

# CS 452 Project 2

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## 1 How To Run

```
> load -b 0x00218000 -h 10.15.167.4 "ARM/f2fung/p2_final.elf"
> go
```

## 2 Submitted Files

Files listed here can be found under /u1/f2fung/cs452/p2/

### 2.1 md5sums

```
6b95cd7a797ed011c80bfd1c9c9f3a60 ./Makefile
8dd9b113c5d58039b523402022b5d182 ./debug.c
e6fe878a12d13ea01c7cdb38895772f8 ./context_switch.s
3db9d3f453cad4f61c79884d500379c9 ./reservation_server.c
1dc118c000601dc8accbed9bf54a2076 ./orex.ld
3a8b24b398ece870c61432b0cd3b3160 ./ourlib.c
3774f518f194d500c51de712c567e3d8 ./first_task.c
18e880c6ff334eb5f682c21dcbaf2c61 ./track_data.c
3b096de077660480045b6f57a090e482 ./icu.c
52b8990e115e43c17cb418b3eb2e8741 ./dijkstra.c
0044a9d5892b591929afcd304891ad7f ./run_tests.c
cf871e452ca5cddbc3995304b57831ce ./track_node.c
351eefdf131296b5c5ffdd324afabd01 ./track_edge_array.c
586458ee65db0afd0b1c4a39461b0795 ./main.map
820ae458f6e19c1fca45371dc7ccd2c7 ./ioserver.c
696a458ab20b11b20bb389abd145f753 ./location_server.c
feba44366f52d656b8811adba24da103 ./project.c
6a025c0ed584875d4bc92812ac0ae68c ./sensor_server.c
92b17d4751cd6351ad5937f28952e828 ./train.c
c1705146beff0edb48142664c208d7fc ./user_prompt.c
b9814306df3c3ce8fbf871b91a0121ae ./nameserver.c
296f7f84cfb2c088fad7b6a69268d00b ./data_structures/bitmask.c
```

fa8f8a366df3c90c69f6d4bdcc3e0a3a	./data_structures/heap.c
b7891ab62d1d88925f871a99a4e047b9	./data_structures/heapplus.c
89d74272f5d03eb54db03f8633cb2abb	./data_structures/linked_array.c
6009877e08b2eb92fefe76ccdba82c27	./data_structures/queue.c
5a913deb0a153b5cd55bb5c52f27215e	./data_structures/simple_sm.c
d8e007eaadc6b69717224d34b4682969	./test_helpers.c
792ad97b51eece81a637452da6056674	./strings.c
6ef4c4581e33ad9c58ab73a896fc1cb2	./rps_server.c
f351ccf69b83adb1e2aa0ef559a11eb8	./include/all_tests.h
35bd0114e8113fbd214e3a389b4844c3	./include/bitmask.h
4c86aad2cca610cd67c7dd645371d33	./include/clockserver.h
f14b1bd18405e4a13aa29074b4d3c265	./include/context_switch.h
6234f8bf104c4eb3a280e512df891a36	./include/debug.h
e68c6f9cbaee62d844dc83784b936ad3	./include/dijkstra.h
9b124aeb5f84630af58c3abc2843c1a6	./include/events.h
f5d5f01a856e51feeefb0c672539e687	./include/first_task.h
e80eed468576da5be1cb04b8572681ae	./include/heap.h
9d32c0d251a4f75f201ce8ebe295eb32	./include/heapplus.h
60122cea48e43550bf96143b8310ab30	./include/icu.h
574e859de18cdbe722764e3230f226ca	./include/idle_task.h
c5b1026567dfc98fa4be22dde2163d98	./include/interrupt_handler.h
bbd1a58e9662dc9efab4ffbeb4655ab0	./include/ioserver.h
3ac7a3b2def34929bbd3198847a84c50	./include/kernel.h
1f1dbb640125c1ea0cf60f07910134b6	./include/linked_array.h
6cd532bf50de3b84920d11deb91c0ef9	./include/location_server.h
d9fcde742e0118ccfc12d5f5f5f3c043	./include/messenger.h
ac6862447751e9b7b12c59c6aa491011	./include/nameserver.h
6012cd83a92ded693f863eb5dff23be8	./include/ourio.h
66c074d7f5a93750ed3cd4e1796ebc33	./include/ourlib.h
ad8404d6ff9b3cd23ab35da21a70037f	./include/priorities.h
e1b272be0185c041b8dcf2d5df968f7a	./include/project.h
ad16b7ff18670d6a6a5afd2236d41650	./include/queue.h
f42681e19e3dc50960b701be52a53546	./include/rps_server.h
0e390e153530b05118c87063a5dd3120	./include/run_tests.h
621140a6884a581a7e896c056efe717e	./include/scheduler.h
d0a3e405c2b9edacbe2561ccd872b603	./include/sensor.h
04f3437f5e8c454f6be806b30a0f186a	./include/sensor_server.h
2a521c524bcd6a4e301e9a923dc136d	./include/simple_sm.h
7425e47fb975228ae9a05887462d1b23	./include/string.h
7a1b1692e08413e0632172e8bab8cd11	./include/strings.h
fdb9f38ec11ac3afd4644d93d582c008	./include/syscall.h
a1acf7c44412bd034c8932b9df952c9b	./include/task.h
cd42684f05820c5322c424f711652b5f	./include/test_helpers.h
077b0816d3b8542fd64497f05d360c41	./include/timer.h
95a649f7921abd9d08642eb541c5c995	./include/reservation_server.h
9830e1eafae7ba84b37489351892c1a4	./include/track_node.h

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4a954411751380de42180fe5cd60c7f6 ./include/track_data.h
473d468b5c307bb6eeae7d35ac54 ./include/ts7200.h
04e5789e07fb586a1b6b101acf73a96b ./include/uart.h
d12fe2880a682aa19c08f51ac05ceb26 ./include/user_prompt.h
f703df970dc0bc8279d9e4ae5b5298f4 ./include/calibration.h
7ffedb06b94e0ba0050c3a42269be680 ./include/distance_server.h
2b1154e2e313f9bc358a3a22cceb5f5d ./include/location.h
eefb867d28328c48d1f87e66b176ebbf ./include/physics.h
860b3c773db3e6c1a05693985ea72eb1 ./include/timings.h
67795f2f9468209a9c5758228e280f1e ./include/track_edge_array.h
8e2f5f00ae304ef9738376b157ee5ee1 ./include/train.h
d03b8d04bdad4e70525f2b961203302a ./include/switch_server.h
dd2b4cd6cd2e5b4275b864749bdfdb40 ./include/demo.h
bde87554c6753ab69679a0096a9f0eab ./kernel/interrupt_handler.c
0a86f08289c856a47d8ca56ee92a7fdb ./kernel/kernel.c
ab372eec3ca8c8429171c6ff462c23fa ./kernel/main.c
e9e1ac4c766842ccd536393e5915b901 ./kernel/messenger.c
8108e4058969ac8a377ad7241006656c ./kernel/scheduler.c
21dcdc6ab513c96b214e074b17836870 ./kernel/task.c
aed6ada1a6bce02e32269bb41ab1bf58 ./ourio.c
06c596f61b859cd9a572323c4d1b0ae1 ./uart.c
6006d09d2d94833c991897dda725e5df ./syscall.c
447725a2507da0fef1d1d3bfcfdb65bb ./physics.c
db794839ecaf9c135161e36d45ed24b7 ./timer.c
03405297ee2aa55f6320405e437838b8 ./project/calibration.c
940c64a85e0ce0be2e92cdec7a6c3186 ./colorgcc
ad4bab3f9b64a0a6297df47541d1d698 ./clockserver.c
114ddacba047bcaa3cfef9925015a4e5 ./scripts/spread.c
0f82872b40cd19b7541c0d8ebe6c8602 ./idle_task.c
82a620d148aec576d56b0dd3b97b8a1a ./location.c
65c110e4d7da151a5d2c0763f8e338d3 ./timings.c
6d621ccc191ee6a634d64b880f69edab ./switch_server.c
988f42698f988d7ea7cdb30d26cba724 ./demo.c
df844325885708ff93e4eafdd2f12a51 ./unittests/all_tests.c
ad417e31447983fe13bab3ad5f7d4fac ./unittests/bitmask_tests.c
9e27f3bfff6356af0d99ee24d6c7c2db9 ./unittests/linked_array_tests.c
1413c01a1b7694350c45058180c18a5b ./unittests/heap_tests.c
f068e72416d05f20660390bb1e50a4ef ./unittests/test_helpers.c
24bc70d54528b73d8d7eb23f573921bc ./unittests/test_helpers.h
4b935cf081a780b986545df31445c30a ./unittests/strings_tests.c
c178f53bceae14123574a76460d4a1d9 ./unittests/dijkstra_tests.c
b625a0bbf0fa9e81c70dd5648f206b3a ./unittests/free_tests.c
eb4742a2b697b95c442ccedfb5fee408 ./sensor.c
d141a877fd638c446d299532e5db186 ./priorities.c
0077ca5ad3b96616b9d58756ba4bb89a ./string.c
acedd21cd25515e2b43bc6ecaed28c72 ./tests/scheduler_speed_test.c
```

```

0a009e1c2cf45b3a2e4fe54aa323bf7a ./tests/task_creation_errors_test.c
fb8849e3daee133a6dbd8d46aae51841 ./tests/multiple_priorities_test.c
eee31a1660aeb081646807700f42916e ./tests/assignment_1_test.c
bcb10795dece42854f1afdfeba58abc3 ./tests/message_passing_test.c
36f8e02155a2ec078a6b9f39c7fa84c6 ./tests/basic_test.c
e84e447e74452e7a0e121584432b0101 ./tests/nameserver_test.c
70ba721afbb029c5f5fd274610cd04e5 ./tests/hwi_test.c
ba53b95ab3af146a4e579451899bba5b ./tests/srr_speed_test.c
9baef3b3aba60fa62a52f1fac6081ee5 ./tests/rps_server_test.c
6525c92955cc2dcefd59010920d3def1 ./tests/syscall_speed_test.c
3efd35b657aae300b4c27610c3de0ed1 ./tests/assignment_3_test.c
55d83782fdbdbd446d40150475e99a64 ./tests/clockserver_test.c
c83a8c9eb4d8bfd8ce93024e85e90615 ./tests/uart1_intr_test.c
9405cd8cffd7436c9d32ca14e651ab03 ./tests/train_test.c

```

## 3 Project Description

### 3.1 Stopping Distance

In TC1 it felt good conceptually to do stopping like we did accelerating. That is, we had a deceleration function, and after so and so many ticks, we say we've stopped when current velocity was 0. If we wanted to change the stopping distance, manipulating the deceleration function to produce that stopping distance was notoriously difficult. We dropped the deceleration function and instead focussed entirely on just updating the train by the calibrated stopping distance. As a result, the location server is error-prone while stopping, but when fully stopped it is incredibly accurate. As a result, our path following actions always require a full-stop instead of slowing down.

### 3.2 Dijkstra with Blocked or Broken Edges

Dijkstra is performed as usual. Before traversing an edge, we can do  $O(1)$  lookups into our broken or blocked tracked edge arrays and refuse to traverse those edges.