Live stream from raspberry pi using logitech C922

What you need:

Hardware:

- A Raspberry pi 3 (you will need two raspberry pis if you want to communicate with each other)
- Pc setup(Monitor,mouse and keyboard)
- Logitech C922 cam
- HDMI to HDMI connector
- USB to microUSB charging cable with a normal mobile charger
- Pc or laptop running window
- A microSD card of at least 16GB
- microSD card reader
- Casing,heatsink and fan (https://www.amazon.com/dp/B07G91JHWH/ref=dp_cerb_3)

Software:

- Raspbian image file for OS
- Balena etcher for flashing image

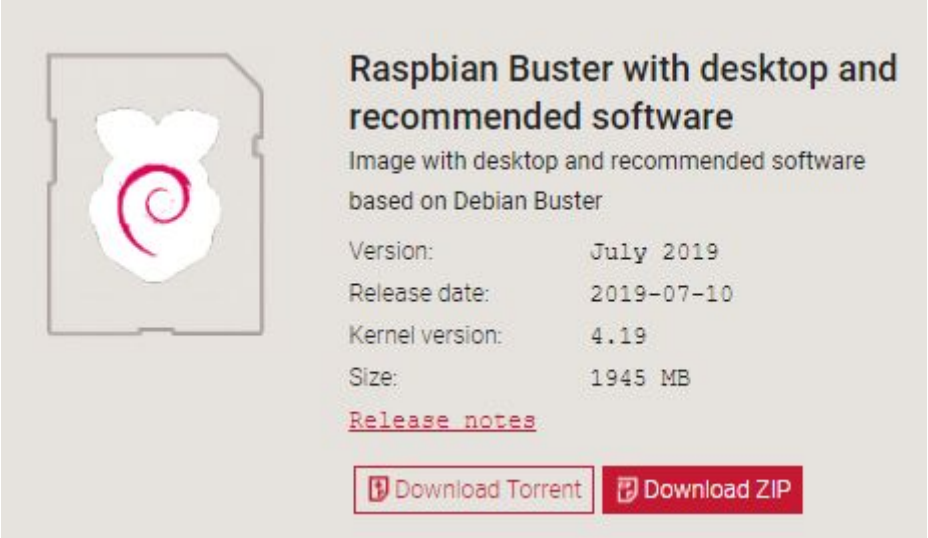
What to do:

1. Installing OS in raspberry pi
2. Getting raspberry pi ready for streaming
3. Launching the stream

1.Installing OS in raspberry pi

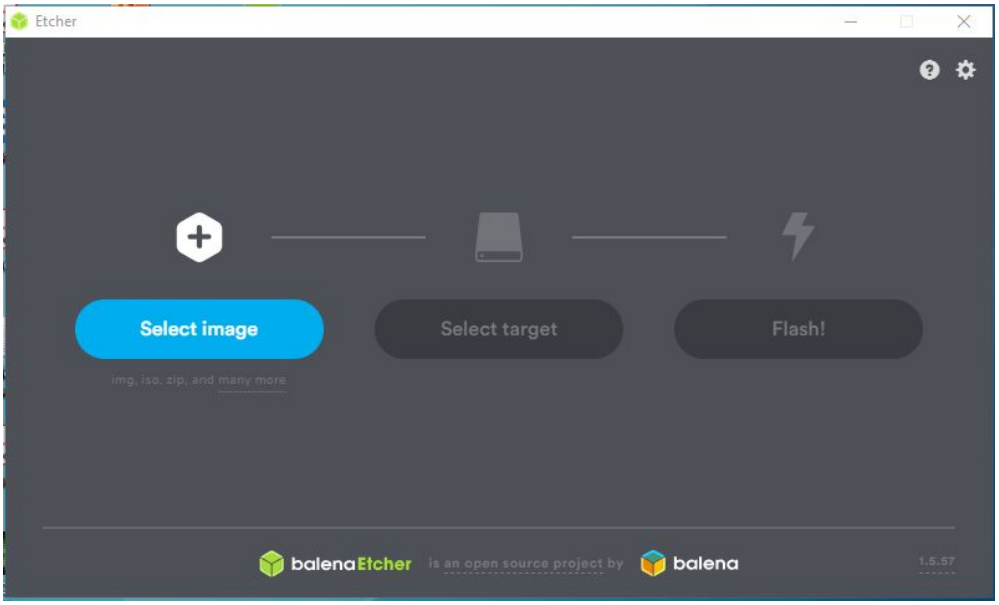
Step1

First of all go to
https://www.raspberrypi.org/downloads/raspbian/
And download the latest version of raspbian with desktop and recommended software(In this project we will be using raspbian Buster version 4.19).



Step2

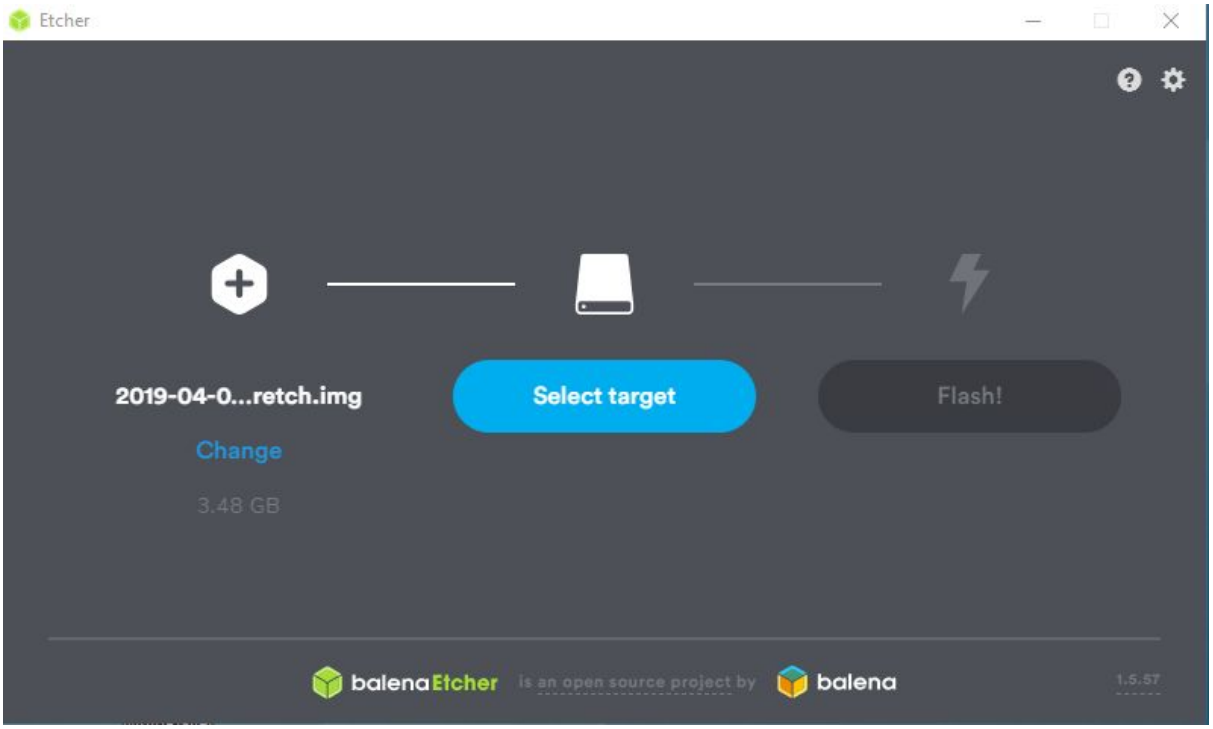
Download and install the flashing software.
https://www.balena.io/etcher/



Now insert the microSD card to micro card reader and connect it to a laptop or pc.

Step3

After the card is connected,open Etcher. Select the raspbian image downloaded before. Choose the card when asked for target and finally hit the flash button.

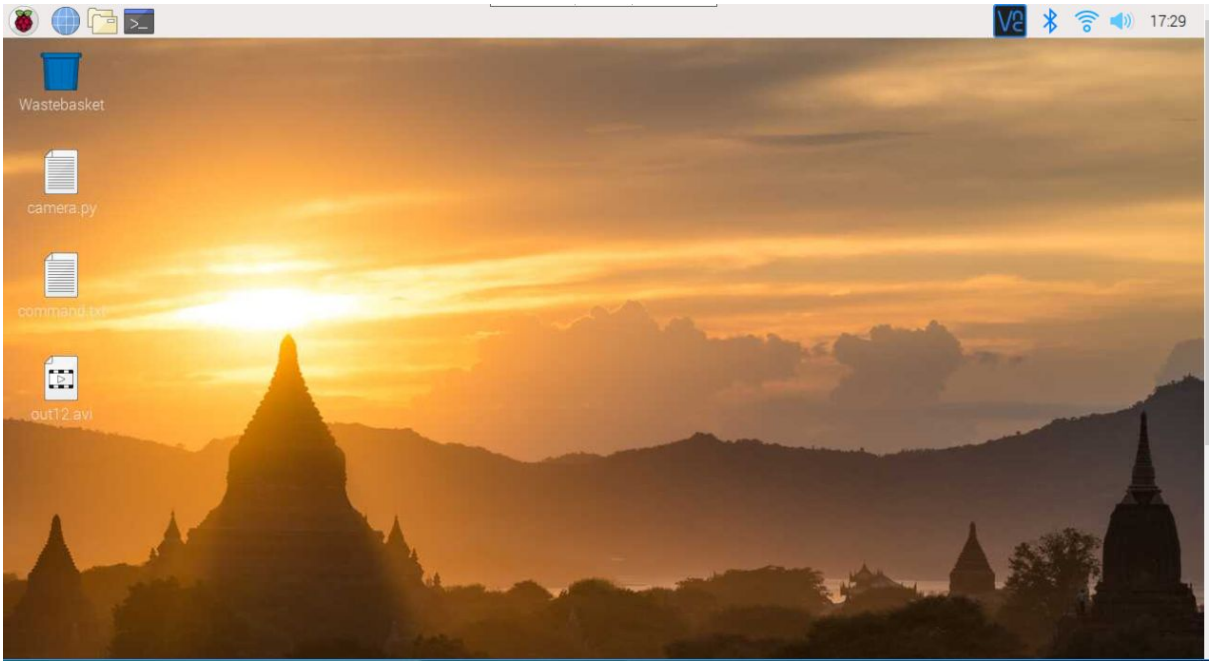


After sometime,the image should have been flashed inside the SDcard. Take the card out of the reader and put the card in the memory slot of raspberry pi. The memory slot is located at the bottom of the pi.

2.Getting raspberry pi ready for streaming

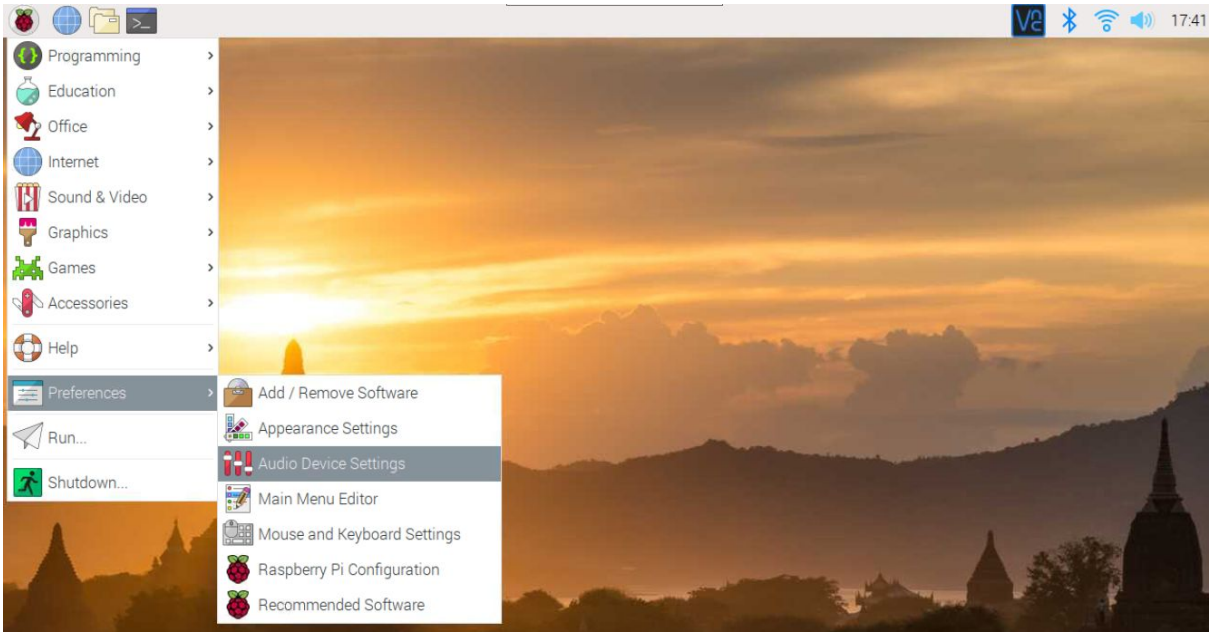
Step1

Connect your pi to the monitor by using the HDMI cable. Connect one end to pi HDMI slot and another to the monitor. Then connect your mouse and keyboard to USB slots.Finally connect the power to pi using charging cable either with a charger or through the laptop. The pi should turn on and the pi desktop should take a few minutes to load. Wait for the desktop to appear.Make sure to connect your pi to the net. The internet options can be chosen with middle icon at the right corner.

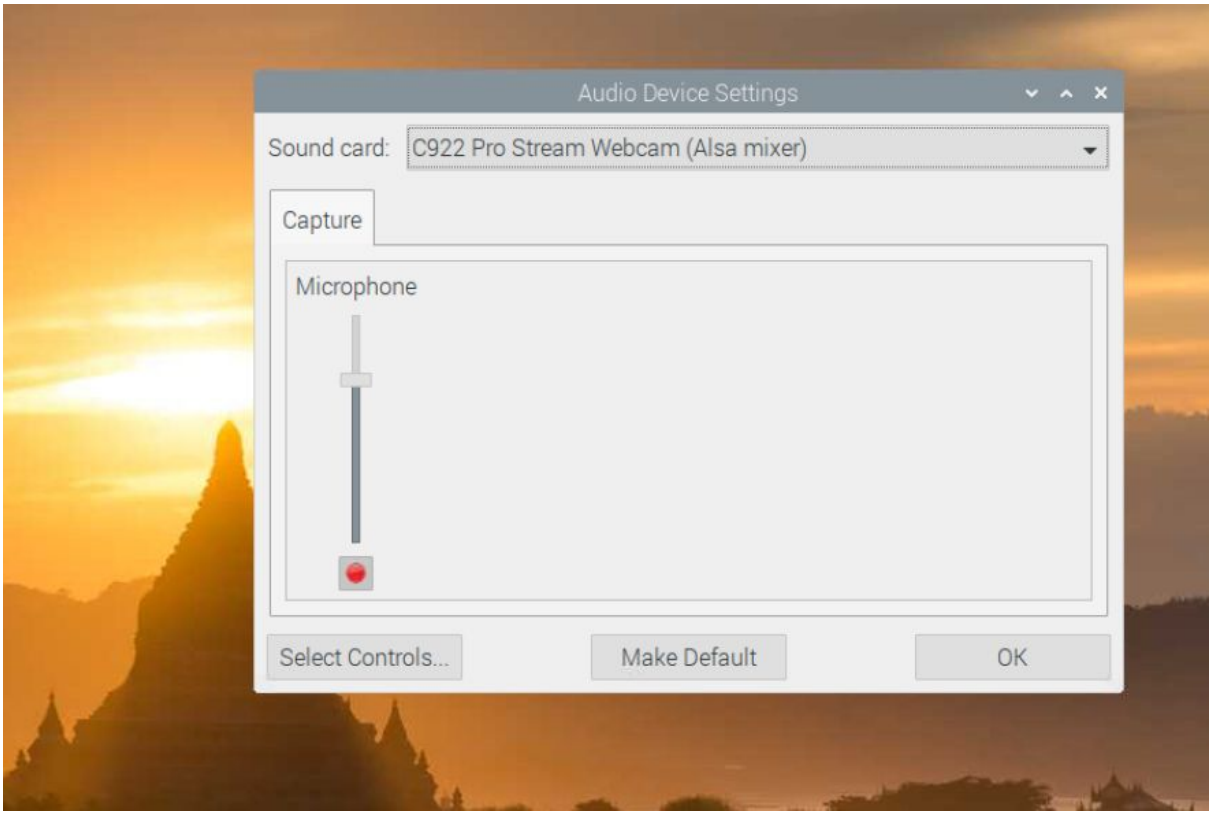


Step2

Enable sound through settings.Connect your logitech C922 with raspberry pi. Go to the pi icon at the top left corner,choose preferences and then audio device settings.



Choose the bcm Alsa sound card first. Go to select controls and check pcm.Then choose C922 pro stream on sound card option and click select controls. Here check the microphone and hit close. After that hit OK.



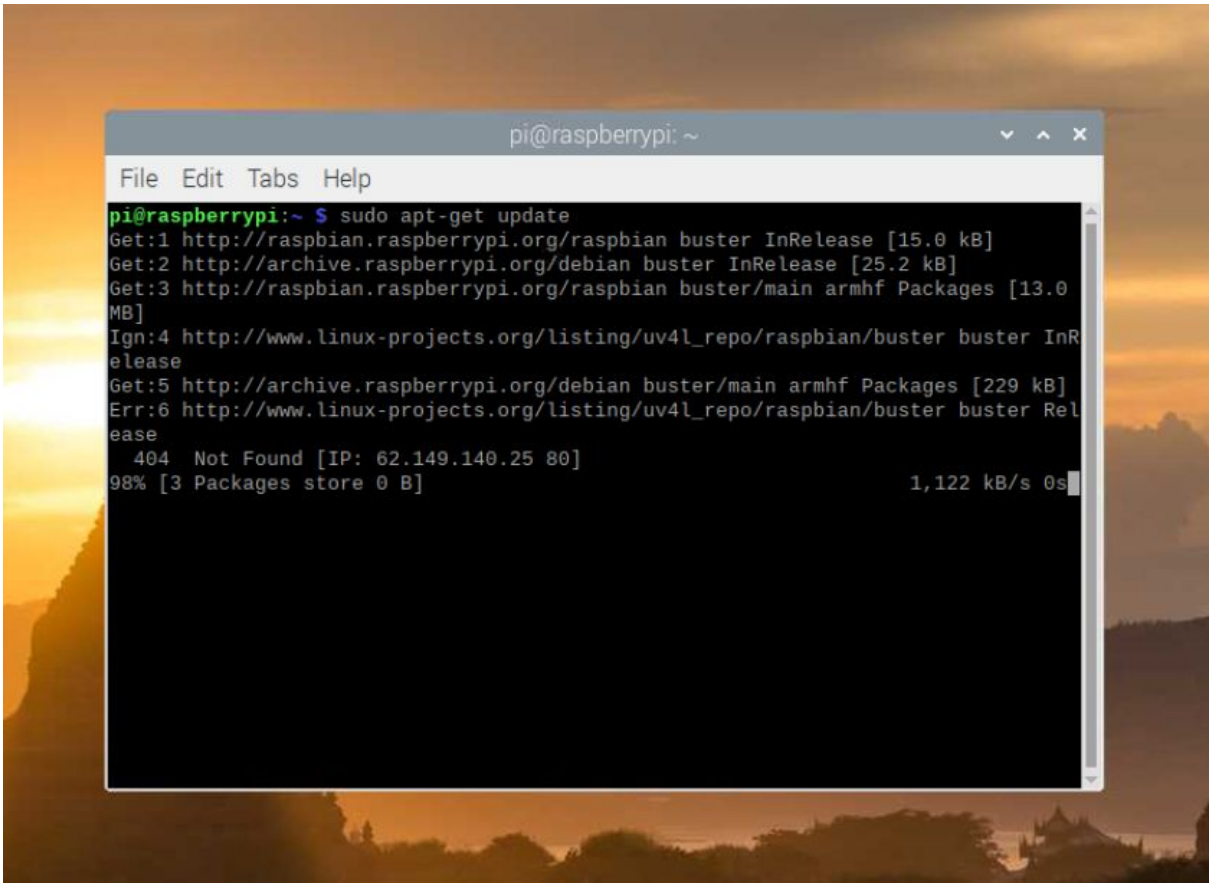
Step3

Open terminal(black box icon at the top left corner) and type:

```
sudo apt-get update
```

```
sudo apt-get dist-upgrade
```

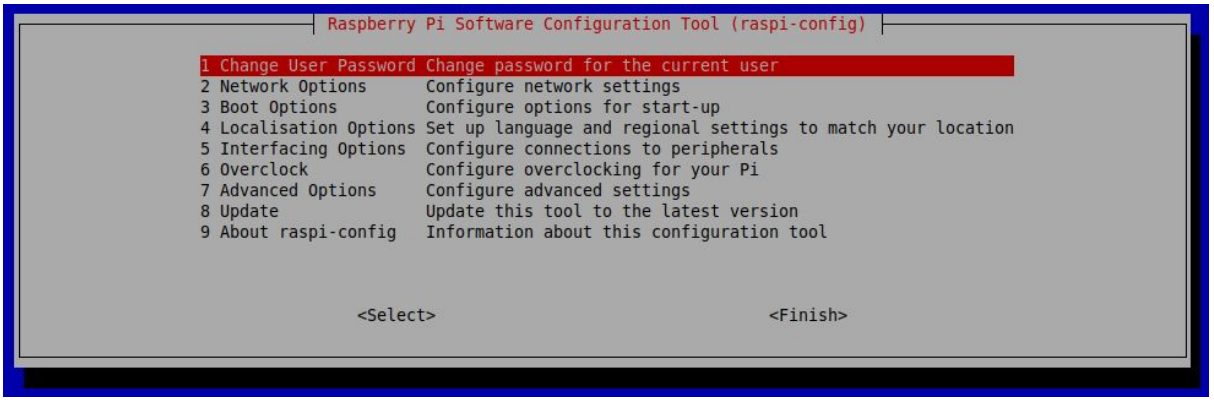
This will update most of the existing software in raspbian. This will take a while so make sure you do this when you have the time.



Step4

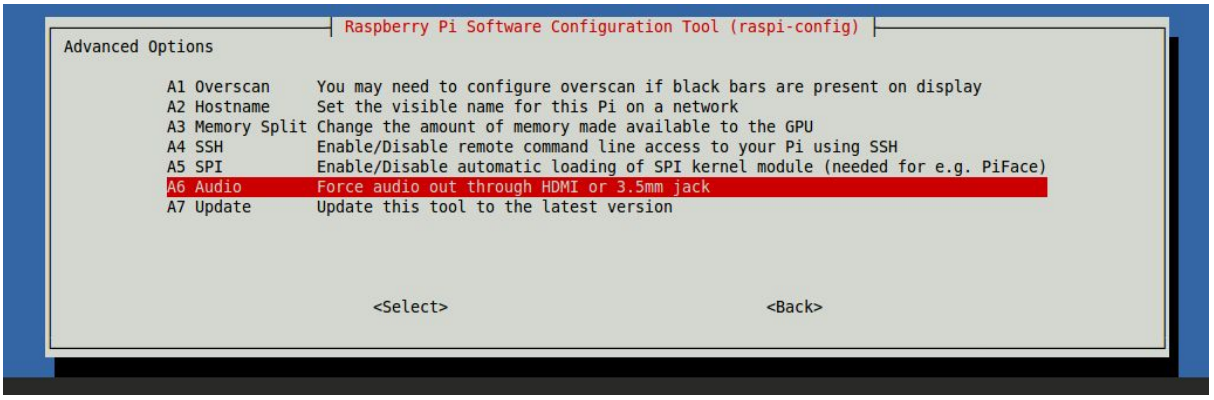
This step is to change audio output.The Raspberry Pi has two audio output modes: HDMI and headphone jack. You can switch between these modes at any time.
Enter the following command in the terminal

```
sudo raspi-config
```



Select Advanced Options (here shown as Option 7, but yours may be different) and press Enter.

Now select the Option named, Audio (here shown as A6, but yours may be different) and press Enter:



Audio configuration screen

Now you are presented with the two modes explained above as an alternative to the default Auto option. Select a mode, press Enter and press the right arrow key to exit the options list, then select Finish to exit the configuration tool. In our case we have used 3.5mm jack.

After you have finished modifying your audio settings, you need to restart your Raspberry Pi in order for your changes to take effect.

After this your pi is ready for streaming.
Repeat these steps for another pi,if you want to communicate between two pi.

Launching the stream

Make sure your cam is connected to pi. Open terminal and write:
This is for the sending side.

ffmpeg -re -f alsa -i hw:1,0 -framerate 20 -s 640x480 -f v4l2 -i /dev/video0 -preset ultrafast -vcodec libx264 -tune zerolatency -b 200k -f mpegts udp://127.0.0.1:8080

Explaining the command above.
ffmpeg is the audio/video camera software used in pi.
-re is used for real time operations.
-f alsa -i hw:1,0 is your audio input
-framerate is used for setting framerate of your video.
-s is your resolution.
-f v4l2 -i /dev/video0 is your video input
-preset ultrafast is to reduced delay
-tune zerolatency encodes the video to reduce latency
-b is the bitrate of the video/audio. If you want to specify video and audio bitrate differently then use **-b:v for** video bitrate and **-b:a** for audio bitrate

-f mpegts udp://127.0.0.1:8080 are the udp packets we are sending to this ip. You can change the ip depending on the device. Change to 224.0.0.2:8080 to multicast it to other raspberry pis.

You can use one pi to both send and receive, for testing purposes, using the ip 127.0.0.1:8080 (loopback address) .If you want to use it for multicasting then you will need to use multicasting address such as 224.0.0.2 .If you want to receive to a specific device then use the address of that device. If you want to receive the packets in another pi or the same pi, use the command below:

ffplay -fflags nobuffer -flags low_delay -framedrop udp://127.0.0.1:8080

Ffplay is a simple ffmpeg player
-fflags nobuffer avoids buffering to reduce the delay
-flags low_delay again to reduce delays
-framedrop drop frames if the latency is too high, so to catch upto the stream
-udp://127.0.0.1:8080 the ip address and the port address from where you are receiving the udp packets. Change to according to the ip used by the sender.