

به نام خدا

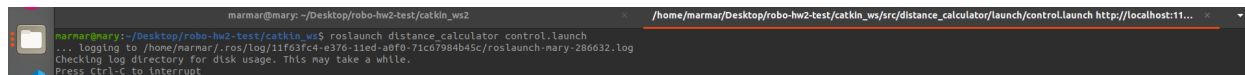
گزارش تمرین عملی سری دوم ربات - بهار ۱۴۰۲

مریم کرمانشاهانی - ۹۷۲۳۰۷۳

سوال اول

در این گام از سرویس استفاده شده است . در کنار آن از سه فایل استفاده شده است یکی مانیتور یکی سنسور و دیگری کنترلر. در سنسور اعداد در بازه ۱۰ تولید میشوند طبق خواسته سوال و در کال بک سرویس این تابع برای تولید اعداد فراخوانی میشود

در کنترلر نیز به این گونه عمل شد که ابتدا زاویه مربوط به نقطه مقصد به دست آورده می شود. بعد به سمت آن چرخش انجام شده و به سمت آن حرکت میکند. ۵ بار این کار را انجام میدهد و بعد از ارور ها میانگین میگیرد. این کار برای سه سرعت تکرار شده که نتایج و دستورات در زیر قابل مشاهده است.



```
marmar@mary: ~/Desktop/robo-hw2-test/catkin_ws2
/home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11...
marmar@mary: ~/Desktop/robo-hw2-test/catkin_ws$ roslaunch distance_calculator control.launch
... logging to /home/marmar/.ros/log/11f63fc4-e376-11ed-a0f0-71c7984b45c/roslaunch-mary-286032.log
Checking log directory for disk usage. This may take a while.
Press Ctrl-C to interrupt
```

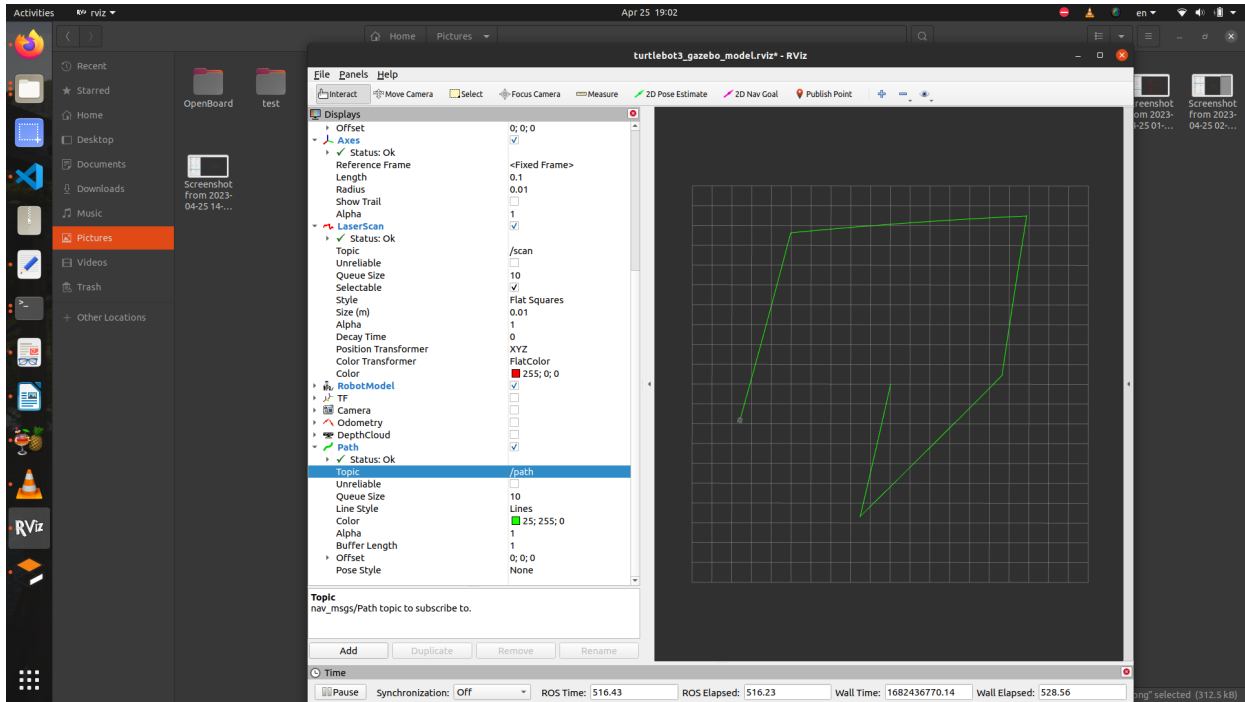
سرعت = ۰.۲ :

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Activities Terminal Apr 25 19:01
/home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11311
marmar@mariy: ~/Desktop/robo-hw2-test/catkin_ws2 /home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11...

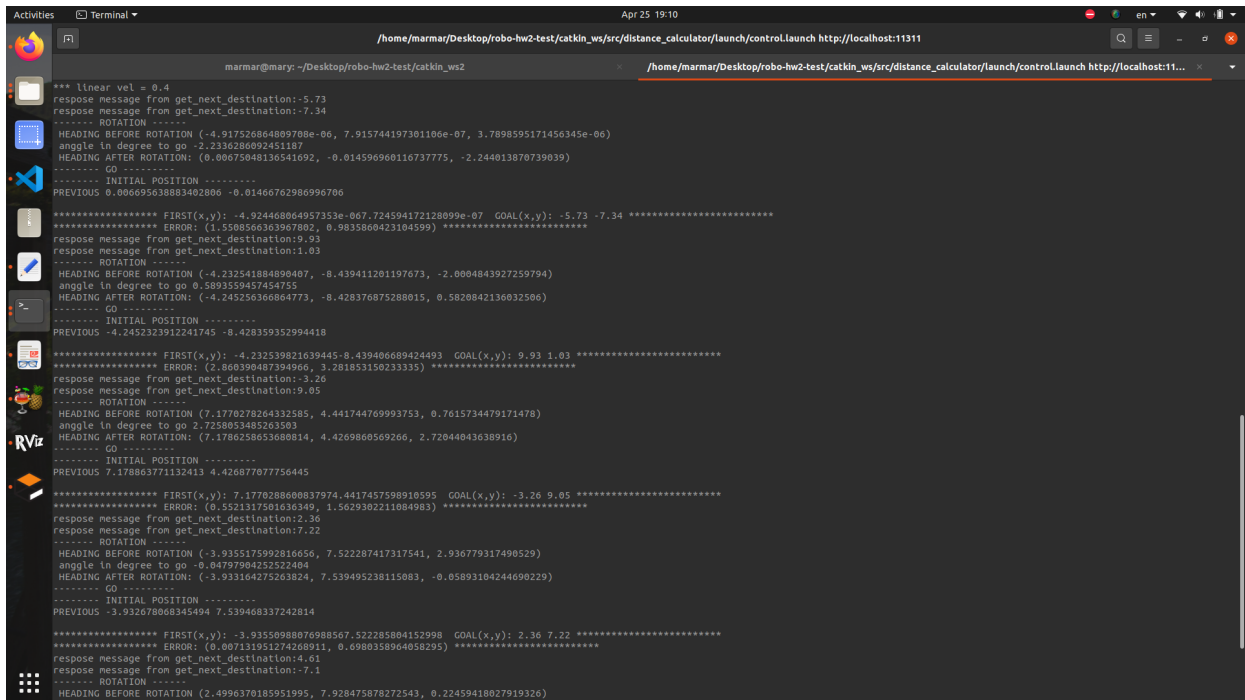
*** linear vel = 0.2
response message from get_next_destination:-6.79
response message from get_next_destination:0.9
----- ROTATION -----
HEADING BEFORE ROTATION (-4.917526864899780e-06, 7.915744197381106e-07, 3.7898595171456345e-06)
angle in degree to go 3.0098129638374385
HEADING AFTER ROTATION: (-0.0013486439596901902, -0.01781283569608818, 2.998898221487978)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS -0.0013666240881205104 -0.017808660268940558
***** FIRST(x,y): -4.9244688405735e-067, 7.24594172138099e-07, GOAL(x,y): -0.79 0.9 *****
***** ERROR: (0.1970461858211844, 0.6121347667518952) *****
response message from get_next_destination:-0.19
response message from get_next_destination:-0.17
----- ROTATION -----
HEADING BEFORE ROTATION (-6.6982867091227, 1.518744198732089, 2.8996223148848284)
angle in degree to go -0.8683558021302675
HEADING AFTER ROTATION: (-6.68930559699511, 1.5326612329666855, -0.879438630443657)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS -6.689104992868417 1.5324190732931509
libcurl: (52) Empty reply from server
***** FIRST(x,y): -0.6982844956651341, 5.187436691978555, GOAL(x,y): -0.19 -0.17 *****
***** ERROR: (0.6023357049066862, 0.5570721736339896) *****
response message from get_next_destination:8.39
response message from get_next_destination:-7.31
----- ROTATION -----
HEADING BEFORE ROTATION (0.4433336872056794, -5.642308736396548, -0.6744805086477822)
angle in degree to go -0.20685930468222644
HEADING AFTER ROTATION: (0.4411429241906277, -5.6398062233379544, -0.2111791266211823)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 0.44191676645200373 -5.639973847359525
***** FIRST(x,y): 0.4433285314309856-5.6423046077479135, GOAL(x,y): 8.39 -7.31 *****
***** ERROR: (0.0744351765851956, 0.432219686275405) *****
response message from get_next_destination:8.36
response message from get_next_destination:4.96
----- ROTATION -----
HEADING BEFORE ROTATION (0.497372687936751, -6.883359854359952, -0.2066663830440468)
angle in degree to go 1.5823937359623148
HEADING AFTER ROTATION: (0.487088883294662, -6.892130941399364, 1.5718573263316844)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 0.487087959510633 -6.892658821680454
***** FIRST(x,y): 8.497365551358783-6.883358403445607, GOAL(x,y): 8.36 4.96 *****
***** ERROR: (0.7202791423249462, 0.03557137726947612) *****
response message from get_next_destination:-1.87
response message from get_next_destination:7.65
```

```
Activities Terminal Apr 25 19:01
/home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11311
marmar@mariy: ~/Desktop/robo-hw2-test/catkin_ws2 /home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11...

response message from get_next_destination:-0.17
----- ROTATION -----
HEADING BEFORE ROTATION (-6.6982867091227, 1.518744198732089, 2.8996223148848284)
angle in degree to go -0.8683558021302675
HEADING AFTER ROTATION: (-6.68930559699511, 1.5326612329666855, -0.879438630443657)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS -6.689104992868417 1.5324190732931509
libcurl: (52) Empty reply from server
***** FIRST(x,y): -0.6982844956651341, 5.187436691978555, GOAL(x,y): -0.19 -0.17 *****
***** ERROR: (0.6023357049066862, 0.5570721736339896) *****
response message from get_next_destination:8.39
response message from get_next_destination:-7.31
----- ROTATION -----
HEADING BEFORE ROTATION (0.4433336872056794, -5.642308736396548, -0.6744805086477822)
angle in degree to go -0.20685930468222644
HEADING AFTER ROTATION: (0.4411429241906277, -5.6398062233379544, -0.2111791266211823)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 0.44191676645200373 -5.639973847359525
***** FIRST(x,y): 0.4433285314309856-5.6423046077479135, GOAL(x,y): 8.39 -7.31 *****
***** ERROR: (0.0744351765851956, 0.432219686275405) *****
response message from get_next_destination:8.36
response message from get_next_destination:4.96
----- ROTATION -----
HEADING BEFORE ROTATION (0.497372687936751, -6.883359854359952, -0.2066663830440468)
angle in degree to go 1.5823937359623148
HEADING AFTER ROTATION: (0.487088883294662, -6.892130941399364, 1.5718573263316844)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 0.487087959510633 -6.892658821680454
***** FIRST(x,y): 8.497365551358783-6.883358403445607, GOAL(x,y): 8.36 4.96 *****
***** ERROR: (0.7202791423249462, 0.03557137726947612) *****
response message from get_next_destination:-1.87
response message from get_next_destination:7.65
----- ROTATION -----
HEADING BEFORE ROTATION (7.602503160772381, 5.03777630738339, 2.2860264214239336)
angle in degree to go 2.8725112278652447
HEADING AFTER ROTATION: (7.60451379086268, 5.037298161895444, 2.8671514586207785)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 7.604347169373429 5.037344720337015
***** FIRST(x,y): 7.6025050870416495, 0.037748837953215, GOAL(x,y): -1.87 7.65 *****
***** ERROR: (0.009238466555031799, 0.0455953260533839) *****
***** SUM ERROR: (0.31, 0.34) *****
[controller-4] process has finished cleanly
log file: /home/marmar/.ros/log/3334e4fe-e3fd-11ed-80fo-71c67984b45c/controller-4*.log
```

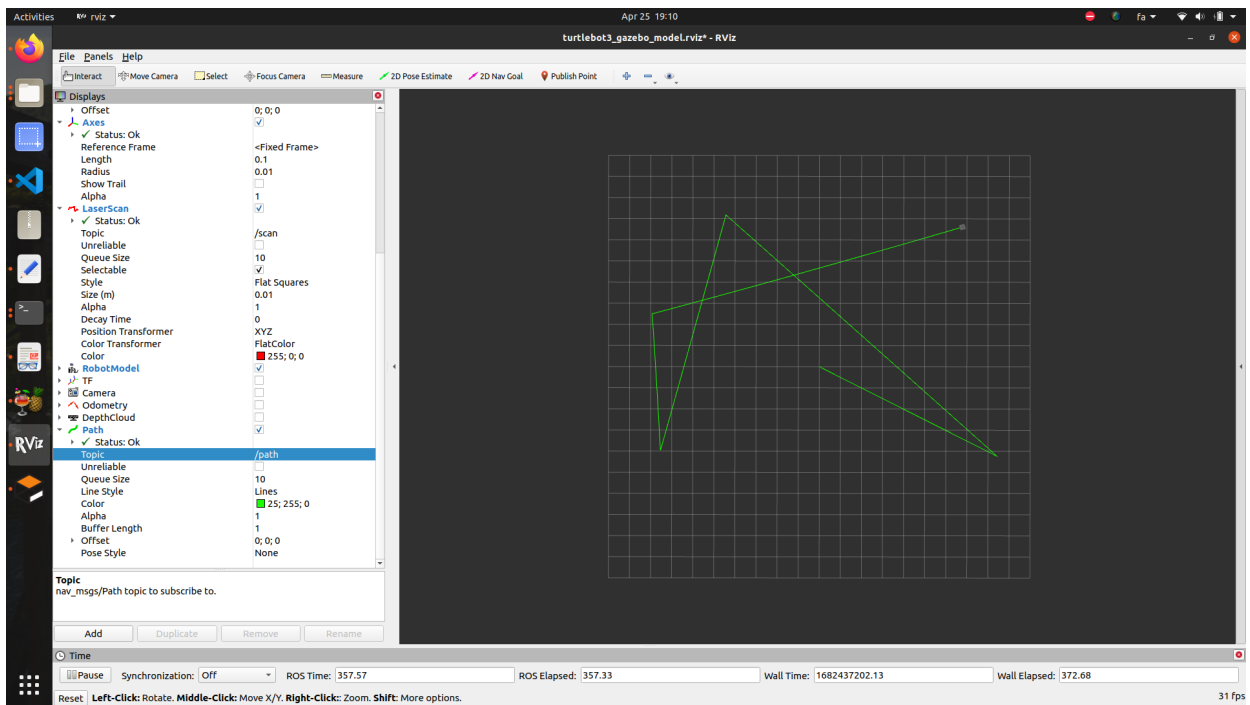


سرعت = 0.4



```
Activities Terminal Apr 25 19:10
/home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11311
marmar@marmar: ~/Desktop/robo-hw2-test/catkin_ws2 /home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11...

***** ERROR: (1.55085663967802, 0.9835860423104599) *****
response message from get_next_destination:9.93
response message from get_next_destination:1.03
***** ROTATION *****
HEADING BEFORE ROTATION (-4.23251884890407, -8.439411201197673, -2.0004843927259794)
angle in degree to go 0.5893559457454755
HEADING AFTER ROTATION: (-4.24525636664773, -8.428376075280015, 0.5828042136032506)
***** GO *****
***** INITIAL POSITION *****
PREVIOUS -4.2452323912241745 -8.428359352994418
***** FIRST(x,y): -4.232539821639445 -8.439406689424493 GOAL(x,y): 9.93 1.03 *****
***** ERROR: (2.860390487394966, 3.281853150233335) *****
response message from get_next_destination:3.26
response message from get_next_destination:9.05
***** ROTATION *****
HEADING BEFORE ROTATION (7.1770278264332585, 4.441744769993753, 0.7615734479171478)
angle in degree to go 2.7258053486263593
HEADING AFTER ROTATION: (7.1780258653688014, 4.4269860559266, 2.72844043638916)
***** GO *****
***** INITIAL POSITION *****
PREVIOUS 7.178063771132413 4.426877077756445
***** FIRST(x,y): 7.1770288608037974, 4.417457598910595 GOAL(x,y): -3.26 9.05 *****
***** ERROR: (0.552131756183049, 1.5629302211004983) *****
response message from get_next_destination:2.36
response message from get_next_destination:7.22
***** ROTATION *****
HEADING BEFORE ROTATION (-3.9355175992816656, 7.522287417131541, 2.936779317490529)
angle in degree to go -0.0479799425252404
HEADING AFTER ROTATION: (-3.933164275263824, 7.539495238115083, -0.05893184244690229)
***** GO *****
***** INITIAL POSITION *****
PREVIOUS -3.932678668345494 7.539468337242814
***** FIRST(x,y): -3.9355988976988567, 5.22285804152998 GOAL(x,y): 2.36 7.22 *****
***** ERROR: (0.007131951274268911, 0.6980358964058295) *****
response message from get_next_destination:4.61
response message from get_next_destination:-7.1
***** ROTATION *****
HEADING BEFORE ROTATION (2.4996370185951995, 7.928475878272543, 0.22459418027919326)
angle in degree to go -1.4312847680909868
HEADING AFTER ROTATION: (2.510036693393767, 7.921146956504807, -1.4389512235858684)
***** GO *****
***** INITIAL POSITION *****
PREVIOUS 2.5101328873408284 7.920397190413378
***** FIRST(x,y): 2.499640692183887, 9.28476714155718 GOAL(x,y): 4.61 -7.1 *****
***** ERROR: (1.9754658630365722, 0.410595886214149) *****
***** SUM ERROR: (1.39, 1.39) *****
[controller-4] process has finished cleanly
log file: /home/marmar/.ros/log/91ad4930-e37e-11ed-af0-71c67984b45c/controller-4*.log
```



سرعت = 0.8:

```
Activities Terminal Apr 25 20:13
/home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11311

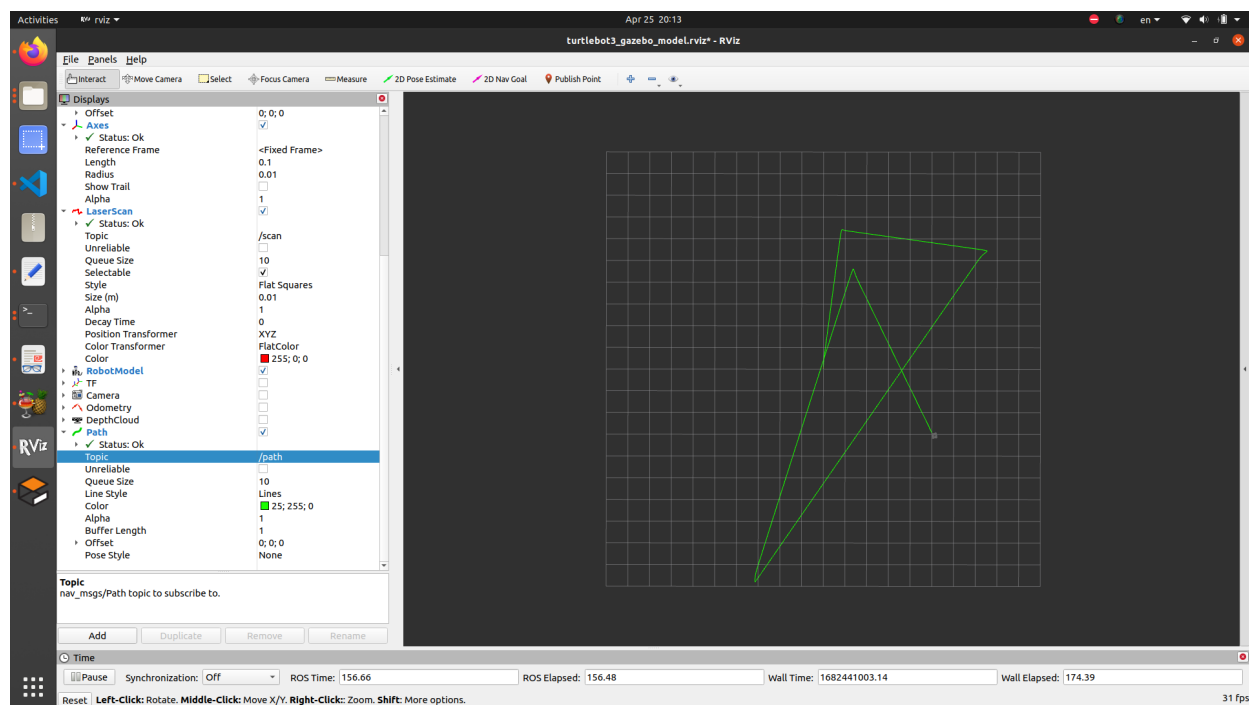
marmar@mary: ~/Desktop/robo-hw2-test/catkin_ws2 /home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11...

***** started *****
*** linear vel = 0.8
response message from get_next_destination:5.94
response message from get_next_destination:-0.27
----- ROTATION -----
HEADING BEFORE ROTATION (-4.924468064957353e-06, 7.724594172128099e-07, 3.669805324550564e-06)
angle in degree to go -0.04542336496366739
HEADING AFTER ROTATION: (0.00044000294006824037, -5.462044983847237e-06, -0.05137026083263915)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 0.000450389474767378 -4.193493446090675e-06
***** FIRST(x,y): -4.931409251019618e-067.533444607107815e-07 GOAL(x,y): 5.94 -0.27 *****
***** ERROR: (0.03830163822700924, 0.4788503905194843) *****
response message from get_next_destination:3.92
response message from get_next_destination:-0.53
----- ROTATION -----
HEADING BEFORE ROTATION (0.420340785196519, -0.8356498280575368, -0.06761457711329842)
angle in degree to go -1.9845437985384773
HEADING AFTER ROTATION: (6.42831776896806, -0.8477940775795236, -1.9883583521979893)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 6.428356383242986 -0.8478307943513378
***** FIRST(x,y): 6.4203474496323185-0.8356502784475467 GOAL(x,y): 3.92 -0.53 *****
***** ERROR: (1.6275361088063187, 0.4670937873203478) *****
response message from get_next_destination:4.86
response message from get_next_destination:7.23
----- ROTATION -----
HEADING BEFORE ROTATION (5.442330437427647, -7.544406353211352, -2.178015271749726)
angle in degree to go 2.1797142523317836
HEADING AFTER ROTATION: (5.428792250496406, -7.544181306898497, 2.1747840949962853)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 5.4286040682250305 -7.543911731076184
***** FIRST(x,y): 5.4423310243672525-7.544405509544023 GOAL(x,y): -4.86 7.23 *****
***** ERROR: (4.444986675939892, 4.4375762861112396) *****
response message from get_next_destination:4.56
response message from get_next_destination:5.59
----- ROTATION -----
HEADING BEFORE ROTATION (-9.785152293988222, 3.1255099060909295, 2.519594319968725)
angle in degree to go 0.17013796108407812
HEADING AFTER ROTATION: (-9.782107430107438, 3.141328853794095, 0.16494311186022517)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS -9.781907583020699 3.1413619987464383
***** FIRST(x,y): -9.7851575140856913.1255136390626657 GOAL(x,y): 4.56 5.59 *****
***** ERROR: (0.44503934602191857, 6.7755515483689335) *****
response message from get_next_destination:-2.71
response message from get_next_destination:-4.44
----- ROTATION -----
HEADING BEFORE ROTATION (4.618137230713674, -1.3618628900166692, -0.23521541362439538)
angle in degree to go -2.7439274325299694
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 4.6193062169007595 -1.378924998293293
***** FIRST(x,y): 4.618136997420403-1.36186261578616 GOAL(x,y): -2.71 -4.44 *****
***** ERROR: (0.1593075373241048, 0.38057805987407350) *****
***** SUM ERROR: (1.34, 2.51) *****
[controller-4] process has finished cleanly
Log file: /home/marmar/.ros/log/e187e772-e387-11ed-a0f0-73c67984b45c/controller-4*.log
```

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Activities Terminal Apr 25 20:14
/home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11311

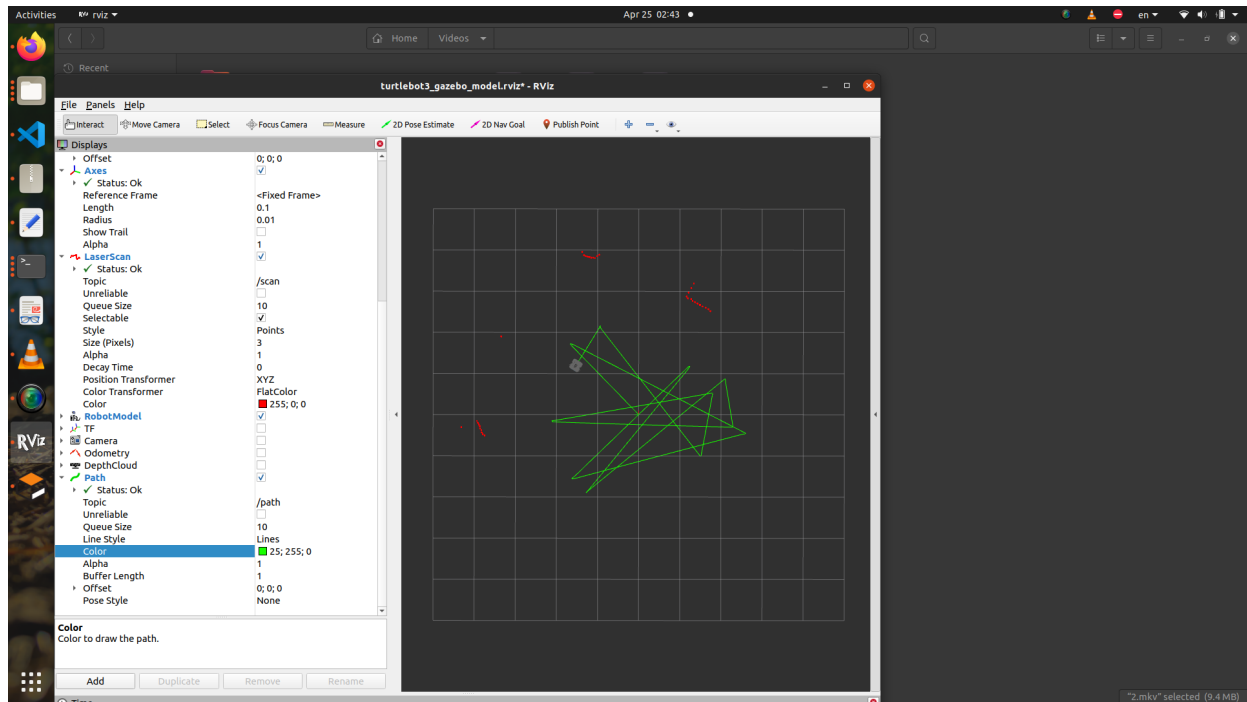
marmar@mary: ~/Desktop/robo-hw2-test/catkin_ws2 /home/marmar/Desktop/robo-hw2-test/catkin_ws/src/distance_calculator/launch/control.launch http://localhost:11...

response message from get_next_destination:-0.53
----- ROTATION -----
HEADING BEFORE ROTATION (0.420340785196519, -0.8356498280575368, -0.06761457711329842)
angle in degree to go -1.9845437985384773
HEADING AFTER ROTATION: (6.42831776896806, -0.8477940775795236, -1.9883583521979893)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 6.428356383242986 -0.8478307943513378
***** FIRST(x,y): 6.4203474496323185-0.8356502784475467 GOAL(x,y): 3.92 -0.53 *****
***** ERROR: (1.6275361088063187, 0.4670937873203478) *****
response message from get_next_destination:-4.86
response message from get_next_destination:7.23
----- ROTATION -----
HEADING BEFORE ROTATION (5.442330437427647, -7.544406353211352, -2.178015271749726)
angle in degree to go 2.1797142523317836
HEADING AFTER ROTATION: (5.428792250496406, -7.544181306898497, 2.1747840949962853)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 5.4286040682250305 -7.543911731076184
***** FIRST(x,y): 5.4423310243672525-7.544405509544023 GOAL(x,y): -4.86 7.23 *****
***** ERROR: (4.444986675939892, 4.4375762861112396) *****
response message from get_next_destination:4.56
response message from get_next_destination:5.59
----- ROTATION -----
HEADING BEFORE ROTATION (-9.785152293988222, 3.1255099060909295, 2.519594319968725)
angle in degree to go 0.17013796108407812
HEADING AFTER ROTATION: (-9.782107430107438, 3.141328853794095, 0.16494311186022517)
----- GO -----
----- INITIAL POSITION -----
PREVIOUS -9.781907583020699 3.1413619987464383
***** FIRST(x,y): -9.7851575140856913.1255136390626657 GOAL(x,y): 4.56 5.59 *****
***** ERROR: (0.44503934602191857, 6.7755515483689335) *****
response message from get_next_destination:-2.71
response message from get_next_destination:-4.44
----- ROTATION -----
HEADING BEFORE ROTATION (4.618137230713674, -1.3618628900166692, -0.23521541362439538)
angle in degree to go -2.7439274325299694
----- GO -----
----- INITIAL POSITION -----
PREVIOUS 4.6193062169007595 -1.378924998293293
***** FIRST(x,y): 4.618136997420403-1.36186261578616 GOAL(x,y): -2.71 -4.44 *****
***** ERROR: (0.1593075373241048, 0.38057805987407350) *****
***** SUM ERROR: (1.34, 2.51) *****
[controller-4] process has finished cleanly
Log file: /home/marmar/.ros/log/e187e772-e387-11ed-a0f0-73c67984b45c/controller-4*.log
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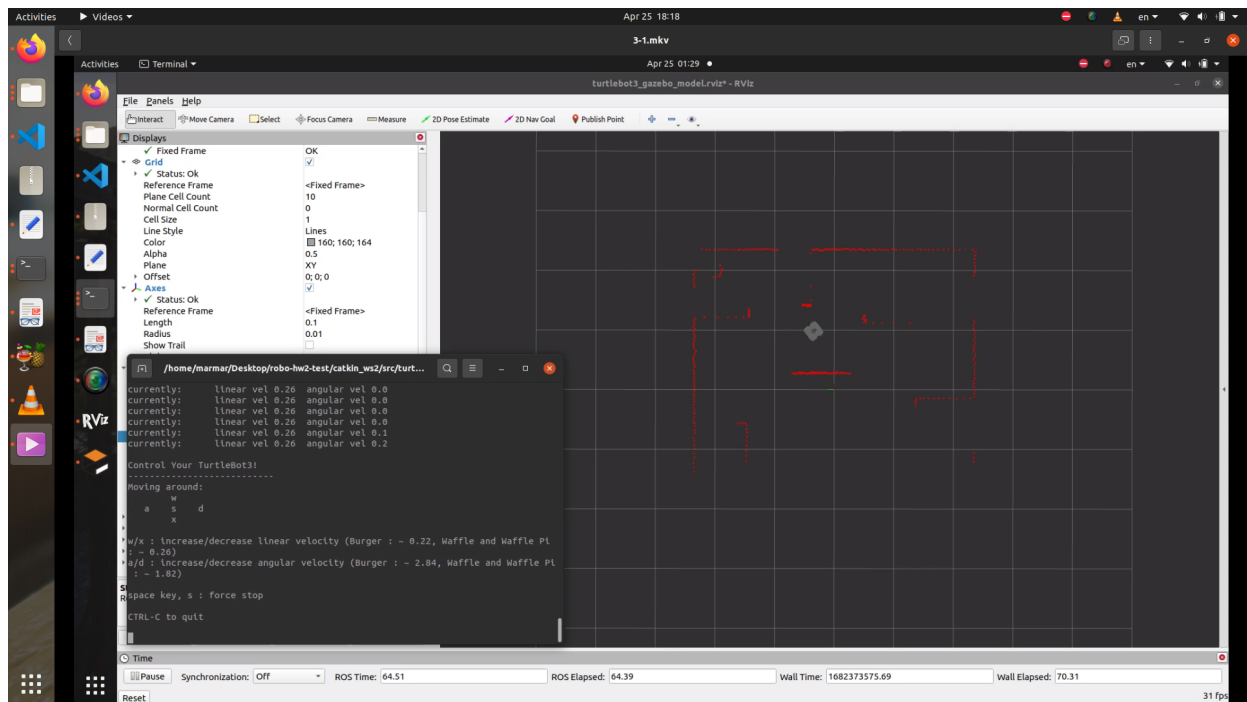
گام دوم: phase2 package

در این گام باید موانع در فاصله کمتر از ۲ متر را شناسایی میکردیم. نکته ی مهمی که من در اینجا در نظر گرفتم این است که ربات موانعی که در ۱۸۰ درجه روبرویش هستند را در نظر میگیرد. این طوری موقعی که به مانعی برخورد میکند و چرخش میکند را دوباره به عنوان نزدیک ترین مانع در نظر نمیگیرد. در توضیح کلاس ها هم باید گفت در کلاس سنسور توسط لیزر فاصله اشیا را دریافت میکنیم. بعد روی یک تاپیک آن را ارسال میکنیم.



گام سوم:

بخش اول:



سوال- علت لرزش چیست؟

لرزش نقاط داده در شبیه ساز rviz معمولاً به دلیل دو علت اساسی رخ می دهد:

1. ناهمگونی در مختصات منابع: معمولا این مشکل در شبیه‌سازی‌هایی رخ می‌دهد که از منابع متفاوتی مثل سنسورها، ربات‌ها و... استفاده می‌شود. برای رفع این مشکل باید به دقت مختصات منابع را در RViz بررسی کنید و در صورت نیاز آن‌ها را اصلاح کنید.

2. سرعت نامناسب گرافیک: اگر کارت گرافیک رایانه شما قدرت پردازش لازم را نداشته باشد، ممکن است با مشکل لرزش نقاط داده در RViz روبرو شوید. در این صورت می‌توانید تنظیمات گرافیکی RViz را کاهش داده و یا از یک رایانه با کارت گرافیک قوی‌تر استفاده کنید.

به طور کلی باید گفت که دقت و دید کامل در تنظیمات RViz و تعامل با آن امری ضروری است تا اینگونه مشکلات را بتوانید برطرف کنید

بخش دوم:

