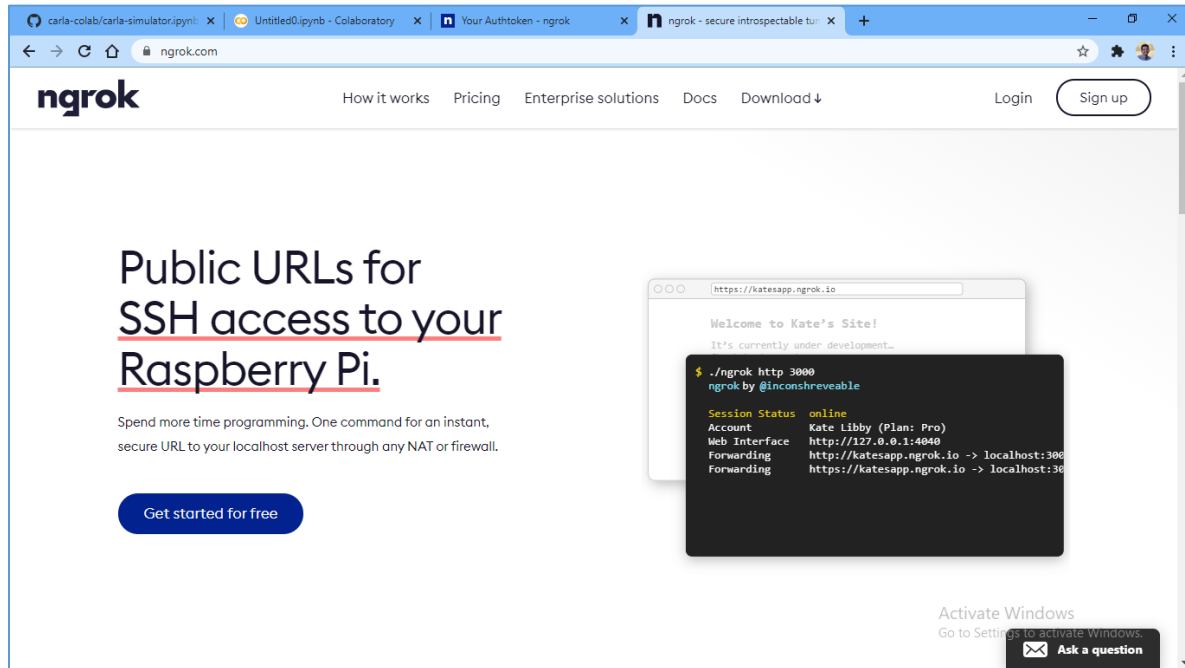# STEP 1:

Ngrok account (you don't need to buy premium plans).
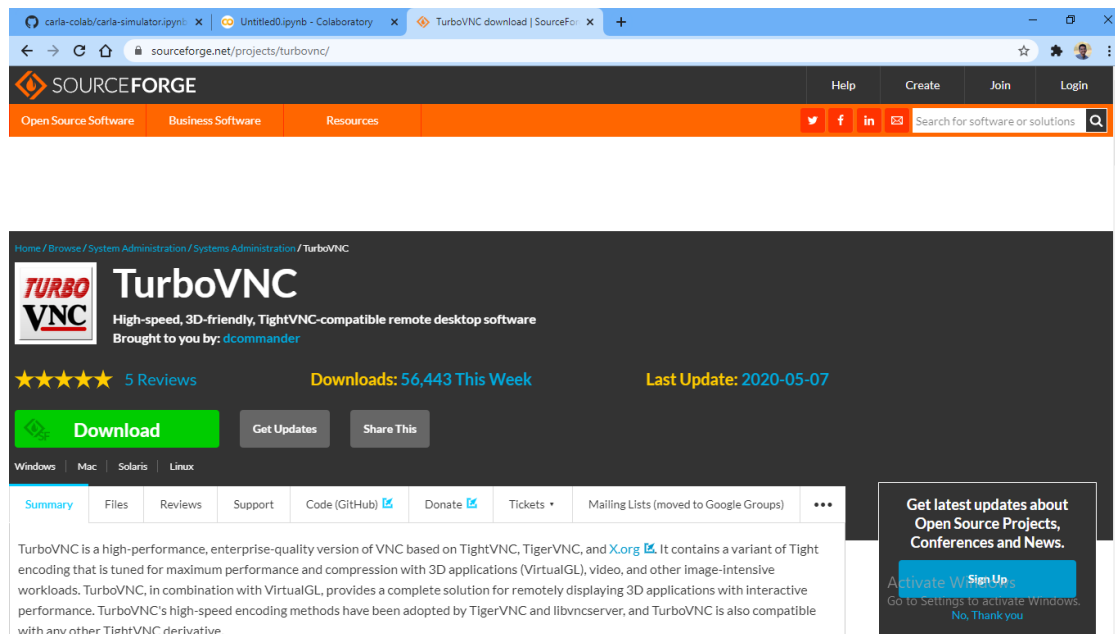
GO TO ngrok.com

CLICK ON *GET STARTED FOR FREE* and create your account, keep the window open

STEP 2:

Download TurboVNC Viewer HERE

Click on DOWNLOAD and save it to an accessible folder, then install it in your computer

STEP 3:

Ssh client (already present in all recent os).

Step 4:

Go to Google, search for **google colab,** should give you a notebook similar to a jupyter notebook

Change the runtime

In colab: click "Runtime" in the top bar -> "Change runtime type" -> change hardware accelerator to GPU.

Run the snippet below

!pip install git+https://github.com/demotomohiro/remocolab.git

import remocolab

remocolab.setupVNC()

It will ask for your **ngrok authtoken**.

```
---
    Copy&paste your tunnel authtoken from https://dashboard.ngrok.com/auth
    (You need to sign up for ngrok and login,)
    ..........
```

CLICK ON ABOVE LINK SHOWN IN PICTURE AND COPY YOUR AUTHTOKEN AND PASTE IN COLAB

Enter

WILL ASK FOR REGION

TYPE **'in'** and Enter (INDIA _MUMBAI)

Wait till the end of the process

It sets up OpenSSH server, VirtualGL and TurboVNC.

Then, access passwords are shown

```
            .   ++=U|
    |            o.* o|
    |             XoE |
    |             oO  |
    +----[SHA256]-----+

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
root password: VKsR9jozu_GQYtchJ0cO4mArKC7vVylztog7xq8BGe8
colab password: aebZ9--DIQ46ueF92A3aZezp-syx1NGkIAdDUA3Wc_g
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
---
Execute following command on your local machine and login before running TurboVNC viewer:
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
ssh -o UserKnownHostsFile=/dev/null -o VisualHostKey=yes -p 16336 -L 5901:localhost:5901 colab@0.tcp.in.ngrok.io
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
VNC password: ft1CN0t6
VNC view only password: cx9yDky0
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

STEP 5:

Open command prompt in your PC

Use the command under "If you use VNC:" message. Run it in the command prompt in your Computer(local pc)
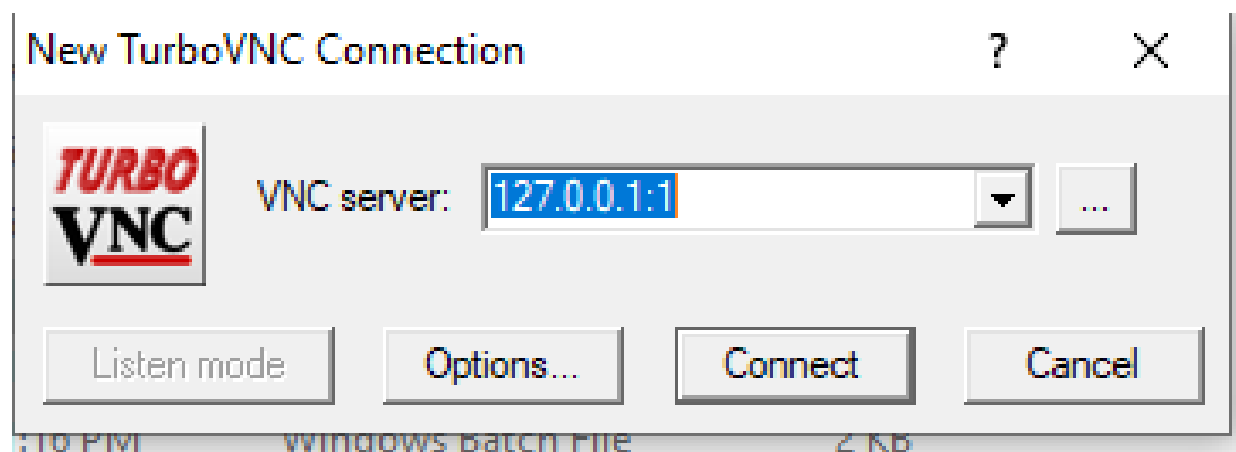
Use the "colab password" displayed in Colab output

```
C:\WINDOWS\system32\cmd.exe - ssh  -o UserKnownHostsFile=/dev/null -o VisualHostKey=yes -p 16336 -L 5901:localhost:5901 colab@0.tcp.in.ngrok.io    —

Microsoft Windows [Version 10.0.18362.959]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\shreeram>ssh -o UserKnownHostsFile=/dev/null -o VisualHostKey=yes -p 16336 -L 5901:localhost:5901 colab@
n.ngrok.io
The authenticity of host '[0.tcp.in.ngrok.io]:16336 ([3.6.115.182]:16336)' can't be established.
ECDSA key fingerprint is SHA256:SBdhvpckYv19uW5GkfGnWc5DRU1WmbrLJ7E8FU3rK2c.
----[ECDSA 256]---+
       +.      oX|
     + .     .++|
    + = .    .=+|
   o + = o .o==|
    . S + . *Bo|
        .   ++=o|
          o.* o|
          XoE |
          oO  |
-----[SHA256]-----+
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '[0.tcp.in.ngrok.io]:16336,[3.6.115.182]:16336' (ECDSA) to the list of known hosts.
colab@0.tcp.in.ngrok.io's password: _
```
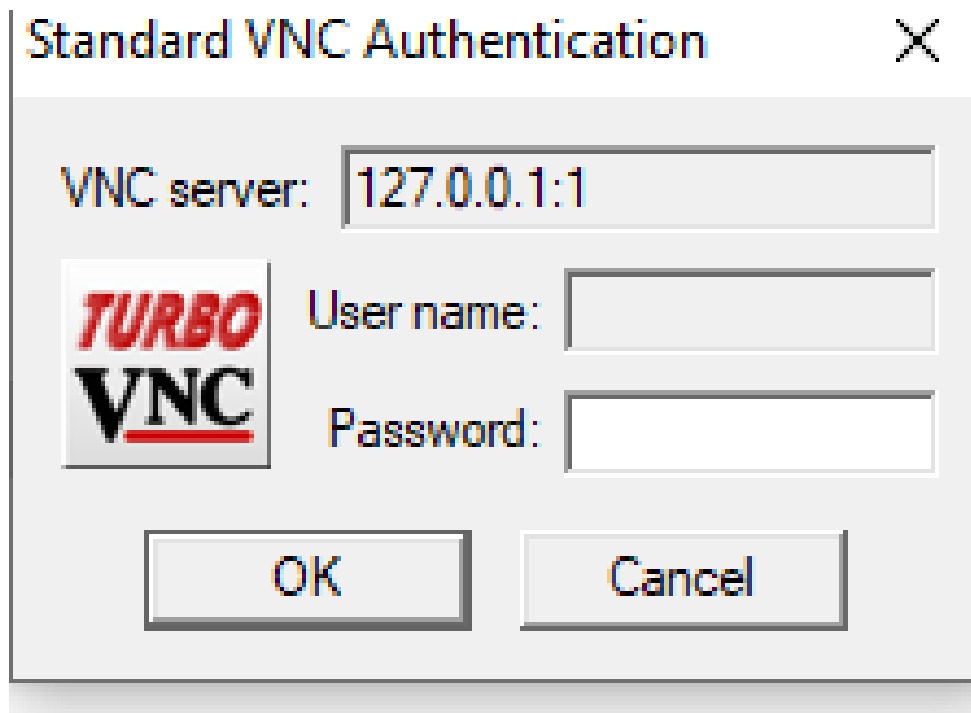
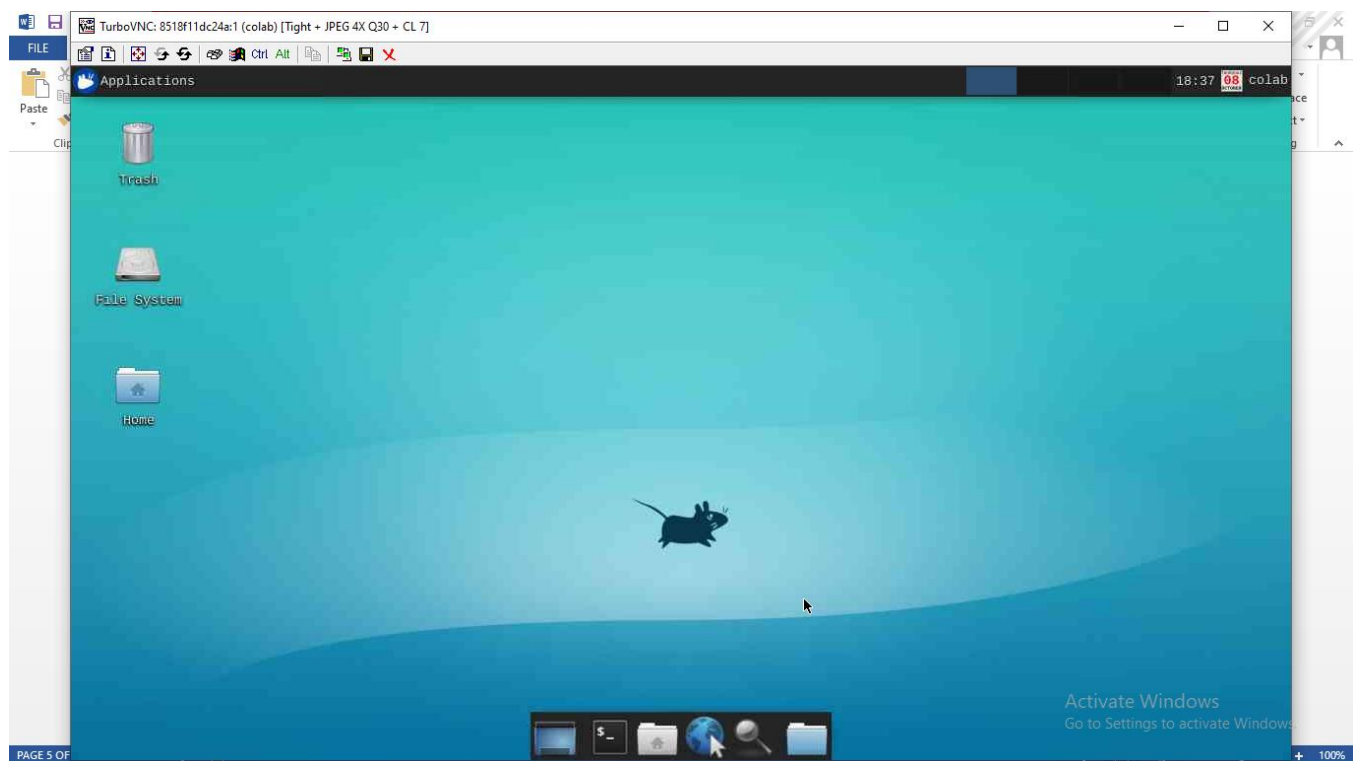## STEP 6:

GO TO WHERE TURBOVNC IS INSTALLED, RUN IT

The **connection address** is **localhost:1**

Click on Connect

Use the **"VNC password" displayed above in GOOGLE COLAB**

If everything worked properly, you will see a screen.

STEP 7: RUN FOLLOWING COMMANDS IN COLAB NOTEBOOK

Number 1:

! sudo -u colab wget -O /home/colab/CARLA.tar.gz https://carla-releases.s3.eu-west-3.amazonaws.com/Linux/CARLA_0.9.8.tar.gz

Number 2:

! sudo -u colab mkdir /home/colab/carla

! sudo -u colab tar -xf /home/colab/CARLA.tar.gz -C /home/colab/Carla

Number 3:

! sudo -u colab DISPLAY=:1 vglrun /home/colab/carla/CarlaUE4.sh

You should have CARLA running in VNC
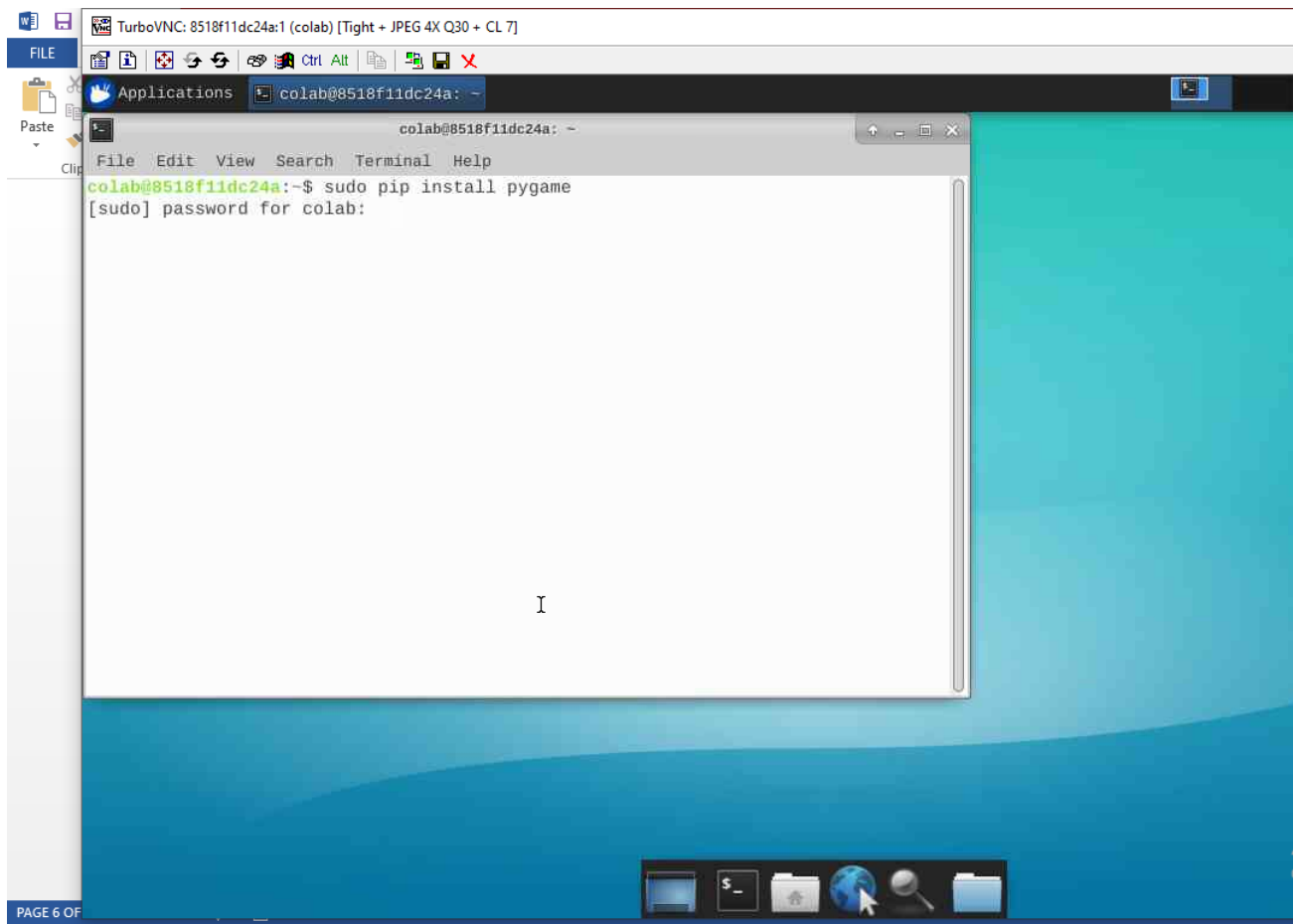

IMPORTANT

Client control with python

You can run CARLA clients from the remote desktop

From a **terminal** on the **remote desktop**

RUN FOLLOWING COMMAND

sudo pip install pygame

The password for colab user is shown above

RUN FOLLOWING COMMAND IN A TERMINAL

cd /home/colab/carla/PythonAPI/examples

ENTER

AND THEN FOLLOWING COMMAND

python manual_control.py

Should work.

EXTRA

Display smooth animation

Open TurboVNC Viewer options and change "Encoding method" to "Tight + Medium-Quality JPEG" or "Tight + Low-Quality JPEG(WAN)". Some noises could appear but it will look smoother.

Tips

Keeping the virtual machine alive

https://stackoverflow.com/questions/57113226/how-to-prevent-google-colab-from-disconnecting

Closing Carla

Close CARLA always from the **remote desktop**, if you interrupt the execution from the colab web-page you will interrupt also the VNC server.