Accessing and Transferring Onboard Code from Unitree Go2

The Unitree Go2 communicates over a private Ethernet network (192.168.123.18). Since the robot does not always provide DHCP, a static IPv4 configuration is required on the host machine.

1. Connect the laptop to the Go2 using a USB-Ethernet or Ethernet cable. Connect yellow ethernet cable to RJ45 jack and other end to laptop/hub via USB-C cable
2. Configure a static IPv4 address on the host laptop:
   Steps for windows - > settings -> network & internet -> ethernet -> change IP assignment to manual and add below IPv4 details
3. IP address: 192.168.123.100
4. Subnet mask: 255.255.255.0
5. Go to powershell and type ipconfig and see if above ip address is visible in IPv4
6. If yes, Verify connectivity using ping 192.168.123.18
7. 4 pings will be transferred and returned with no loss.

```
Pinging 192.168.123.18 with 32 bytes of data:
Reply from 192.168.123.18: bytes=32 time=5ms TTL=64
Reply from 192.168.123.18: bytes=32 time=2ms TTL=64
Reply from 192.168.123.18: bytes=32 time=1ms TTL=64
Reply from 192.168.123.18: bytes=32 time=2ms TTL=64

Ping statistics for 192.168.123.18:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 5ms, Average = 2ms
```

1. Once network connectivity is confirmed, access the robot using SSH. This provides terminal access to the onboard Ubuntu environment running on the Go2. ssh unitree@192.168.123.18
2. Password: 123
3. Upon successful connection you should see an option to choose between ROS foxy or noetic.Choose 1 to use ROS foxy

```
ros:foxy(1) noetic(2) ?
1
```

Use ls command to view all files and folders onboard.

```
-bash: /home/unitree/cyclonedds_ws/install/setup.bash: No such file or directory
unitree@ubuntu:~$ ls
ac1l_offline_files        Documents              Public
camera_calibration        Downloads              robot_continous.py
camera_calibration.txt    export.py              robot_movement_server.py
captured_images           fast_neon              Templates
cuda-keyring_1.1-1_all.deb go2_ball_follower.py  test_cuda
cudnn_install             go2_webrtc_connect     test_cuda.cu
cyclen_diagnise.sh        move_debug.py          torch-2.1.0a0+41361538.nv23.06-cp38-cp38-linux_aarch64.whl
cyclonedds                movement_tester.py     torchvision_build
dataset_server.py         Music                  unitree_webrtc_connect
depth_test                nomachine.sh           Videos
Desktop                   Pictures               yolov8n.pt
unitree@ubuntu:~$ cd depth_test
unitree@ubuntu:~/depth_test$ ls
ball_follow_pose.py              gdb.txt                  velocities.txt  yolov8s.pt           yolov8s_test_5.jpg
file_control.log                 pose_control.py          voice_agent     yolov8s_test_0.jpg   yolov8s_test_6.jpg
file_control.py                  target.txt               yolo_debug.py   yolov8s_test_1.jpg   yolov8s_test_7.jpg
file_control.py.bak              test_coloured_model.py   yolo_models.py  yolov8s_test_2.jpg   yolov8s_test_8.jpg
final_ball_identification.ipynb  test_yolov8n.py          yolov8n.onnx    yolov8s_test_3.jpg   yolov8s_test_9.jpg
final_best.pt                    test_yolov8n.py.bak      yolov8s.onnx    yolov8s_test_4.jpg
```

- Files related to robot perception and movement are saved in the depth_test folder.
- Run the files test_coloured_model.py and file_control.py in two separate terminals to make the robot move by itself and detect multi-colored balls.
- Final_best.pt model is used by test_coloured_model.py file
- To view the robot camera, access the laptop_viewer.py file via another terminal through this code command
  python <file path> <ip:default value 192.168.123.18>

Best Practices

- Avoid modifying onboard robot code directly
- Always develop and test locally before deploying changes back to the robot.
- Transfer only required source files (scripts, models, configs) to keep workflows clean and reproducible.
- Maintain backups before experimentation

Helpful Links

- Github Repo: Link
- Video demonstration: Link 1 , Link 2
- Poster: Link