

12. Mediapipe arm attitude control robotic arm

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12.1. Using

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12.1. Using

After the program starts, the camera captures the image, and the right arm is raised. After the buzzer is not heard, the robotic arm will synchronously imitate the movement of the arm (straighten, bend the palm to close).

Note: [R2] of the remote controller has the function of [pause/on] for this gameplay.

Feature package path: ~transbot_ws/src/arm_mediapipe/

Robot side

```
roslaunch arm_mediapipe mediaArm.launch # Robots
```

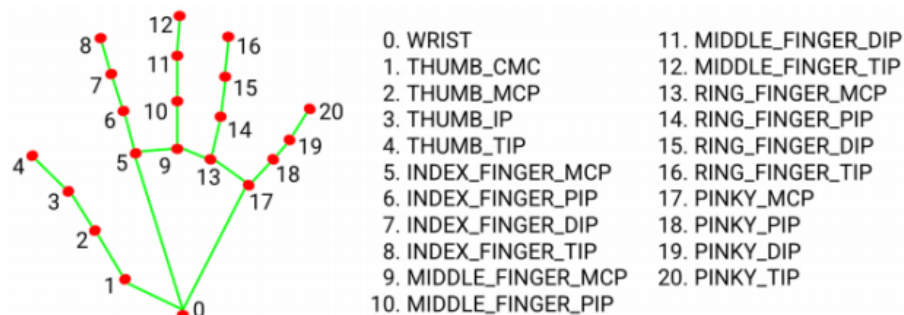
Virtual machine side (recommended)

```
roslaunch arm_mediapipe PoseArm.py
```

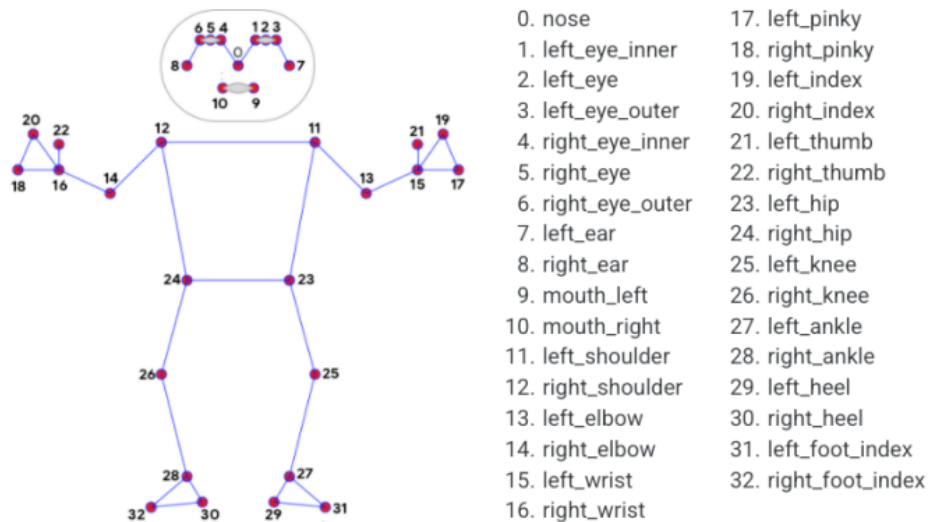
After the program starts, press the R2 key on the handle to turn on this function, stand in front of the camera, and make the entire arm appear on the screen. At this time, the buzzer will sound. This is written in the program to prevent the robotic arm from moving after the arm is put down, causing confusion in the program. We raised our elbows and waited for the buzzer to go off, and the robotic arm would simulate the movement of the forearm. You can straighten, bend your wrist and open/close your palm to control the mechanical arm. Remember that the range of forearm movements is not too large.

12.2. Principle of realization

MediaPipe Hands infers 3D coordinates of 21 hand-valued joints from one frame



The landmark model in MediaPipe Pose predicts the location of 33 pose coordinates (see figure below).



In this program, all we need is the coordinates of the part of the right arm. By calculating the angle formed by these coordinates, we can calculate how much angle each steering gear of the robotic arm needs to turn.

12.3.Core code analysis PoseArm.py

Code reference path: ~/transbot_ws/src/arm_mediapipe/scripts

- Import critical libraries

```
from media_library import *
```

- Get the information of each joint of the right arm

```
frame, pointArray, lhandptArray, rhandptArray =
self.pose_detector.findHolistic(frame)
#This pose_detector.findHolistic function prototype is in media_library.py
```

- Here is an explanation of how the angles formed by the elbow joint, wrist joint, palm opening and closing are calculated:

1) 、 As can be seen from the above figure, the three points 13-0 (palm wrist joint)-8 (top of index finger) form the wrist joint. Therefore, the coordinate values of these three points can be obtained to calculate the angle of the wrist joint;

2) 、 As can be seen from the above figure, the three points of 4 (the top of the thumb)-0 (the palm wrist joint)-8 (the top of the index finger) form the angle of the gripper. Therefore, the coordinate values of these three points can be obtained to calculate the gripper angle at which the claw needs to be clamped;

The above-mentioned 4 key joint codes are specifically realized,you can look at the program source code.

12.4. Program flow chart

