LAMPIRAN LAMPIRAN

Lampiran 1 Alat Penelitian dan Peneliti

Lampiran 2 Listing Program Robot

1.   Robot 1

```python
"""Describe this function...
"""
def IR_1_HIDUP():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_1_MATI():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 0:
    pass

"""Describe this function...
"""
def GERAK():
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 200,  0,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 200,  103,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 113,  204,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 113,  204,  33, current_pose[3], 1)
  dType.SetEndEffectorSuctionCupEx(api, 1, 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 113,  204,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 242,  202,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 242,  202,  62, current_pose[3], 1)
  dType.SetEndEffectorSuctionCupEx(api, 0, 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 242,  202,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 113,  204,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 200,  103,  80, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 200,  0,  80, current_pose[3], 1)


current_pose = dType.GetPose(api)
dType.SetPTPCmdEx(api, 4, current_pose[4], current_pose[5], current_pose[6], 0, 1)
dType.SetInfraredSensor(api, 1 ,3, 1)
while True:
  dType.SetEMotorEx(api, 0, 1, 5000, 1)
  IR_1_HIDUP()
  dType.SetEMotorEx(api, 0, 0, 0, 1)
  GERAK()
  dType.SetEMotorEx(api, 0, 1, 5000, 1)
  IR_1_MATI()
```

1. Robot 2

```python
"""Describe this function...
"""
def IR_1_HIDUP():
  while not (dType.GetInfraredSensor(api, 2)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_1_MATI():
  while not (dType.GetInfraredSensor(api, 2)[0]) == 0:
    pass

"""Describe this function...
"""
def GERAK():
  for count in range(1):
    current_pose = dType.GetPose(api)
    dType.SetPTPCmdEx(api, 2, 122,  (-112),  (-8), current_pose[3], 1)
    current_pose = dType.GetPose(api)
    dType.SetPTPCmdEx(api, 2, 146,  (-41),  (-8), current_pose[3], 1)

"""Describe this function...
"""
def IR_2_HIDUP():
  while not (dType.GetInfraredSensor(api, 0)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_2_MATI():
  while not (dType.GetInfraredSensor(api, 0)[0]) == 0:
    pass

"""Describe this function...
"""
def IR_3_HIDUP():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_3_MATI():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 0:
    pass

"""Describe this function...
"""
def IR_4_HIDUP():
  while not (dType.GetInfraredSensor(api, 1)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_4_MATI():
  while not (dType.GetInfraredSensor(api, 1)[0]) == 0:
    pass


current_pose = dType.GetPose(api)
dType.SetPTPCmdEx(api, 4, current_pose[4], current_pose[5], current_pose[6], 0, 1)
dType.SetInfraredSensor(api, 1 ,2, 1)
dType.SetInfraredSensor(api, 1 ,0, 1)
dType.SetInfraredSensor(api, 1 ,3, 1)
dType.SetInfraredSensor(api, 1 ,1, 1)
while True:
  IR_1_HIDUP()
  dType.SetEMotorEx(api, 0, 1, 5000, 1)
  IR_2_HIDUP()
  dType.SetEMotorEx(api, 0, 0, 0, 1)
  GERAK()
  GERAK()
  dType.SetEMotorEx(api, 0, 1, 5000, 1)
  IR_3_HIDUP()
  dType.SetEMotorEx(api, 0, 0, 0, 1)
  dType.dSleep(6000)
  dType.SetEMotorEx(api, 0, 1, 5000, 1)
  dType.dSleep(8000)
  dType.SetEMotorEx(api, 0, 0, 0, 1)
```

2. Robot 3

```python
"""Describe this function...
"""
def IR_1_HIDUP():
  while not (dType.GetInfraredSensor(api, 2)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_1_MATI():
  while not (dType.GetInfraredSensor(api, 2)[0]) == 0:
    pass

"""Describe this function...
"""
def GERAK():
  for count in range(1):
    current_pose = dType.GetPose(api)
    dType.SetPTPCmdEx(api, 2, 122, (-112), (-8), current_pose[3], 1)
    current_pose = dType.GetPose(api)
    dType.SetPTPCmdEx(api, 2, 146, (-41), (-8), current_pose[3], 1)

"""Describe this function...
"""
def IR_2_HIDUP():
  while not (dType.GetInfraredSensor(api, 0)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_2_MATI():
  while not (dType.GetInfraredSensor(api, 0)[0]) == 0:
    pass

"""Describe this function...
"""
def IR_3_HIDUP():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_3_MATI():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 0:
    pass

"""Describe this function...
"""
def IR_4_HIDUP():
  while not (dType.GetInfraredSensor(api, 1)[0]) == 1:
    pass

"""Describe this function...
"""
def IR_4_MATI():
  while not (dType.GetInfraredSensor(api, 1)[0]) == 0:
    pass


current_pose = dType.GetPose(api)
dType.SetPTPCmdEx(api, 4, current_pose[4], current_pose[5], current_pose[6], 0, 1)
dType.SetInfraredSensor(api, 1 ,2, 1)
dType.SetInfraredSensor(api, 1 ,0, 1)
dType.SetInfraredSensor(api, 1 ,3, 1)
dType.SetInfraredSensor(api, 1 ,1, 1)
while True:
  IR_1_HIDUP()
  GERAK()
  GERAK()
```

3. Robot 4

```python
"""Describe this function...
"""
def MENUNGGU_IR():
  while not (dType.GetInfraredSensor(api, 3)[0]) == 1:
    pass

"""Describe this function...
"""
def GERAK():
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 260,  0,  90, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 260,  (-72),  90, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 262,  (-72),  62, current_pose[3], 1)
  dType.SetEndEffectorSuctionCupEx(api, 1, 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 260,  (-72),  100, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 200,  140,  100, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 72,  240,  100, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 72,  240,  11, current_pose[3], 1)
  dType.SetEndEffectorSuctionCupEx(api, 0, 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 72,  240,  90, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 200,  140,  90, current_pose[3], 1)
  current_pose = dType.GetPose(api)
  dType.SetPTPCmdEx(api, 2, 260,  0,  90, current_pose[3], 1)


dType.SetInfraredSensor(api, 1 ,3, 1)
while True:
  MENUNGGU_IR()
  dType.dSleep(2000)
  GERAK()
```

Lampiran 3. *Data Sheet*
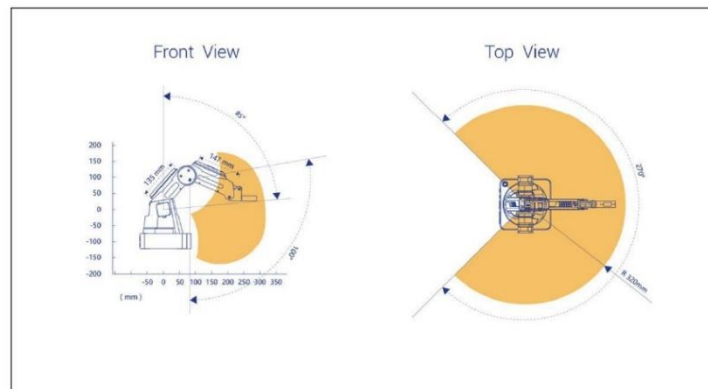
1. Robot Dobot Magician

Dobot Magician Specifications

Specifications	
Number of Axes	4
Playload	500 g
Max. Reach	320 mm
Position Repeatability (Control)	0.2 mm
Communication	USB/ WIFI* / Bluetooth
Power Supply	100V-240V, 50/60 Hz
Power In	12V / 7A DC
Consumption	60W Max
Working Temperature	-10°C-60°C

Axis Movement		
Axis	Range	Max Speed (250g Workload)
Joint 1 base	-135° to +135°	320°/s
Joint 2 rear arm	0° to +85°	320°/s
Joint 3 forearm	-10° to +95°	320°/s
Joint 4 rotation servo	+90° to -90°	480°/s

Physical	
Net Weight (Arm and Controller)	3.4kg
Gross weight (Standard Version)	7.2kg
Gross weight (Education Version)	8.0kg
Base Dimension (Footprint)	158 mm * 158 mm
Materials	Aluminum Alloy 6061, ABS Engineering Plastic
Controller	Dobot Integrated Controller
Robot Mounting	Desktop
Packing Size (L*W*H)	307mm * 224mm * 330mm
Carton Size for Standard Version (L*W*H)	340mm * 300mm * 400mm
Carton Size for Education Version (L*W*H)	345mm * 290mm * 485mm

Applications	
Software	DobotStudio, Repetier Host GrblController3.6 DobotBlockly (Visual Programing editor)
SDK (Software Develop Kit)	Communication Protocol, Dobot Program Library
Extensible I/O Interfaces	1. I/O*10 (Configurable as Analog Input or PWM 2. Controllable 12V Power output*4 3. Communication Interface (UART, Reset, Stop, 12V, 5V and two I/O included) 4. Stepper * 2

Endeffectors		
3D Printer Kit	Maximum Print Size (L *W *H) Material	150 mm*150 mm*150mm (MAX) PLA 0.1 mm
Laser	Power Consumption Type Power	500 mw 405 nm (Blue laser) 12V
Pen Holder	Pen Diameter	10 mm
Vacuum Suction Cap	Cap Diameter Pressure	20 mm -35 Kpa
Gripper	Range Drive Type Force	27.5 mm Pneumatic 8 N

Note: Above information is for reference only and subject to change without prior notice

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2. *Photoelectric* Sensor

Specifications

- Input voltage : +5V DC
- Current consumption : > 25mA (min) ~ 100mA (max)
- Dimension : 1.7cm (diameter) x 4.5cm (length)
- Cable length : 45cm
- Detection of objects : transparent or opaque
- Diffuse reflective type
- Sensing range : 3cm to 80cm (depends on obstacle surface)
- NPN output (normally high)
- Environment temperature : -25 °C ~ 55 °C