ABM Interaction Setup

Release 1.0

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Contents

Contents:

CHAPTER 1

Setting up QT

1.1 What you'll need

- A monitor
- A mouse and keyboard
- Wireless internet
- An Amazon Web Services account
- An account with Fitbit
- A tablet for the user interface
- A Google account to get an app for the tablet

QT has two ports: one USB-C and one USB-A. You'll need to use the USB-C port for display and figure out how to control a mouse and keyboard. I suggest a USB-C hub that has a display port that you can use (USB-C or HDMI, for example) and has USB-A ports for your mouse and keyboard. Alternatively, you can use a USB-A hub to connect your mouse and keyboard to QT.

Note: If you have trouble using your mouse or keyboard through a USB-C port, try flipping the USB-C input going into QT. In theory, USB-C should go both ways, but in practice, sometimes not.

1.2 Basics

1.2.1 Turning QT on and off

To turn on QT, just plug in power to QT and it will boot.

To turn off QT, there are two options:

1. Press the button on the backside of QT, near its feet.
2. Login to the head computer (see below) and do `sudo shutdown`.

If you do `sudo shutdown` on the body computer, you only turn off the body computer—the head computer is still on.

Note: If you unplug QT to restart QT, it may mess up the boot timing of the two computers. Probably one of them takes longer because it boots in recovery mode. This screws up how the head and body computer network. You will not be able to connect to the head computer from the body computer. If this occurs, simple restart QT by pushing the button on its backside.

1.2.2 Accessing QT's body computer

When you connect a monitor to QT and turn QT on, you will start on QT's body computer.

1.2.3 Accessing QT's head computer

To setup the head, you must Secure-SHell into it (SSH) from QT's body computer. To do this

0. Turn on QT.
1. Open a terminal.
2. Type the following and hit return:

```
ssh qtrobot@192.168.100.1
```

1.3 Head

1.3.1 Turning off the default face

0. If you haven't already, SSH into QT's head computer:

```
ssh qtrobot@192.168.100.1
```

1. Update QT:

```
cd ~/robot/packages/deb
git pull
sudo dpkg -i ros-kinetic-qt-robot-interface_1.1.8-0xenial_armhf.deb
```

Note: If the `git pull` step fails, the head computer might be having trouble with it its network. You can check this with `ping google.com`. If there's nothing, there is a problem with the network. To fix this, the best think we've found is to restart QT: `sudo reboot`.

---

2. Edit a configuration file to turn off QT's default face:
   a. Open the configuration file:

```
sudo nano /opt/ros/kinetic/share/qt_robot_interface/config/qtrobot-interface.
↪yaml
```

b. Change the line that says `disable_interface: false` to `disable_interface: true`

c. Save and exit `nano` by hitting Ctrl+x, then typing 'y', and then hitting Enter twice to confirm things.

Note: You can reboot to see these changes take effect, or continue on and we'll reboot eventually.

1.3.2 Setting up our code

0. Secure-Shell (SSH) into QT's head computer:

```
ssh qtrobot@192.168.100.1
```

1. Install our project's dependencies:

```
git clone -b master https://github.com/robotpt/abm-setup ~/abm-setup
bash ~/abm-setup/scripts/pi_setup.bash
```

2. Increase the swap size, so we're able to build without running out of virtual memory:

   a. Turn off your swap memory:

   ```
   sudo /sbin/dphys-swapfile swapoff
   ```

   b. Open your swap configuration file:

   ```
   sudo nano /etc/dphys-swapfile
   ```

   c. Set *CONF_SWAPFACTOR* to 2 by changing the line that says `#CONF_SWAPFACTOR=2` to `CONF_SWAPFACTOR=2`, that is by deleting the `#` character to uncomment the line.

   d. Save and exit `nano` by hitting Ctrl+x, then typing 'y', and then hitting Enter twice to confirm things.

   e. Turn the swap file back on:

   ```
   sudo /sbin/dphys-swapfile swapon
   ```

3. Clone our repositories and build them:

   a. Go to the source code directory in the catkin workspace:

   ```
   cd ~/catkin_ws/src
   ```

   b. Clone our repositories:

   ```
   git clone -b master https://github.com/robotpt/cordial
   git clone -b master https://github.com/robotpt/qt-robot
   ```

   c. Build our workspace:

   ```
   cd ~/catkin_ws
   catkin_make
   ```

Note: It takes around five minutes for this command to finish. You can setup QT's body computer at the same time as it runs, if you like.

4. Setup our code to run when QT's head computer turns on.
   a. Copy the autostart script into the correct directory:

```
roscp qt_robot_pi start_usc.sh /home/qtrobot/robot/autostart/
```

   b. Enable the autostart script:
      i. Open a webbrowser on QT (e.g., Firefox) and go to http://192.168.100.1:8080/.

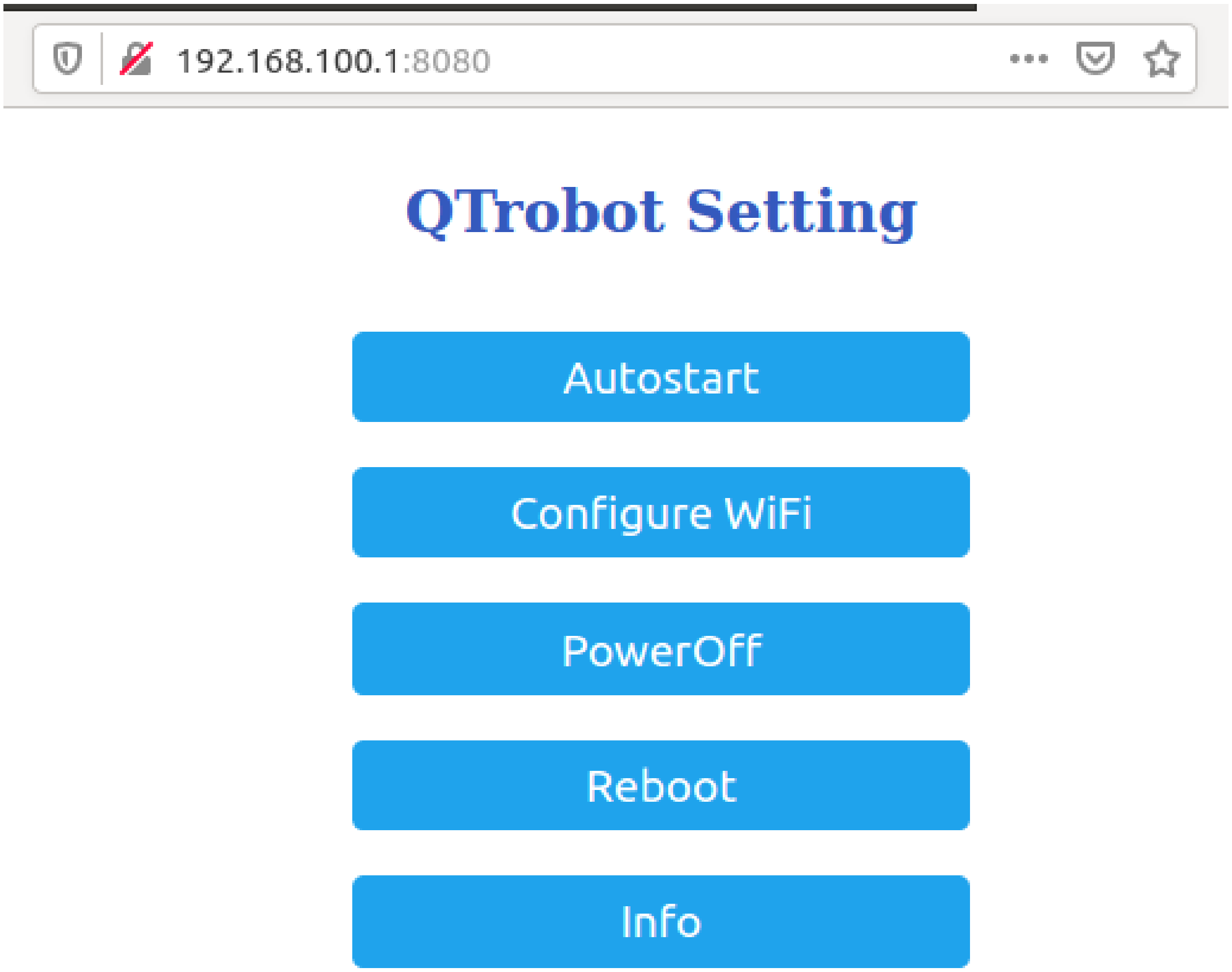
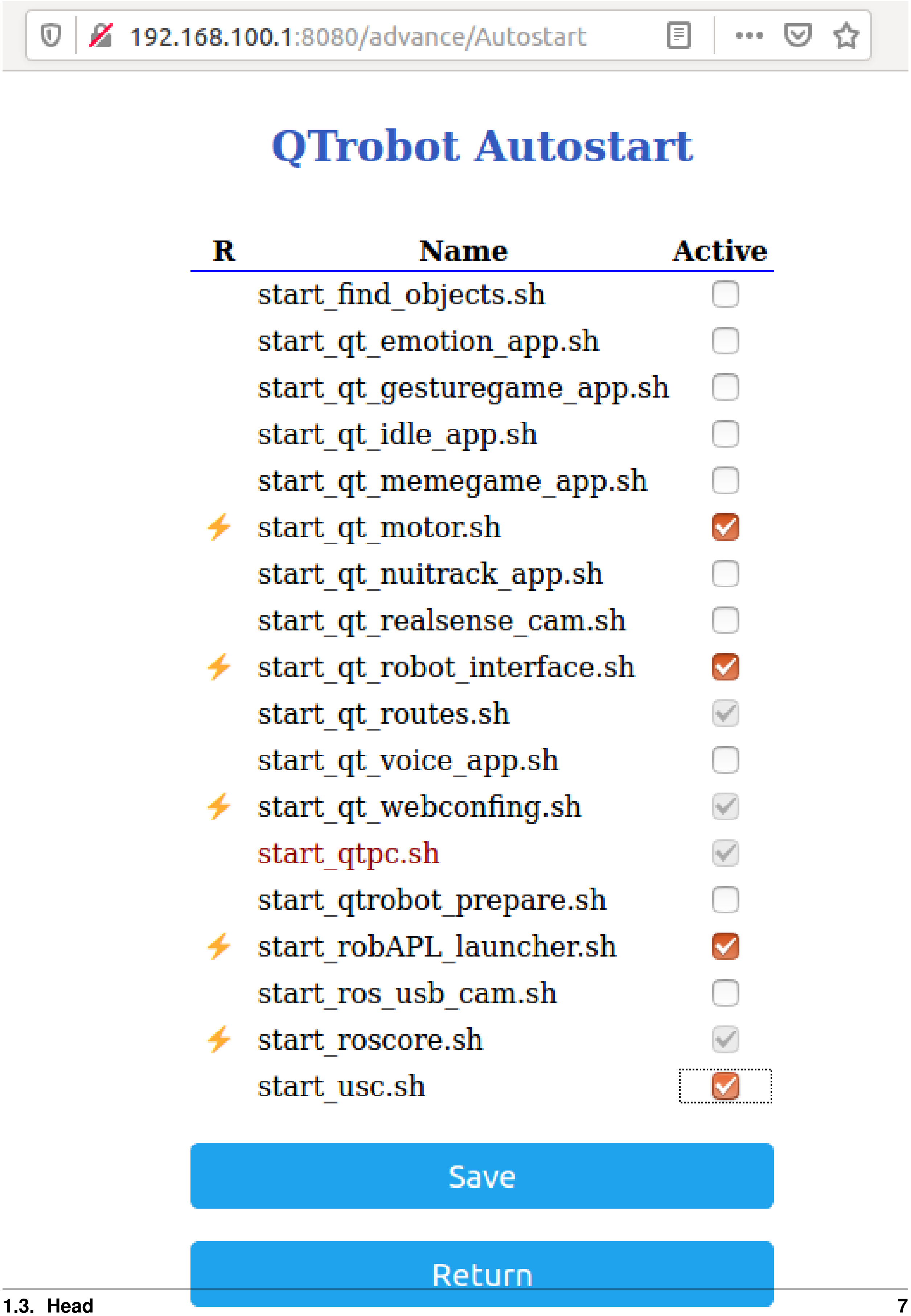


Fig. 1: QT's configuration menu.

      ii. Click 'Autostart'. You'll be prompted for a username and password. Enter `qtrobot` for both.
      iii. Click the 'Active' checkbox next to `start_usc.sh`.



QTrobot Autostart

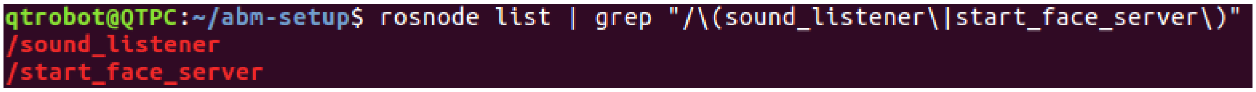
R	Name	Active
	start_find_objects.sh	☐
	start_qt_emotion_app.sh	☐
	start_qt_gesturegame_app.sh	☐
	start_qt_idle_app.sh	☐
	start_qt_memegame_app.sh	☐
⚡	start_qt_motor.sh	☑
	start_qt_nuitrack_app.sh	☐
	start_qt_realsense_cam.sh	☐
⚡	start_qt_robot_interface.sh	☑
	start_qt_routes.sh	☑
	start_qt_voice_app.sh	☐
⚡	start_qt_webconfing.sh	☑
	start_qtpc.sh	☑
	start_qtrobot_prepare.sh	☐
⚡	start_robAPL_launcher.sh	☑
	start_ros_usb_cam.sh	☐
⚡	start_roscore.sh	☑
	start_usc.sh	☑

iv. Click ‘Save’ and then ‘Return’ twice.

Note: You can reboot to see these changes take effect, or continue on and we’ll reboot eventually.

If you’d like, you can confirm that things are running after a reboot by opening a terminal and running the following command. You should see both `/sound_listener` and `/start_face_server`:

```
rosnode list | grep "/\(sound_listener\|start_face_server\)"
```



```
qtrobot@QTPC:~/abm-setup$ rosnode list | grep "/\(sound_listener\|start_face_server\)"
/sound_listener
/start_face_server
```

Fig. 3: What you should see if the head nodes are running correctly.

1.4 Body

1.4.1 Getting your Amazon Web Service credentials

For QT to speak, we use Amazon Polly, which requires an Amazon Web Services account. At our current usage, using Amazon Polly is free up to a certain level), but you will need a credit card to create an account.

1. Create an Amazon Web Services account.
2. Once you sign in, in the top right of the page, click your account name (mine says “Audrow”), then in the drop-down menu click “My Security Credentials,” then click “Create New Access Key.”
3. Record your access key and keep it somewhere safe. You can do this by downloading this or just viewing it and copy-pasting it to somewhere for later reference.

Note: It is best practice to create separate accounts with less access than your root account and use those access keys, see Amazon’s security best practices.

1.4.2 Setting up an Amazon Web Service bucket

For storing the recorded audio and video we’ll use an Amazon Web services S3 bucket.

1. Login to Amazon Web Services.
2. In “Find Services” type “S3” and click it when it appears.
3. Create your bucket:
    a. Hit the “Create bucket” button.
    b. Name your bucket and select US-West for the region. Note that the name has to be globally unique, so you may have to add some random characters to it.
    c. Continue through the setup process leaving things as they are set by default (no public access, etc.) and finally click “Create bucket”
4. Write down the bucket name you have created.

1.4.3 Getting your Fitbit credentials

You will need to make a Fitbit "app" for each Fitbit device. We are interested in the Client ID, Client Secret, and a generated code that saves us from having to login on a web browser.

1. Create a Fitbit account for each Fitbit device.
2. Login to your Fitbit account.
3. Go to register an app
4. Fill in the application. You can put whatever you think makes sense for most of them (URL, policy, etc.). (Make sure you include the *http* part int he urls.) The following are the parts that matter to get access to the Intraday data.
    - "OAuth 2.0 Application Type" should be "Personal"
    - "Callback URL" should be *http://localhost*
    - "Default Access Type" should be "Read-Only"

    Warning: If you get an error when trying to setup QT's body later, come back here and make sure things are correct.

5. On the registered app's page, record your Client ID and Client Secret, and then click "OAuth 2.0 tutorial page," near the bottom.
6. On the Oauth2.0 tutorial page, set "Flow type" to "Authorization Code Flow."

    Note: The "Expires In(ms)" text field is only used for "Implicit Grant Flow." "Authorization Code Flow," what we are using, expires in a fixed time (8 hours), but we are able to renew our authorization.

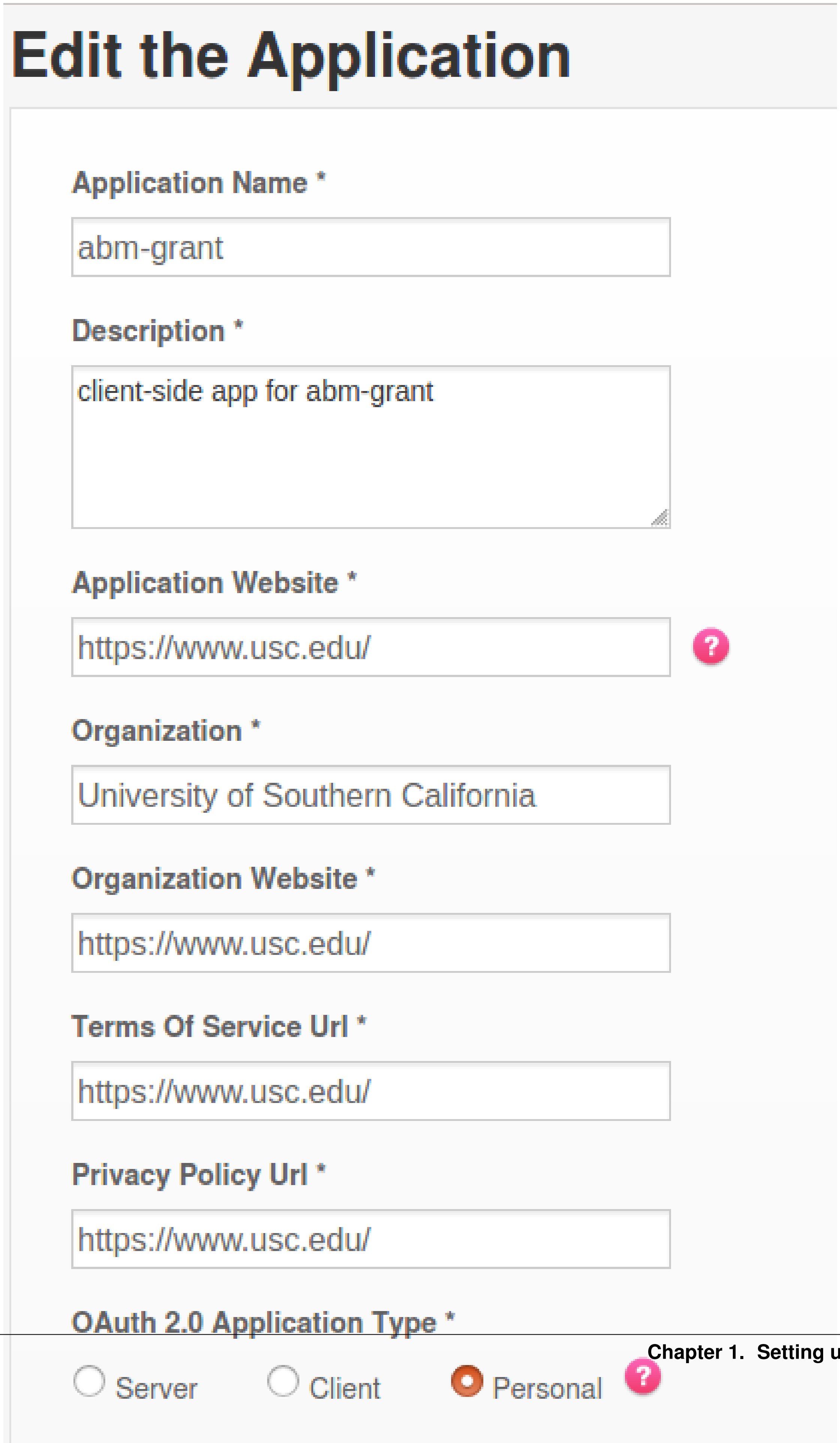
7. Click the URL above "1A Get Code." You'll be brought to an error page, but that's okay. We need the code from the URL. Record that code.

    Warning: If the URL is longer than in the picture, go back to the OAuth2.0 tutorial page and make sure that you have the "Flow type" set to "Authorization Code Flow," not "Implicit Grant Flow."

    Note: The code obtained in this step only works once. After you use it to initialize a Fitbit client, it cannot be used again. We use it to obtain an access and refresh token for talking to Fitbit's web API. If you need to reset Fitbit credentials for any reason, you will have to go to the OAuth2.0 tutorial page and get a new code.

Note: From this section, you should have the following information:

- Client ID
- Client Secret
- A generated code



Edit the Application

Application Name *

abm-grant

Description *

client-side app for abm-grant

Application Website *

https://www.usc.edu/

Organization *

University of Southern California

Organization Website *

https://www.usc.edu/

Terms Of Service Url *

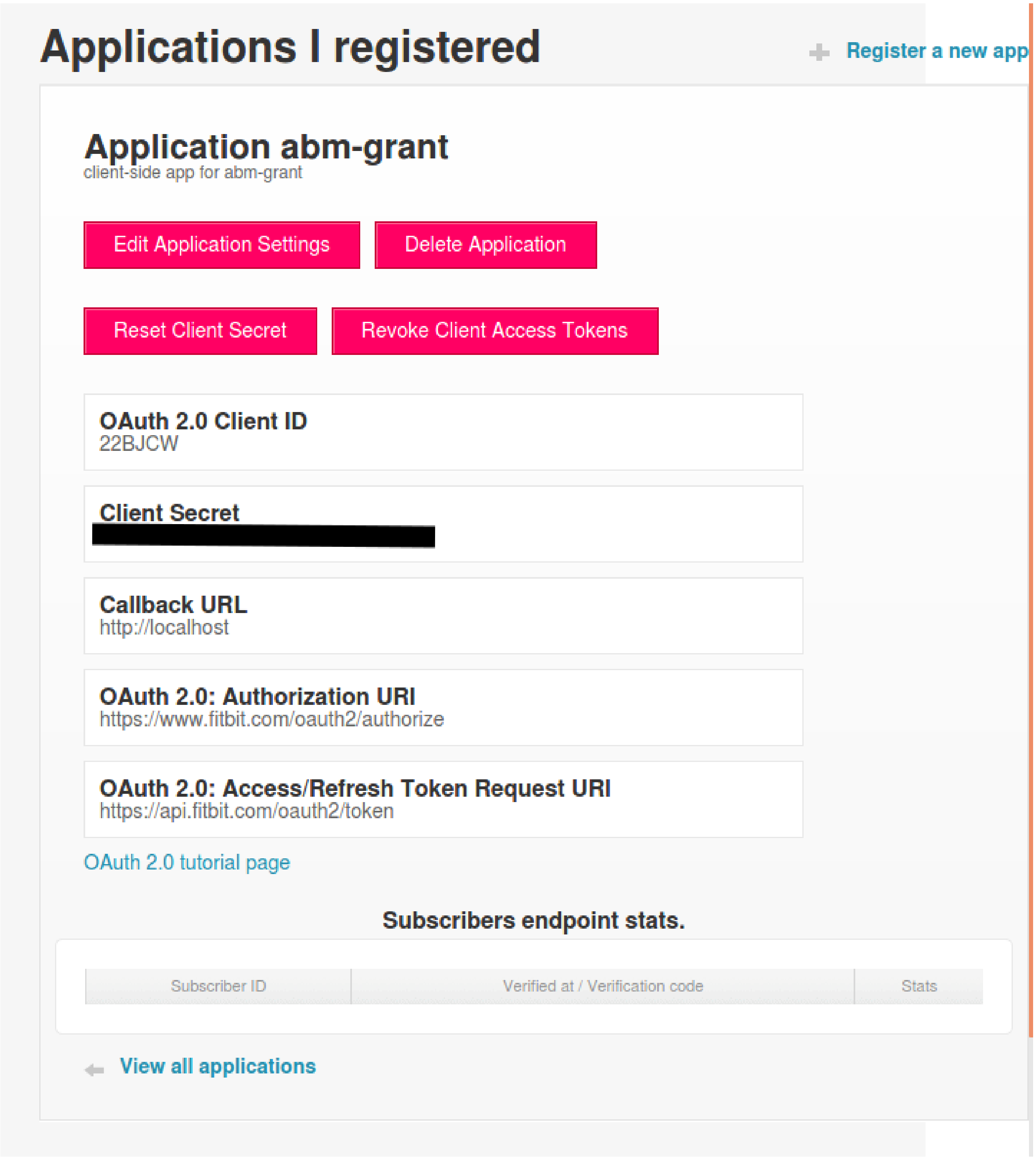
https://www.usc.edu/

Privacy Policy Url *

https://www.usc.edu/

OAuth 2.0 Application Type *

○ Server ○ Client ● Personal



Applications I registered

Application abm-grant
client-side app for abm-grant

OAuth 2.0 Client ID
22BJCW

Client Secret
[redacted]

Callback URL
http://localhost

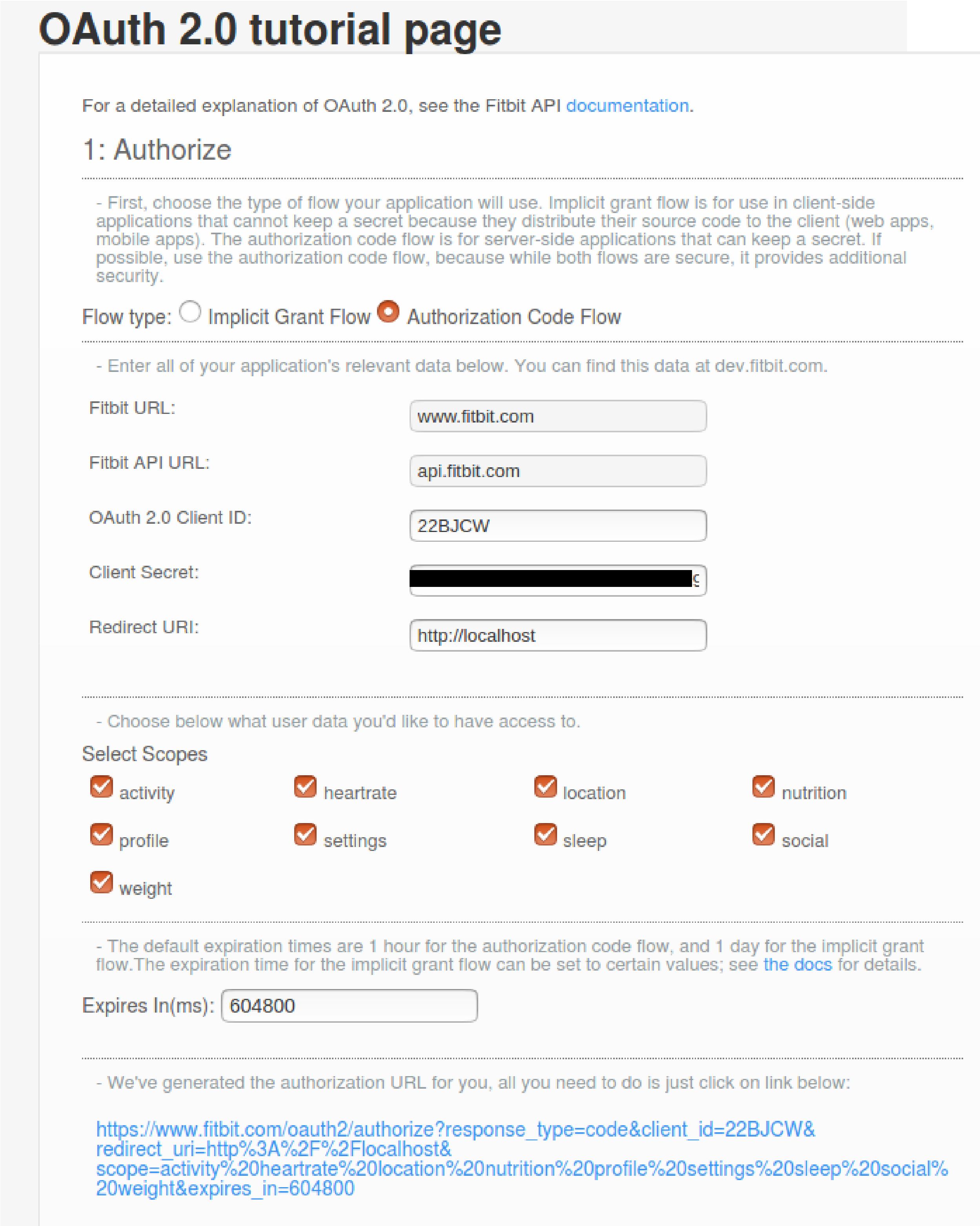
OAuth 2.0: Authorization URI
https://www.fitbit.com/oauth2/authorize

OAuth 2.0: Access/Refresh Token Request URI
https://api.fitbit.com/oauth2/token

Subscribers endpoint stats.

Subscriber ID	Verified at / Verification code	Stats

Fig. 5: The registered app page.



OAuth 2.0 tutorial page

For a detailed explanation of OAuth 2.0, see the Fitbit API documentation.

1: Authorize

- First, choose the type of flow your application will use. Implicit grant flow is for use in client-side applications that cannot keep a secret because they distribute their source code to the client (web apps, mobile apps). The authorization code flow is for server-side applications that can keep a secret. If possible, use the authorization code flow, because while both flows are secure, it provides additional security.

Flow type: ○ Implicit Grant Flow ● Authorization Code Flow

- Enter all of your application's relevant data below. You can find this data at dev.fitbit.com.

Fitbit URL: www.fitbit.com
Fitbit API URL: api.fitbit.com
OAuth 2.0 Client ID: 22BJCW
Client Secret: [redacted]
Redirect URI: http://localhost

- Choose below what user data you'd like to have access to.

Select Scopes

☑ activity ☑ heartrate ☑ location ☑ nutrition
☑ profile ☑ settings ☑ sleep ☑ social
☑ weight

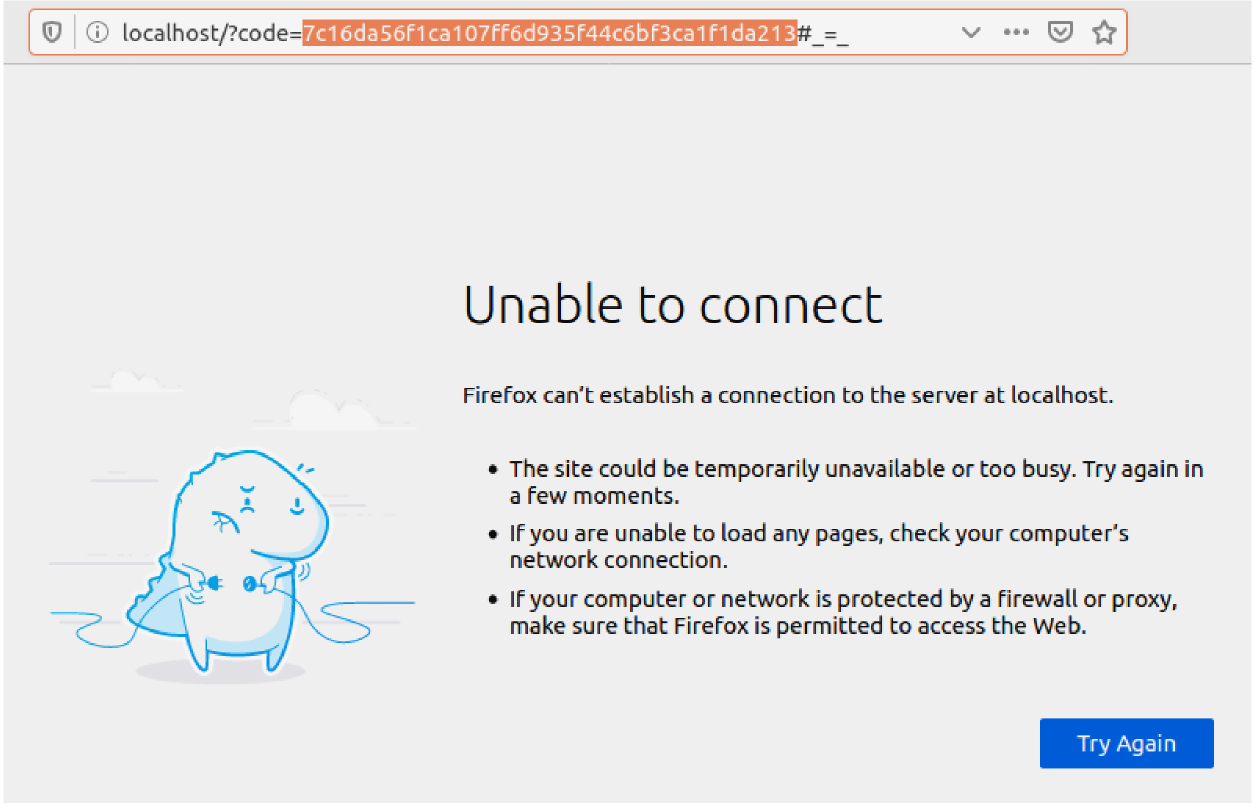
- The default expiration times are 1 hour for the authorization code flow, and 1 day for the implicit grant flow.The expiration time for the implicit grant flow can be set to certain values; see the docs for details.

Expires In(ms): 604800

- We've generated the authorization URL for you, all you need to do is just click on link below:

https://www.fitbit.com/oauth2/authorize?response_type=code&client_id=22BJCW&redirect_uri=http%3A%2F%2Flocalhost&scope=activity%20heartrate%20location%20nutrition%20profile%20settings%20sleep%20social%20weight&expires_in=604800

Fig. 6: Oauth2.0 tutorial page with “Flow type” set to “Authorization Code Flow.”



localhost/?code=7c16da56f1ca107ff6d935f44c6bf3ca1f1da213#_=_

Unable to connect

Firefox can't establish a connection to the server at localhost.

- The site could be temporarily unavailable or too busy. Try again in a few moments.
- If you are unable to load any pages, check your computer's network connection.
- If your computer or network is protected by a firewall or proxy, make sure that Firefox is permitted to access the Web.

Fig. 7: The page that you arrive at when clicking the URL above "1A Get Code." The code we are interested in in the URL is highlighted.

1.4.4 Setting up our interaction

0. Change your system timezone to be in your current timezone. To do this, you can click the time in the upper-right of the desktop on QT and then click 'Time & Date settings. . . '
1. Open a terminal and clone this repository onto QT's body computer:

   ```
   git clone -b master https://github.com/robotpt/abm-setup ~/abm-setup
   ```

2. Run a script to allow for updates:

   ```
   sudo bash ~/abm-setup/scripts/nuc_setup.bash
   ```

Warning: If this step fails, try the following commands before rerunning:

```
sudo apt install --reinstall python3-six
sudo apt install --reinstall python3-chardet
```

Note: This step takes five minutes or so.

3. Setup Docker:
   a. Install Docker:

      ```
      curl -fsSL https://get.docker.com -o get-docker.sh
      sh get-docker.sh
      ```

   b. Set Docker to run without `sudo`:

      ```
      sudo groupadd docker
      sudo gpasswd -a $USER docker
      newgrp docker
      ```

   c. Test that Docker is installed correctly and works without `sudo`:

      ```
      docker run hello-world
      ```

4. Setup Docker-compose:
   a. Install Docker-compose:

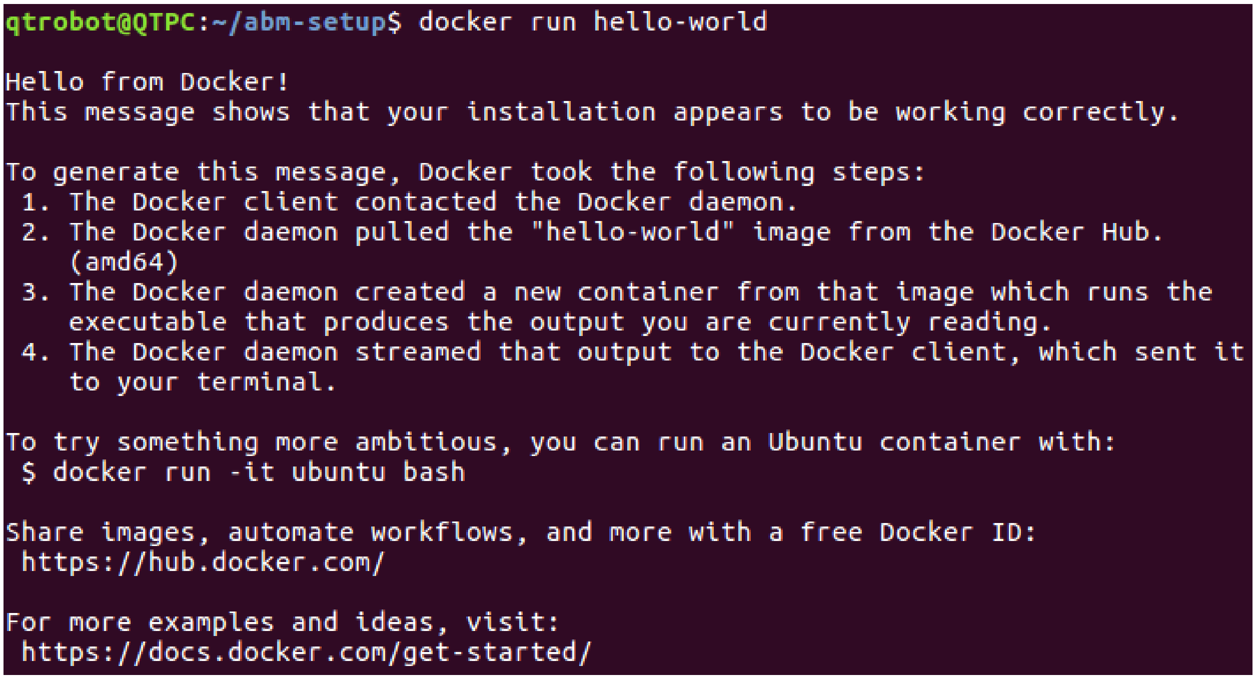
      ```
      sudo curl -L "https://github.com/docker/compose/releases/download/1.25.3/
      ↪docker-compose-$(uname -s)-$(uname -m)" -o /usr/local/bin/docker-compose
      sudo chmod +x /usr/local/bin/docker-compose
      ```

   b. Check that docker compose is installed correctly:

      ```
      docker-compose version
      ```

5. Setup the docker container:

   Note: The first time that you run the Docker script, it will take around 15 minutes to setup the container. After that, it will be fast. Feel free to take a break or go get coffee :-)



```
qtrobot@QTPC:~/abm-setup$ docker run hello-world

Hello from Docker!
This message shows that your installation appears to be working correctly.

To generate this message, Docker took the following steps:
 1. The Docker client contacted the Docker daemon.
 2. The Docker daemon pulled the "hello-world" image from the Docker Hub.
    (amd64)
 3. The Docker daemon created a new container from that image which runs the
    executable that produces the output you are currently reading.
 4. The Docker daemon streamed that output to the Docker client, which sent it
    to your terminal.

To try something more ambitious, you can run an Ubuntu container with:
 $ docker run -it ubuntu bash

Share images, automate workflows, and more with a free Docker ID:
 https://hub.docker.com/

For more examples and ideas, visit:
 https://docs.docker.com/get-started/
```

Fig. 8: What is printed from running the `hello-world` docker container.

a. Open the `Dockerfile` with `nano ~/abm-setup/docker/Dockerfile` and replace the name of the Amazon Web Services bucket. The line to change is at the bottom of the file and should be changed to `ENV AWS_BUCKET_NAME <your aws bucket's name>` with whatever your bucket is named, for example, `ENV AWS_BUCKET_NAME qt-robot-1`.

b. Run the `docker.sh` script with the `setup` option:

```
bash ~/abm-setup/docker/docker.sh setup
```

Note: I did have an error occur during this command one of the times I was setting it up. It might have been a network issue. I ran it again and it succeeded. If you have trouble here let me know.

d. Enter your Fitbit and Amazon Web Services credentials as prompted. The following is the order they are asked in and what they look like / should be:

Prompt	Example / value
Fitbit Client ID	`22XXXX`
Fitbit Client Secret	`5912f5907faa693e3e6630XXXXXXXXXX`
Fitbit *Ultra Secret* Code	`6e843fa2b908b1f608b973b845b793XXXXXXXXXX`
AWS Access Key ID	`AKIAY2SYU4XXXXXXXXXX`
AWS Secret Access Key	`jwY9mv9U7DBfZe2/p5XXXXXXXXXXXXXXXXXXXXXX`
AWS Default Region Name	`us-west-1`
AWS Default Output Format	`json`

> **Warning:** If you receive an error after entering the Fitbit information, check that you have a device setup with the Fitbit account.

   e. Ignore the network information displayed and hit Ctrl+C to close the container.

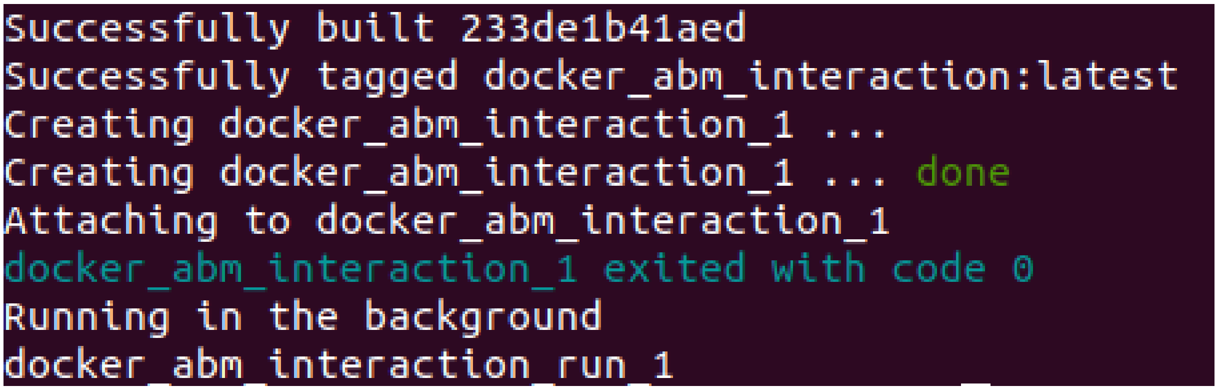
6. Run the interaction:

   a. Make sure that you're in the `docker` directory in the `abm-setup` folder:

   ```
   cd ~/abm-setup/docker
   ```

   b. Run the `docker.sh` script with the `run` option:

   ```
   bash docker.sh run
   ```



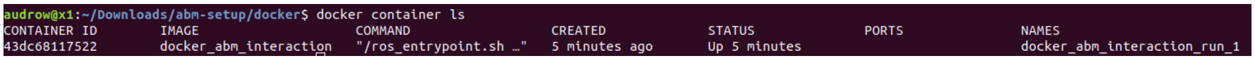
```
Successfully built 233de1b41aed
Successfully tagged docker_abm_interaction:latest
Creating docker_abm_interaction_1 ...
Creating docker_abm_interaction_1 ... done
Attaching to docker_abm_interaction_1
docker_abm_interaction_1 exited with code 0
Running in the background
docker_abm_interaction_run_1
```

Fig. 9: An example of the final message after the interaction run script.

7. Make the interaction run on startup:

   a. List your Docker containers:

   ```
   docker container ls
   ```



```
audrow@x1:~/Downloads/abm-setup/docker$ docker container ls
CONTAINER ID        IMAGE                    COMMAND                  CREATED             STATUS              PORTS               NAMES
43dc68117522        docker_abm_interaction   "/ros_entrypoint.sh …"   5 minutes ago       Up 5 minutes                            docker_abm_interaction_run_1
```

Fig. 10: An example of running containers.

   b. Copy the "CONTAINER ID".

   c. Update the container's restart policy:

   ```
   docker container update --restart=unless-stopped <YOUR COPIED␣
   ↪CONTAINER ID>
   ```

Note: At this point, you should reboot QT. You can do this by either pushing the button on the back of QT or typing `sudo reboot` into the head computer's terminal.

To test that things are setup correctly, you can take the URL for the GUI that you wrote down and type it into the web-browser on any device that's on the same network. QT should begin asking you about your name, if it is your first interaction.

1.4.5 Setting up remote access to QT

Get Dataplicity login credentials from Audrow and sign on. Go to the devices tab and then click "+ Add New Device". Copy or enter this command into a terminal on QT's body PC and enter QT's password 'qtrobot'. After that runs, remote access should be setup. You can confirm this by clicking the added device and confirming that you can explore the file system (e.g., `ls /home/qtrobot` and you should see familiar directories such as `abm-setup`).

1.5 Tablet

For either tablet supplied by LuxAI with QT, or any Android tablet for that matter, we're going to set up the tablet to run as a Kiosk using the app Fully Kiosk Browser.

1. Sign on to the Google Play Store.
2. Search for and download *Fully Kiosk Browser*.
3. Go to settings and connect to QT's network, for example, `QT145`. The password should be `11111111` (eight ones).
4. Start *Fully Kiosk browser* and set the start URL `192.168.100.2:8082/index_only_user_input.html`. This URL will only show the parts of the GUI for user input. If you want to see the text the robot speaks, use the following web address: `192.168.100.2:8082`.
5. Adjust settings in *Fully Kiosk browser*:
    i. In 'Settings > Web Zoom and Scaling', disable 'Enable Zoom'
    ii. In 'Settings > Web Auto Reload', set 'Auto Reload after Page Error' to '2'.

With this app, you can make it so that it's challenging to get out of the app or do other things on the tablet. You can go into 'Settings > Kiosk Mode (PLUS)' to play with these settings. A plus license is 6.90 EUR per device (about 7.50 USD).

CHAPTER 2

Reseting QT

2.1 Full reset

If you would like to delete the data stored on QT, as well as reset the Fitbit and AWS credentials, enter the following commands from QT's body computer:

```
cd ~/abm-setup/docker
docker-compose down -v
```

2.2 Reset AWS credentials

Just run the setup, again:

```
bash ~/abm-setup/docker/docker.sh setup
```

2.3 Reset Fitbit Credentials and/or interaction history

I will seek to make this easier for the full deployment, but for now, do the following:

1. Open a terminal to the Docker environment:

   ```
   bash ~/abm-setup/docker/docker.sh debug
   ```

2. Remove what you'd like:

   a. Remove the Fitbit credentials document from the terminal that pops up:

      ```
      rm /root/state/fitbit_credentials.yaml
      ```

   b. Remove the interaction history to start again from QT introducing itself and setting up the interaction:

```
rm /root/state/state_db.pkl
```

3. Exit the Docker terminal (you can just close it).

To setup your Fitbit credentials, in your original terminal, run the setup script again:

```
bash ~/abm-setup/docker/docker.sh setup
```

Note: The Amazon Web Services credentials will show that they have values with the values in brackets (e.g., `[XX..XXJUXB]`). You can just hit *Enter* to leave these values unchanged.

CHAPTER 3

Troubleshooting

3.1 Unable to contact ROS master at 192.168.100.1:11311

This means that the two computers in QT are not talking correctly because they did not boot in the right order. To fix this, restart QT by pressing down QT's power button for a second or two. QT should slump forward and the face screen should go off. If the face screen doesn't go off, power QT on and repeat the process. I haven't ever had to do this more than twice, as by the second time they are synced.

To test if the computers are talking correctly, you should be enter the following command and see a list of outputs. If you get an error, restart QT.

```
rostopic list
```

3.2 The tablet doesn't connect

This can be two things in my experience:

1. The tablet is on the wrong wifi network
2. The interaction isn't running (most commonly Fitbit credential errors)

3.2.1 Tablet is connecting to the wrong wifi

It is easiest to check that the tablet is on the correct wifi. When QT turns off, it turns off the wireless network that it is hosting. When this happens, most tablets will auto-join other networks that they have been connected to. What makes this worse is that web browsers often rememeber (cache) websites to make them quicker to load, which makes it look like you're connecting to the website hosted by QT, but you're not. To fix this, go into the tablet's settings and turn off autojoin for all wireless networks except for QT (or just the networks you expect the tablet to see while the interaction is running). Once this is set, you should be able to connect to and prompt the interaction on QT, including after QT restarts (if you've changed the container's restart policy).

3.2.2 Interaction isn't running

There can be a few reasons for this. The most likely is that the Fitbit or Amazon Web Services credentials entered aren't working. To see what it is for sure, turn on QT, open a terminal, go into the setup directory, make sure all docker containers are closed, and run a debug docker container:

```
cd ~/abm-setup/docker
docker-compose down
bash docker.sh debug
```

This will open a new terminal that is the Docker container running on QT. In this container, let's see what happens if we start the interaction:

```
roslaunch abm_interaction qt_abm_interaction.launch
```

While it runs, be on the lookout for any red text. If you see something about Fitbit credentials, you'll need to redo the Fitbit credentials. If you see something about Amazon Web Services (AWS uploader, Polly, text-to-speech (tts)) you'll need to redo the Amazon Web Services Credentials.

To redo the Fitbit credentials, delete the current Fitbit credentials. From the terminal that opened up when you ran `bash docker.sh debug`, enter the following and then run the setup script, again (below).

```
rm /root/state/fitbit_credentials.yaml
```

If you need to redo the AWS credentials, just run the setup script. You can do this from the terminal that opened when you ran `bash docker.sh debug`:

```
roslaunch abm_interaction setup_abm_interaction.launch
```

You can then run the interaction from the terminal that opened when you ran `bash docker.sh debug`:

```
roslaunch abm_interaction qt_abm_interaction.launch
```

If you are still getting an error here, check that you have access to the AWS bucket with the account credentials you've supplied (e.g., if the bucket is owned by the account you've entered in the AWS credentials).

If you suspect it is not, in the terminal that is on QT (not the Docker one opened with `bash docker.sh debug`), change the AWS bucket specified at the end of the Dockerfile to a valid bucket owned by the AWS account you're using. To open the Dockerfile, use the following command and go to the last line of the file:

```
nano ~/abm-setup/docker/Dockerfile
```

Note: If neither of these fixed your error, let Audrow know and he will try to guide you through it and then fix the problem or add it to this document.

3.3 QT's head computer doesn't have internet

If you can SSH into QT's head computer, but are unable to clone a repository or make an update, check if you have internet. The following command should show you that messages are being sent and responses are received, it just hangs there, you are not connected to the internet:

```
ping google.com
```

At the moment, just restart QT and hopefully the problem will be fixed. LuxAI has recognized this problem and given me steps to fix it but I haven't tested them.

If you would like to try, here is their email

> In our older setup of RPI/NUC network (same as your QT) we had enabled port forwarding (8080 -> 80) on both machine to facilitate accessing the QTrobot wev config. In some cases and time-to-time (also depending on the router) this causes problem for RPI to reach the internet properly.
>
> In this FAQ we explained it how to disable it: https://docs.luxai.com/FAQ/Network/
>
> Some more comments on this issue : https://github.com/luxai-qtrobot/QA/issues/3
>
> However all you need to do (as I imagine this can be the cause of the problem) is to disable the port forwarding on both machines QTPC and QTRP.
>
> For QTRP (RPI), just follow the simple instruction in the FAQ link and comment the corresponding line in :code'start_qt_routes.sh'. Double check that your `/etc/network/interfaces` on RPI has the following config:

```
auto lo eth0
iface lo inet loopback
auto eth0
iface eth0 inet static
address 192.168.100.1
netmask 255.255.255.0
gateway 192.168.100.2
dns-nameservers 192.168.100.2 8.8.8.8
```

> Regarding the QTPC, you can completely disable/remove the 'start_qt_routes.sh'.

CHAPTER 4

Updating QT

Most updates to QT will only involve the body computer (Audrow should tell you otherwise). In this case, the update process should be fairly straightforward.

Turn on QT, open a terminal, go to the `abm-setup` directory, and pull the updates:

```
cd ~/abm-setup
git stash save
git pull origin master
git stash pop
```

Then start the interaction as specified in the setup. The container rebuild and the updates will be applied.

If you are updating the head computer, Audrow will provide specific instructions. Most likely, you will have to just go through the updated setup for the head computer. Audrow should let you know.

CHAPTER 5

Preparing QT for new participants

To prepare QT for new participants, we have to get the data off and reset the data stored (not the AWS or Fitbit credentials, those can stay as they are).

5.1 Getting the data off QT

To get the data off QT, turn on QT, open a terminal, and open a terminal to QT's Docker container:

```
cd ~/abm-setup/docker
docker-compose down
bash docker.sh debug
```

From the terminal that opens with the command `bash docker.sh debug`, copy the data to a folder that is shared between the Docker container and QT's computer:

```
zip -r /root/shared/log_$(date "+%Y-%m-%d_%H:%M:%S") /root/mongodb_log/ /root/state/
```

In the other terminal (not the one that opened with `bash docker.sh debug`), go to the shared directory and change the file owner. The final command opens a file explorer for convenience:

```
cd ~/abm-setup/docker/shared
sudo chown $USER *
xdg-open .
```

Note: As a sanity check you can unzip the file now and check its contents.

From here you should save the zip file elsewhere, on a harddrive, on the cloud, etc.

Now we can delete the files that save the state of the interaction and user interaction log in our terminal that we started with `bash docker.sh debug`.

> rm -r /root/state/* /root/mongodb_log/*

Now start the interaction as per the setup instructions and QT is ready to begin with a new participant.

Note that, QT will look at the last seven days of Fitbit activity with the associated Fitbit device in setting the first week's steps goal, so if you want to go straight to a new participant, maybe you should use a different Fitbit account.

CHAPTER 6

Known issues

6.1 Critical

6.2 Not critical

- With rare chance, audio may be skipped (PyAudio error)
- Sometimes beginning of sound is cut off

6.3 Little fixes

CHAPTER 7

Planned changes in the interaction

- Sync Fitbit during a conversation if they choose to
- Option to checkin early if they meet their walk goal
- Make morning checkin available before noon - ask would they like to checkin
- Make the GUI timeout occur a set period of time after QT finishs speaking

CHAPTER 8

Suggestions / Bug report

For suggested improvements or bugs to report, please email Audrow Nash at audrow.nash@gmail.com.

CHAPTER 9

Frequently Asked Questions

9.1 On video recording

9.1.1 Is the interaction recording?

By default the interaction is being recorded. If the interaction is proceeding, it means that the Amazon Credentials are correct and that the AWS bucket is valid.

9.1.2 How do we access the recordings / make sure that the face is in view?

All recordings are stored on Amazon Web Services. Get the credentials from Audrow. You can then go to S3 storage on AWS and view the contents of each bucket to see if the face is in frame.

9.2 On implementation

How are steps goals calculated?

$$\begin{aligned} g_{\text{this week}} &= \max\left(g_{\text{week min}},\ \min\left(g_{\text{week max}},\ \hat{g}_{\text{this week}}\right)\right) \\ \hat{g}_{\text{this week}} &= s_{\text{past week}} + \frac{g_{\text{final week}} - s_{\text{past week}}}{\text{weeks remaining}} \\ g_{\text{week min}} &= \max(g_{\text{week goal lower bound}},\ \alpha_{\text{min}} \cdot s_{\text{past week}}) \\ g_{\text{week max}} &= \alpha_{\text{max}} \cdot s_{\text{past week}} \end{aligned}$$

Where g refers to active steps goal, s refers to the number of steps completed by the participant, and α_{min} and α_{max} are constants such as 1.1 and 2.0.

Note that $g_{\text{this week}} = \alpha_{\text{min}} \cdot s_{\text{past week}}$ if $g_{\text{this week}} \geq g_{\text{final week}}$.

The daily steps goal is calculated as follows:

$$\begin{aligned} g_{\text{today}} &= \max\left(g_{\text{today min}},\ \min\left(g_{\text{today max}},\ \hat{g}_{\text{today}}\right)\right) \\ \hat{g}_{\text{today}} &= \frac{g_{\text{this week}} - s_{\text{this week}}}{\text{days remaining}} \\ g_{\text{today min}} &= \frac{g_{\text{this week}}}{\text{days per week}} \\ g_{\text{today max}} &= \gamma \cdot g_{\text{today min}} \end{aligned}$$

Where γ is a constant that relates $g_{\text{today min}}$ to $g_{\text{today max}}$, for example, the value 2.5. γ prevents the days recommendation from being enormous if they haven't done well during the week.