【机械臂视觉抓取教程】
第7讲 如何通过编程控制机械臂

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目录

1 代码讲解

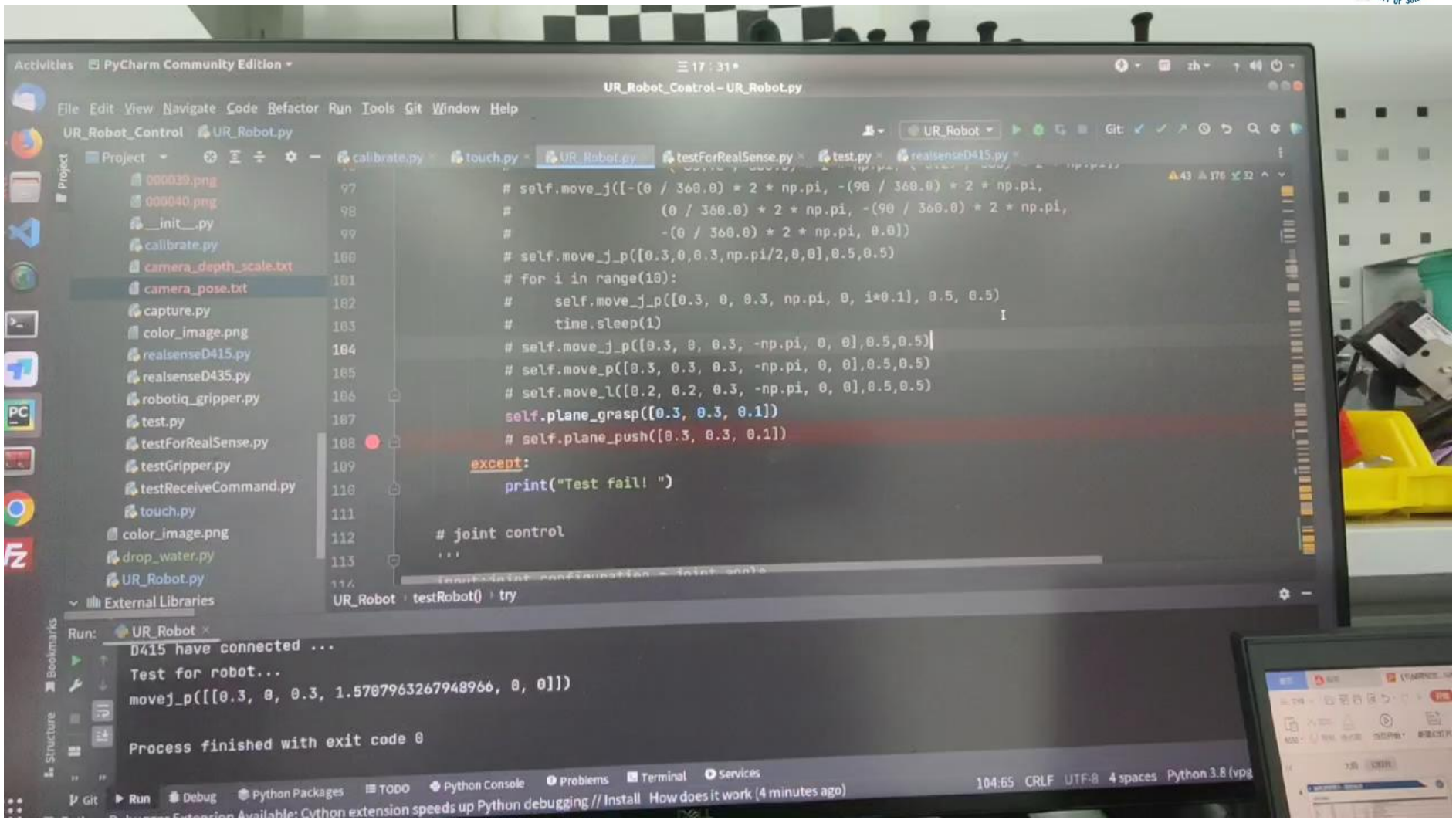
本节使用python语言编写TCP/IP通讯，通过向机械臂发送URScript指令，并接收UR机械臂的信息反馈，实现对机械臂及robotiq85夹爪的控制

- UR_Robot.py整体架构
- 以move_j为例，具体讲解
- 讲解TCP/IP的数据解包
- 讲解平面抓取plane_grasp函数的思路

UR机械臂 30003端口

Meaning	Type	Number of values	Size in bytes	Gnuplot col.	Notes
Message Size	integer	1	4		Total message length in bytes
Time	double	1	8	1	Time elapsed since the controller was started
q target	double	6	48	2 - 7	Target joint positions
qd target	double	6	48	8 - 13	Target joint velocities
qdd target	double	6	48	14 - 19	Target joint accelerations
I target	double	6	48	20 - 25	Target joint currents
M target	double	6	48	26 - 31	Target joint moments (torques)
q actual	double	6	48	32 - 37	Actual joint positions
qd actual	double	6	48	38 - 43	Actual joint velocities
I actual	double	6	48	44 - 49	Actual joint currents
I control	double	6	48	50 - 55	Joint control currents
Tool vector actual	double	6	48	56 - 61	Actual Cartesian coordinates of the tool: (x,y,z,rx,ry,rz), where rx, ry and rz is a rotation vector representation of the tool orientation
TCP speed actual	double	6	48	62 - 67	Actual speed of the tool given in Cartesian coordinates
TCP force	double	6	48	68 - 73	Generalised forces in the TCP
Tool vector target	double	6	48	74 - 79	Target Cartesian coordinates of the tool: (x,y,z,rx,ry,rz), where rx, ry and rz is a rotation vector representation of the tool orientation
TCP speed target	double	6	48	80 - 85	Target speed of the tool given in Cartesian coordinates
Digital input bits	double	1	8	86	Current state of the digital inputs. NOTE: these are bits encoded as int64_t, e.g. a value of 5 corresponds to bit 0 and bit 2 set high
Motor temperatures	double	6	48	87 - 92	Temperature of each joint in degrees celsius
Controller Timer	double	1	8	93	Controller realtime thread execution time
Test value	double	1	8	94	A value used by Universal Robots software only
Robot Mode	double	1	8	95	Robot mode see DataStreamFromURController
Joint Modes	double	6	48	96-101	Joint control modes see DataStreamFromURController (only from software version 1.8 and on)
Safety Mode	double	1	8	102	Safety mode see DataStreamFromURController
	double	6	48	103 - 108	Used by Universal Robots software only
Tool Accelerometer values	double	3	24	109 - 111	Tool x,y and z accelerometer values (software version 1.7)
	double	6	48	112 - 117	Used by Universal Robots software only
Speed scaling	double	1	8	118	Speed scaling of the trajectory limiter
Linear momentum norm	double	1	8	119	Norm of Cartesian linear momentum
	double	1	8	120	Used by Universal Robots software only
	double	1	8	121	Used by Universal Robots software only
V main	double	1	8	122	Masterboard: Main voltage
V robot	double	1	8	123	Masterboard: Robot voltage (48V)
I robot	double	1	8	124	Masterboard: Robot current
V actual	double	6	48	125 - 130	Actual joint voltages
Digital outputs	double	1	8	131	Digital outputs
Program state	double	1	8	132	Program state
Elbow position	double	3	24	133 - 135	Elbow position
Elbow velocity	double	3	24	136 -138	Elbow velocity
TOTAL		139	1108		139 values in a 1108 byte package

2 实战


Activities
PyCharm Community Edition
UR_Robot_Control – UR_Robot.py
File Edit View Navigate Code Refactor Run Tools Git Window Help
UR_Robot_Control
UR_Robot.py
calibrate.py
touch.py
UR_Robot.py
testForRealSense.py
test.py
realsenseD415.py
# self.move_j([-(0 / 360.0) * 2 * np.pi, -(90 / 360.0) * 2 * np.pi,
# (0 / 360.0) * 2 * np.pi, -(90 / 360.0) * 2 * np.pi,
# -(0 / 360.0) * 2 * np.pi, 0.0])
# self.move_j_p([0.3,0,0.3,np.pi/2,0,0],0.5,0.5)
# for i in range(10):
# self.move_j_p([0.3, 0, 0.3, np.pi, 0, i*0.1], 0.5, 0.5)
# time.sleep(1)
# self.move_j_p([0.3, 0, 0.3, -np.pi, 0, 0],0.5,0.5)
# self.move_p([0.3, 0.3, 0.3, -np.pi, 0, 0],0.5,0.5)
# self.move_l([0.2, 0.2, 0.3, -np.pi, 0, 0],0.5,0.5)
self.plane_grasp([0.3, 0.3, 0.1])
# self.plane_push([0.3, 0.3, 0.1])
except:
print("Test fail! ")
# joint control
'''
UR_Robot › testRobot() › try
Run: UR_Robot
D415 have connected ...
Test for robot...
movej_p([[0.3, 0, 0.3, 1.5707963267948966, 0, 0]])
Process finished with exit code 0
Git Run Debug Python Packages TODO Python Console Problems Terminal Services
104:65 CRLF UTF-8 4 spaces Python 3.8 (vpg

视觉抓取教程目录(暂定)

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- **视觉部分**
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- **机器人方向学习路线**
  - 补充教程：本人学习路线分享

机器人方向学习交流群

特点：偏工程、偏基础

本人水平有限，如有讲错，

请在评论区批评指正！！