.006902194)
End:                Aug  4 2011 19:34:15.360058387 (1312486455.360058387)
Messages:           83200
```

Evaluation results:

Table 3: APE metrics aggregated across all iterations of `2011-08-04-12-16-23` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.054 m	0.063 m	0.042 m	0.246 m
Likelihood Prob	0.029 m	0.036 m	0.028 m	0.236 m
Beam Skip	0.029 m	0.036 m	0.028 m	0.247 m

Table 4: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	18.0%	63 MB
Likelihood Prob	18.6%	62 MB
Beam Skip	18.2%	64 MB

5.3 2011-08-04-14-27-40

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       521.8 MiB
Storage id:
Duration:       1311.031026181s
Start:          Aug  4 2011 21:27:41.112645283 (1312493261.112645283)
End:            Aug  4 2011 21:49:32.143671464 (1312494572.143671464)
Messages:       102705
```

Evaluation results:

Table 5: APE metrics aggregated across all iterations of `2011-08-04-14-27-40` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.056 m	0.064 m	0.041 m	0.216 m
Likelihood Prob	0.029 m	0.037 m	0.030 m	0.213 m
Beam Skip	0.030 m	0.037 m	0.029 m	0.196 m

Table 6: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.6%	66 MB
Likelihood Prob	18.0%	65 MB
Beam Skip	17.9%	67 MB

5.4 2011-08-04-23-46-28

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           381.4 MiB
Storage id:
Duration:           1047.574529557s
Start:              Aug  5 2011 06:46:28.399066101 (1312526788.399066101)
End:                Aug  5 2011 07:03:55.973595658 (1312527835.973595658)
Messages:           78913
```

Evaluation results:

Table 7: APE metrics aggregated across all iterations of
`2011-08-04-23-46-28` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.057 m	0.067 m	0.042 m	0.264 m
Likelihood Prob	0.031 m	0.035 m	0.024 m	0.223 m
Beam Skip	0.029 m	0.034 m	0.023 m	0.182 m

Table 8: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.3%	61 MB
Likelihood Prob	17.7%	60 MB
Beam Skip	17.6%	61 MB

5.5 2011-08-05-09-27-53

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           310.0 MiB
Storage id:
Duration:           795.039563778s
Start:              Aug  5 2011 16:27:53.861139847 (1312561673.861139847)
End:                Aug  5 2011 16:41:08.900703625 (1312562468.900703625)
Messages:           61825
```

Evaluation results:

Table 9: APE metrics aggregated across all iterations of
`2011-08-05-09-27-53` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.058 m	0.063 m	0.039 m	0.205 m
Likelihood Prob	0.026 m	0.032 m	0.023 m	0.149 m
Beam Skip	0.025 m	0.031 m	0.023 m	0.140 m

Table 10: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	18.4%	62 MB
Likelihood Prob	18.9%	61 MB
Beam Skip	18.6%	62 MB

5.6 2011-08-05-12-58-41

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           649.1 MiB
Storage id:
Duration:           1670.788619581s
Start:              Aug  5 2011 19:58:41.630230740 (1312574321.630230740)
End:                Aug  5 2011 20:26:32.418850321 (1312575992.418850321)
Messages:           128987
```

Evaluation results:

Table 11: APE metrics aggregated across all iterations of `2011-08-05-12-58-41` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.058 m	0.072 m	0.056 m	0.439 m
Likelihood Prob	0.034 m	0.045 m	0.042 m	0.354 m
Beam Skip	0.033 m	0.044 m	0.042 m	0.429 m

Table 12: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.4%	65 MB
Likelihood Prob	17.7%	64 MB
Beam Skip	17.5%	66 MB

5.7 2011-08-05-23-19-43

Bagfile metadata:

```
Files:              output_0.db3
Bag size:           333.6 MiB
Storage id:
Duration:           894.767121760s
Start:              Aug  6 2011 06:19:43.923742222 (1312611583.923742222)
End:                Aug  6 2011 06:34:38.690863982 (1312612478.690863982)
Messages:           68410
```

Evaluation results:

Table 13: APE metrics aggregated across all iterations of `2011-08-05-23-19-43` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.054 m	0.063 m	0.047 m	0.426 m
Likelihood Prob	0.025 m	0.030 m	0.020 m	0.120 m
Beam Skip	0.025 m	0.029 m	0.020 m	0.108 m

Table 14: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.7%	64 MB
Likelihood Prob	18.0%	63 MB
Beam Skip	17.8%	65 MB

5.8 2011-08-08-09-48-17

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       325.0 MiB
Storage id:
Duration:       842.995704695s
Start:          Aug  8 2011 16:48:17.438536250 (1312822097.438536250)
End:            Aug  8 2011 17:02:20.434240945 (1312822940.434240945)
Messages:       65503
```

Evaluation results:

Table 15: APE metrics aggregated across all iterations of `2011-08-08-09-48-17` for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.057 m	0.068 m	0.049 m	0.276 m
Likelihood Prob	0.027 m	0.037 m	0.032 m	0.241 m
Beam Skip	0.028 m	0.038 m	0.032 m	0.274 m

Table 16: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.3%	63 MB
Likelihood Prob	17.8%	62 MB
Beam Skip	17.6%	63 MB

5.9 2011-08-08-14-26-55

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       439.6 MiB
Storage id:
Duration:       1096.754513803s
Start:          Aug  8 2011 21:26:56.104727757 (1312838816.104727757)
End:            Aug  8 2011 21:45:12.859241560 (1312839912.859241560)
Messages:       86479
```

Evaluation results:

Table 17: APE metrics aggregated across all iterations of 2011-08-08-14-26-55 for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.058 m	0.066 m	0.044 m	0.248 m
Likelihood Prob	0.025 m	0.031 m	0.022 m	0.136 m
Beam Skip	0.026 m	0.030 m	0.021 m	0.137 m

Table 18: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.3%	62 MB
Likelihood Prob	17.6%	61 MB
Beam Skip	17.5%	63 MB

5.10 2011-08-08-23-29-37

Bagfile metadata:

```
Files:          output_0.db3
Bag size:       457.0 MiB
Storage id:
Duration:       1185.175005394s
Start:          Aug  9 2011 06:29:38.103575181 (1312871378.103575181)
End:            Aug  9 2011 06:49:23.278580575 (1312872563.278580575)
Messages:       92384
```

Evaluation results:

Table 19: APE metrics aggregated across all iterations of 2011-08-08-23-29-37 for the Likelihood field sensor model.

Implementation	Likelihood field sensor model			
	median	mean	std	worst-case
Likelihood Field	0.051 m	0.061 m	0.041 m	0.271 m
Likelihood Prob	0.025 m	0.031 m	0.022 m	0.133 m
Beam Skip	0.025 m	0.030 m	0.022 m	0.124 m

Table 20: Average CPU and peak Resident Set Size (RSS) values.

Implementation	Likelihood Field	
	cpu	rss
Likelihood Field	17.5%	66 MB
Likelihood Prob	18.0%	66 MB
Beam Skip	17.8%	67 MB