Introduction to Pioneer 3-DX, ARIA and MobileSim

What is Pioneer

- Pioneer is a family of mobile robots, including two-wheel and four-wheel drive versions.
  - http://www.mobilerobots.com/

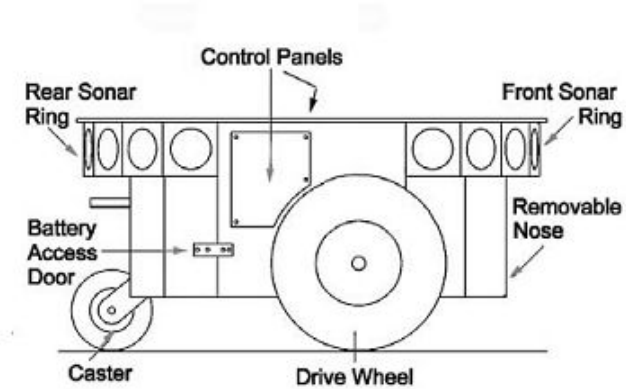
Pioneer 3-AT

Pioneer 3-DX

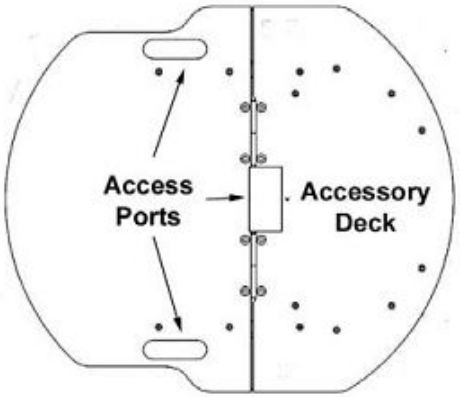
Pioneer LX

Pioneer 3-DX

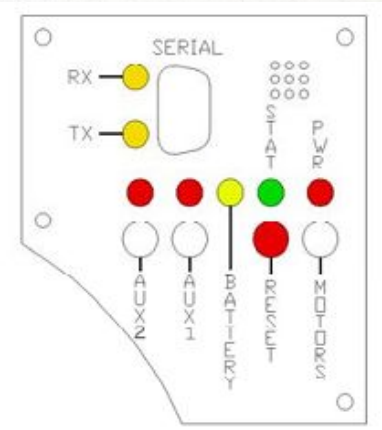
- Specifications



Side view



Top view

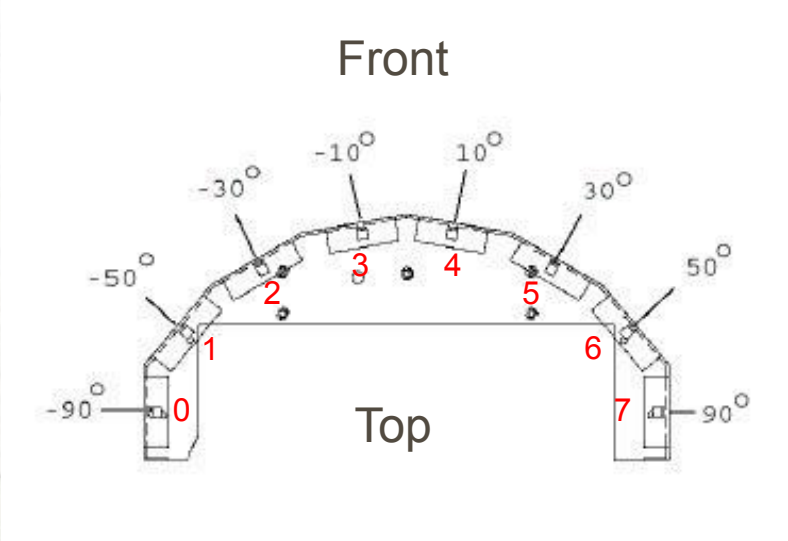


Control Panels

Pioneer 3-DX

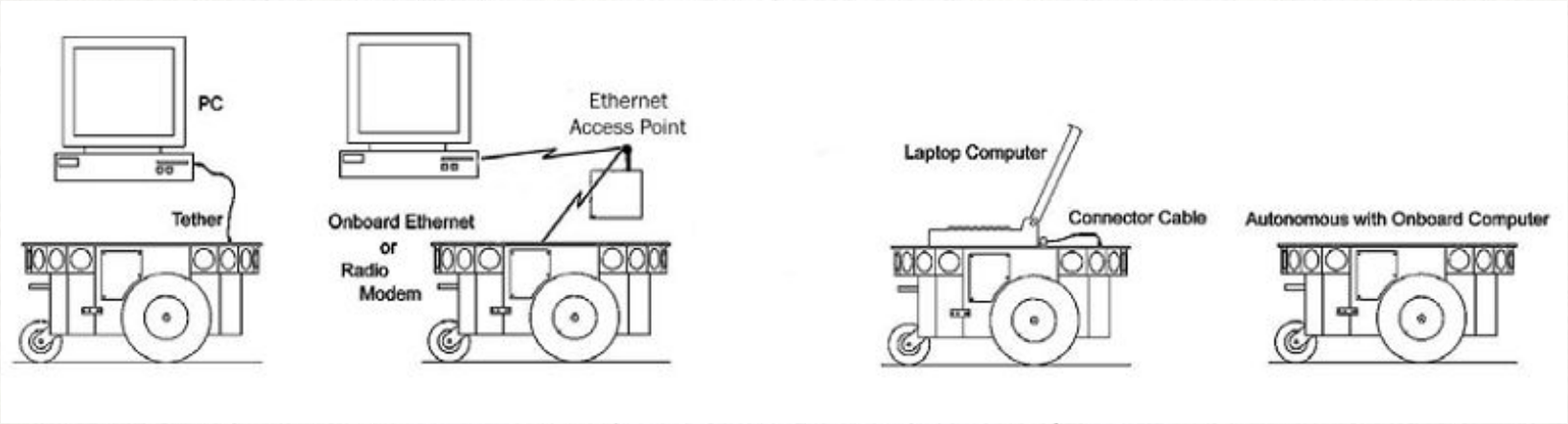
- Sonars
  - 8 sonar arrays: One on each side, and six facing outward at 200 intervals
  - Range from 10cm to 5m

Sonar numbers



Connection Options

- All MobileRobots platforms are served in a client-server architecture.



ARIA

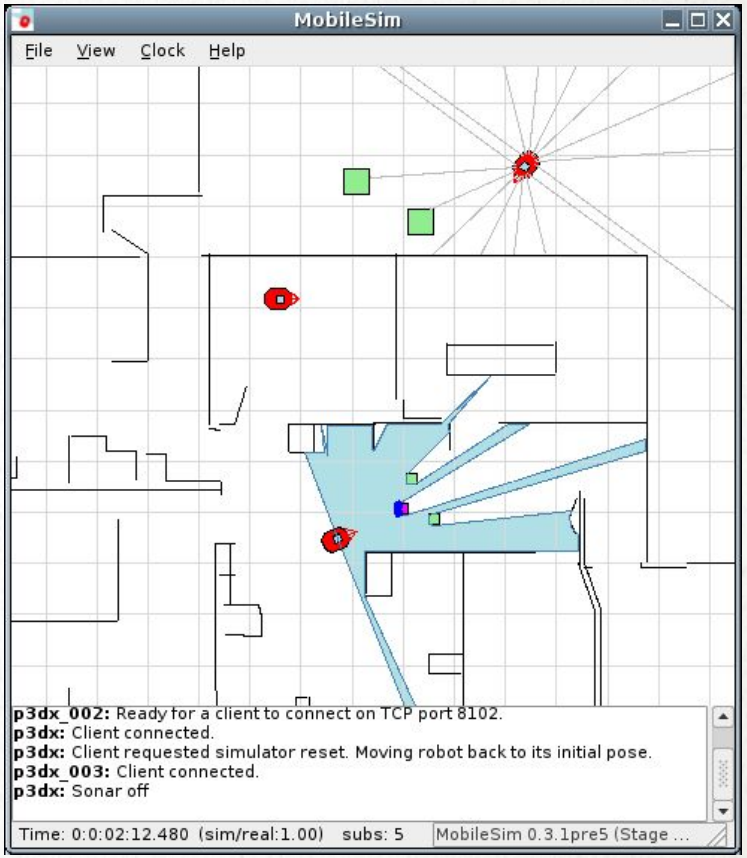
- Open-source C++ library for all MobileRobots platforms and many accessory devices.
- Applications developed with ARIA can easily navigate the mobile platform, as well as manage odometry, sensor readings, and other operating data.
- Download link: https://reurl.cc/W4dl2x
- Recommended OS: **Ubuntu 16.04**

Examples of ARIA

- Path
  - /usr/local/Aria/examples
- Important examples
  - demo.cpp
    - General purpose testing and demo program, using ArMode classes to provide keyboard control of various robot functions.
  - wander.cpp
    - Example using actions and sonars to implement a random wander avoiding obstacles.

MobileSim

- MobileSim provides a simulation environment for MobileRobots platforms and many accessories.
- Download link: https://reurl.cc/Qpdzr5
- The following pages show how to run MobileSim on and Ubuntu.

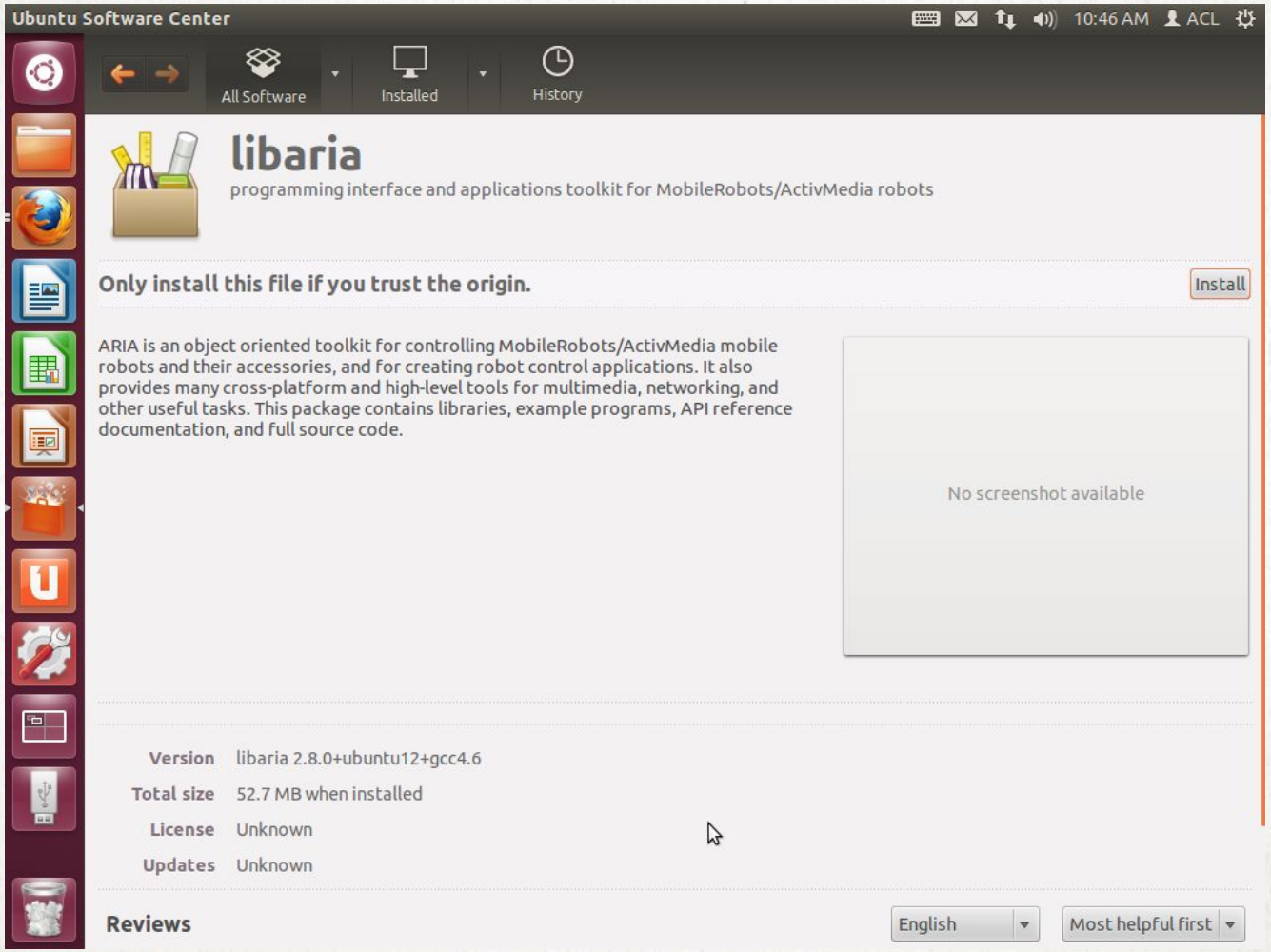


ARIA and MobileSim on Ubuntu

1. Download ARIA and MobileSim for Ubuntu 16.04
   - ARIA 2.9.4: https://reurl.cc/W4dl2x
   - MobileSim 0.9.8: https://reurl.cc/Qpdzr5
2. Install them with the files.
   - They should be located at:
     - /usr/local/Aria
     - /usr/local/MobileSim
3. Make ARIA before use it.

Install ARIA and MobileSim

- You can install them by clicking the files directly.



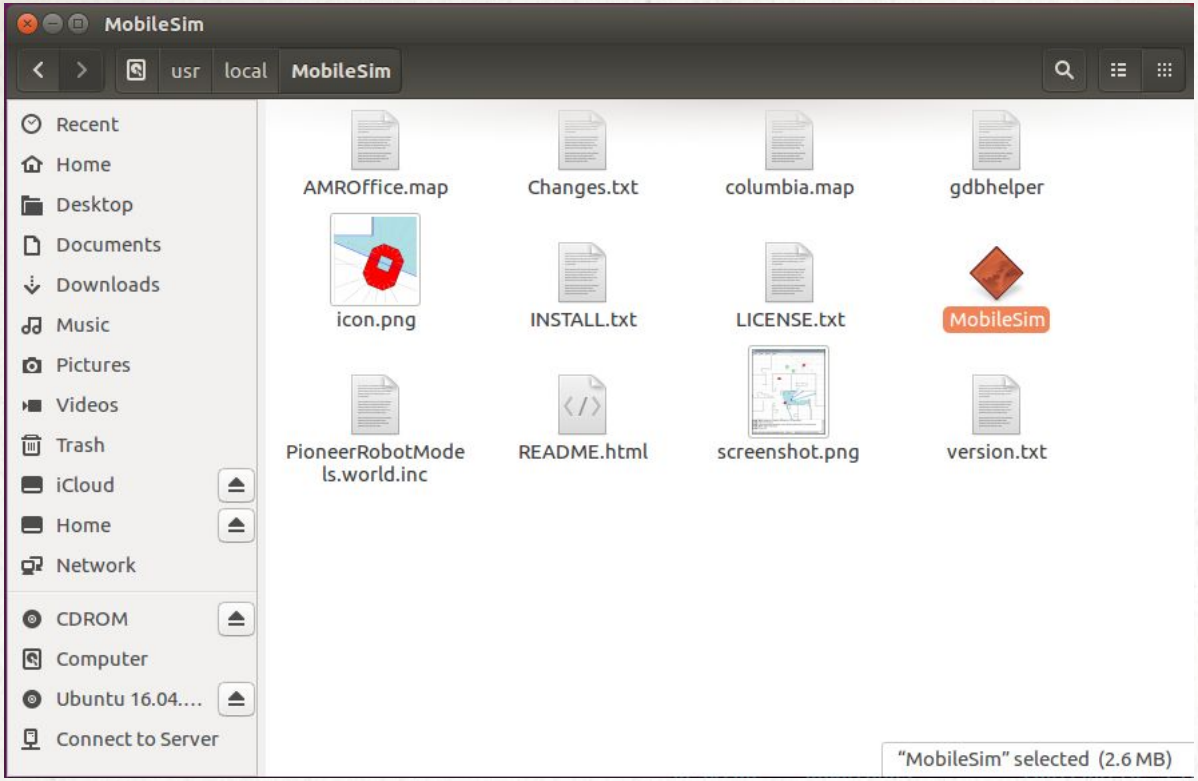
Install ARIA and MobileSim

- If you encounter some problems when installing them, you can enter the following command.

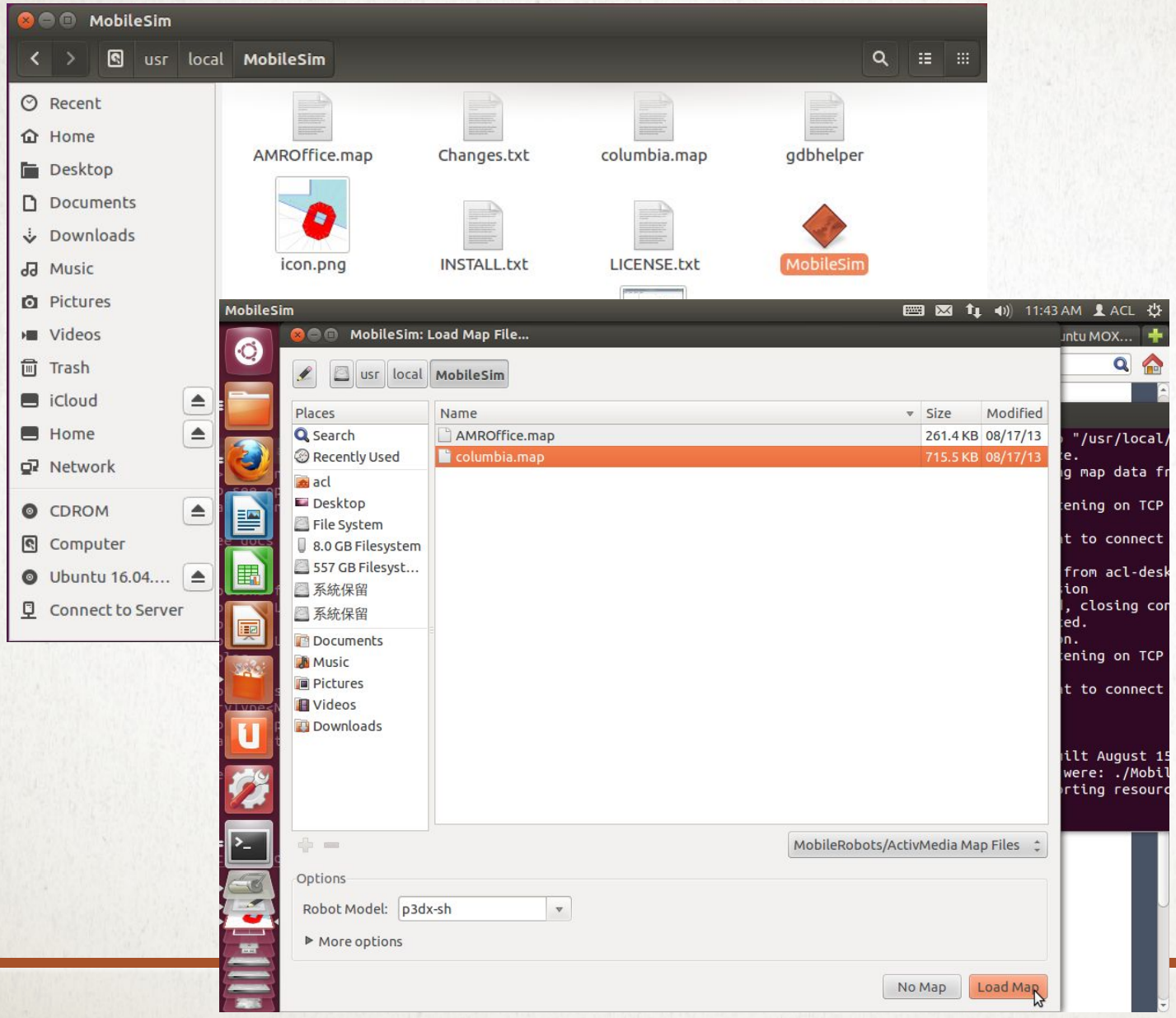
```
ubuntu:~/Downloads$ ls
libaria_2.9.4ubuntu16_amd64.deb  mobilesim_0.9.8ubuntu16_amd64.deb
ubuntu:~/Downloads$ sudo dpkg -i *.deb
Selecting previously unselected package libaria.
(Reading database ... 175155 files and directories currently installed.)
Preparing to unpack libaria_2.9.4ubuntu16_amd64.deb ...
Unpacking libaria (2.9.4+ubuntu16) ...
Selecting previously unselected package mobilesim.
Preparing to unpack mobilesim_0.9.8ubuntu16_amd64.deb ...
Unpacking mobilesim (0.9.8+ubuntu16) ...
Setting up libaria (2.9.4+ubuntu16) ...
ARIA has been installed in /usr/local/Aria.
Header files are in /usr/local/Aria/include. Documentation is in /usr/local/Aria/docs.
libAria.so is in /usr/local/Aria/lib.
Adding /usr/local/Aria/lib to /etc/ld.so.conf...OK.
running ldconfig...
Setting up mobilesim (0.9.8+ubuntu16) ...
MobileSim has been installed in /usr/local/MobileSim.
Processing triggers for gnome-menus (3.13.3-6ubuntu3.1) ...
Processing triggers for desktop-file-utils (0.22-1ubuntu5.1) ...
Processing triggers for bamfdaemon (0.5.3~bzr0+16.04.20160824-0ubuntu1) ...
Rebuilding /usr/share/applications/bamf-2.index...
Processing triggers for mime-support (3.59ubuntu1) ...
Processing triggers for libc-bin (2.23-0ubuntu9) ...
@ubuntu:~/Downloads$ cd /usr/local/
@ubuntu:/usr/local$ ls
Aria  bin  etc  games  include  lib  man  MobileSim  sbin  share  src
```

Make sure you have “Aria” and “MobileSim” directories after installing.

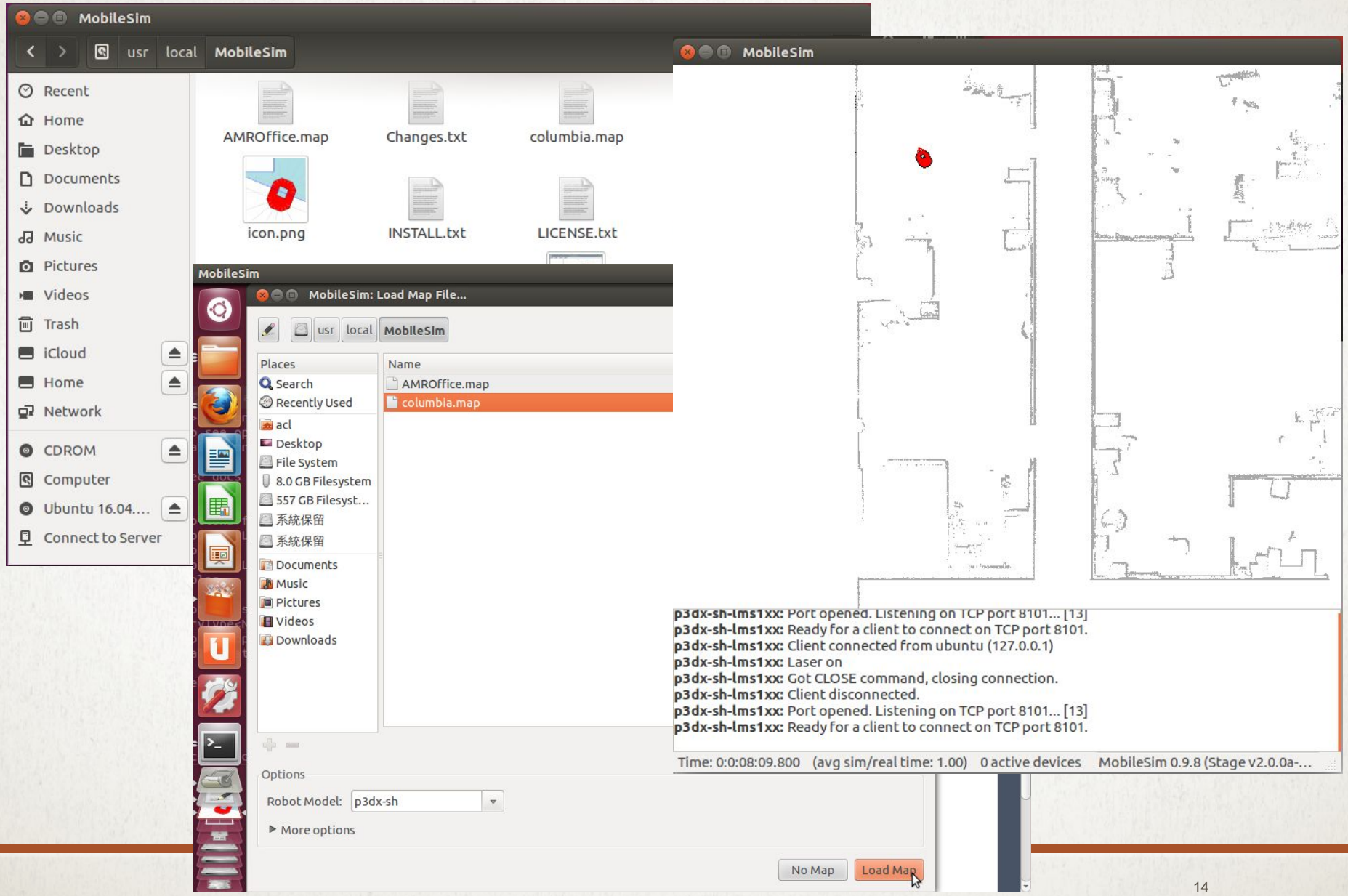
Load map


MobileSim
usr
local
MobileSim
Recent
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
iCloud
Home
Network
CDROM
Computer
Ubuntu 16.04....
Connect to Server
AMROffice.map
Changes.txt
columbia.map
gdbhelper
icon.png
INSTALL.txt
LICENSE.txt
MobileSim
PioneerRobotModels.world.inc
README.html
screenshot.png
version.txt
"MobileSim" selected (2.6 MB)

Load map


MobileSim
usr
local
MobileSim
Recent
Home
Desktop
Documents
Downloads
Music
Pictures
Videos
Trash
iCloud
Home
Network
CDROM
Computer
Ubuntu 16.04....
Connect to Server
AMROffice.map
Changes.txt
columbia.map
gdbhelper
icon.png
INSTALL.txt
LICENSE.txt
MobileSim
MobileSim
11:43 AM
ACL
MobileSim: Load Map File...
usr
local
MobileSim
Places
Search
Recently Used
acl
Desktop
File System
8.0 GB Filesystem
557 GB Filesyst...
系統保留
系統保留
Documents
Music
Pictures
Videos
Downloads
Name
Size
Modified
AMROffice.map
261.4 KB
08/17/13
columbia.map
715.5 KB
08/17/13
MobileRobots/ActivMedia Map Files
Options
Robot Model:
p3dx-sh
More options
No Map
Load Map

Load map


MobileSim
usr
local
MobileSim
Recent
Home
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Downloads
Music
Pictures
Videos
Trash
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Network
CDROM
Computer
Ubuntu 16.04....
Connect to Server
AMROffice.map
Changes.txt
columbia.map
icon.png
INSTALL.txt
LICENSE.txt
MobileSim
MobileSim: Load Map File...
usr
local
MobileSim
Places
Search
Recently Used
acl
Desktop
File System
8.0 GB Filesystem
557 GB Filesyst...
系統保留
系統保留
Documents
Music
Pictures
Videos
Downloads
Name
AMROffice.map
columbia.map
Options
Robot Model:
p3dx-sh
More options
No Map
Load Map
MobileSim
p3dx-sh-lms1xx: Port opened. Listening on TCP port 8101... [13]
p3dx-sh-lms1xx: Ready for a client to connect on TCP port 8101.
p3dx-sh-lms1xx: Client connected from ubuntu (127.0.0.1)
p3dx-sh-lms1xx: Laser on
p3dx-sh-lms1xx: Got CLOSE command, closing connection.
p3dx-sh-lms1xx: Client disconnected.
p3dx-sh-lms1xx: Port opened. Listening on TCP port 8101... [13]
p3dx-sh-lms1xx: Ready for a client to connect on TCP port 8101.
Time: 0:0:08:09.800 (avg sim/real time: 1.00) 0 active devices
MobileSim 0.9.8 (Stage v2.0.0a-...

Run demo

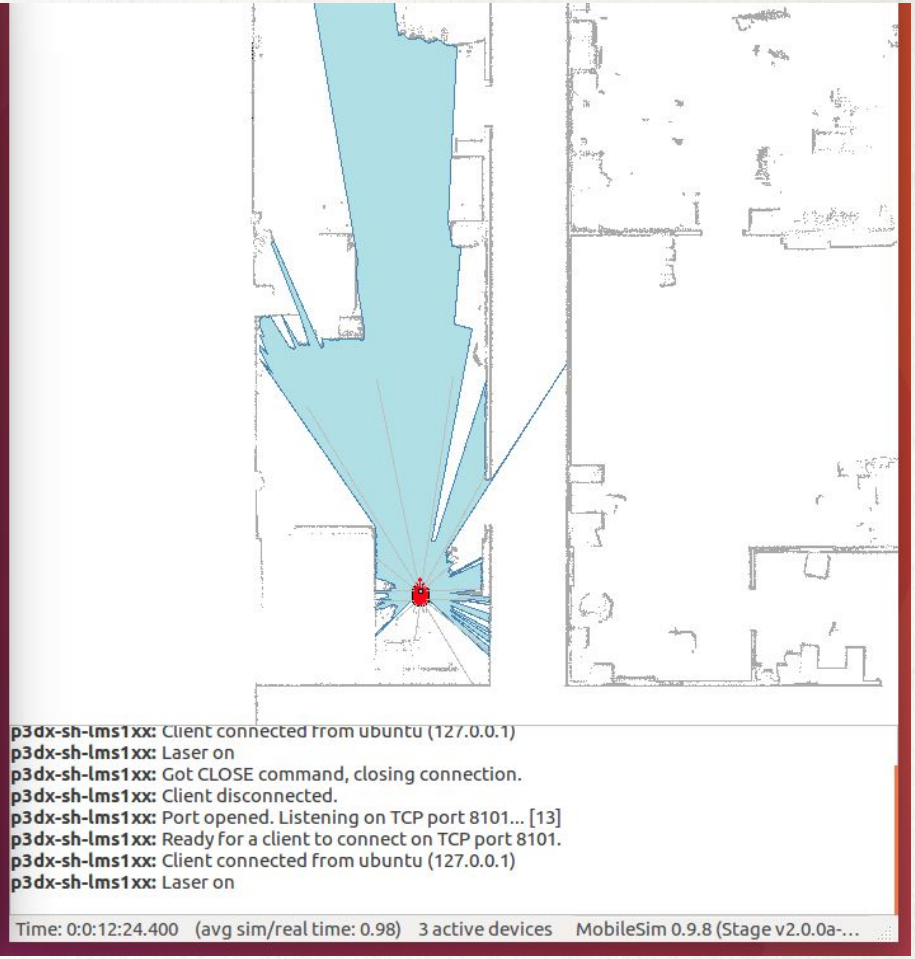
```
     @ubuntu:/usr/local/Aria/examples$ ./demo
Connnecting to robot using TCP connection to localhost:8101...
Connecting to simulator through tcp.

Syncing 0
Syncing 1
Syncing 2
Connected to robot.
Name: MobileSim
Type: Pioneer
Subtype: p3dx-sh-lms1xx
ArConfig: Config version: 2.0
Loaded robot parameters from /usr/local/Aria/params/p3dx-sh-lms1xx.p
Robot Serial Number: SIM
ArRobotConnector: Connected to simulator, not connecting to additional hardware
components.
lms1xx_1: Setting absolute max range to 50000
Using new style simulated laser for lms1xx_1
sim_lms1xx_1::setConnectionTimeoutSeconds: Setting timeout to 8 secs
You may press escape to exit
sim_lms1xx_1: Connected to simulated laser.
Robot does not indicate that it has a gripper.
ArACTS_1_2: Could not connect to ACTS running on localhost:5001 (Connection refu
sed.)


You can do these actions with these keys:

quit: escape
help: 'h' or 'H' or '?' or '/'

You can switch to other modes with these keys:
                        teleop mode: 't' or 'T'
              unguarded teleop mode: 'u' or 'U'
                        wander mode: 'w' or 'W'
                         laser mode: 'l' or 'L'
                         bumps mode: 'b' or 'B'
                         sonar mode: 's' or 'S'
                      position mode: 'p' or 'P'
                        camera mode: 'c' or 'C'
                       command mode: 'd' or 'D'
           report robot config mode: 'o' or 'O'
   detailed status/error flags mode: 'f' or 'F'
```



You can control the robot by entering the keys on terminal window.

Assignment1 Announcement

- Assignment1 is now live on NTU COOL.
  - Deadline: **2021/10/28 13:00**
  - Make sure you followed the requirements before submission.