2022년 IoT기반 스마트 솔루션 개발자 양성과정

Programming : Python

7-Basic Human-Machine Interface

담당 교수 : 윤 종 이

010-9577-1696

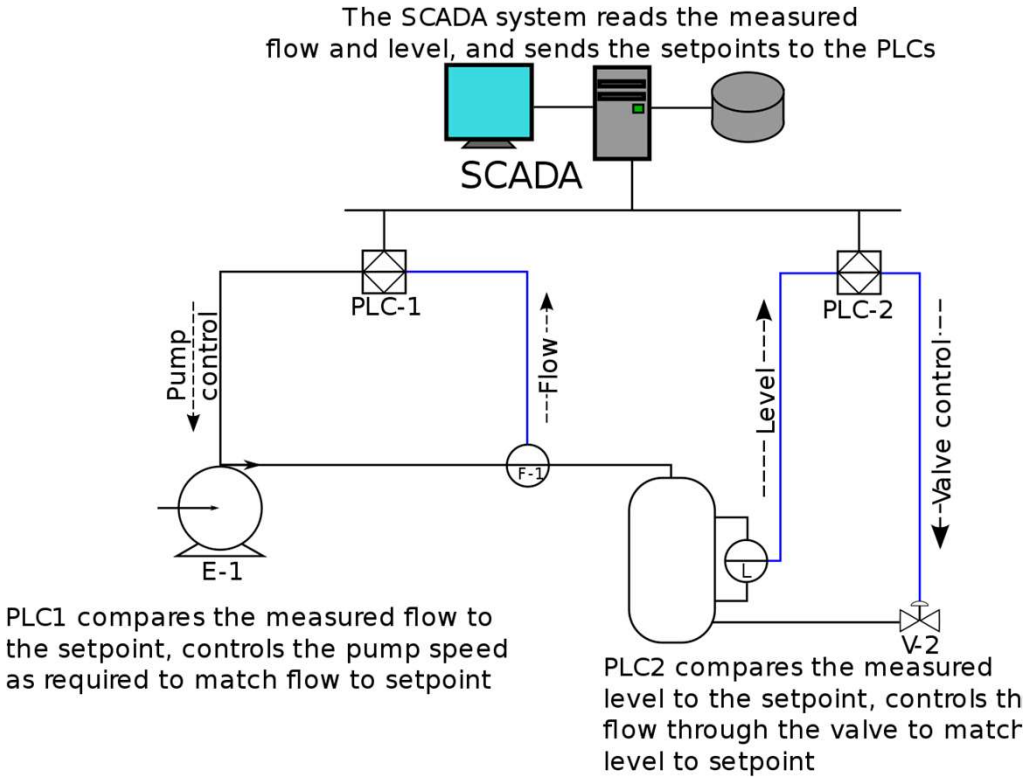
ojo1696@naver.com

https://cafe.naver.com/yoons2022

충북대학교 공동훈련센터

SCADA System

SCADA [Supervisory Control And Data Acquisition]



HMI : Human-Machine Interface

- SCADA 의 일부분
- 인간과 기계의 상호작용 Program

향상된 가시성

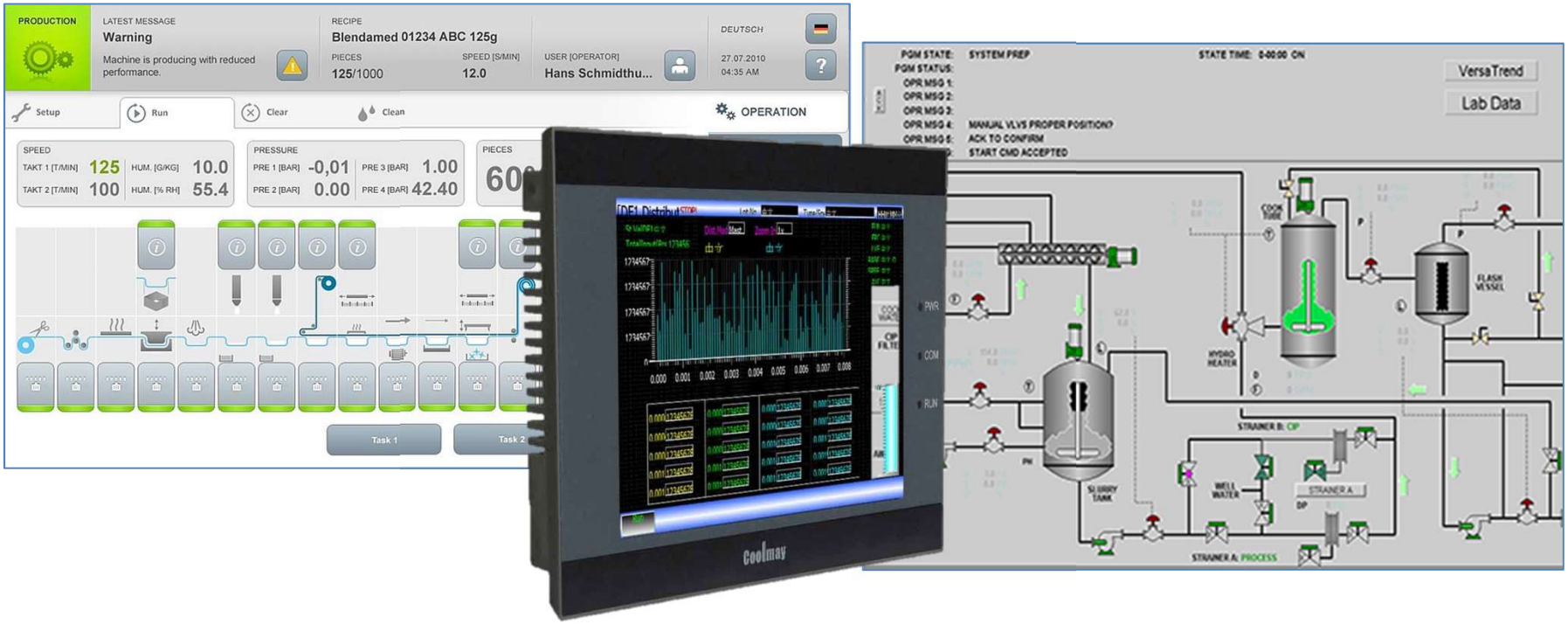
효율성 제고

다운타임 단축

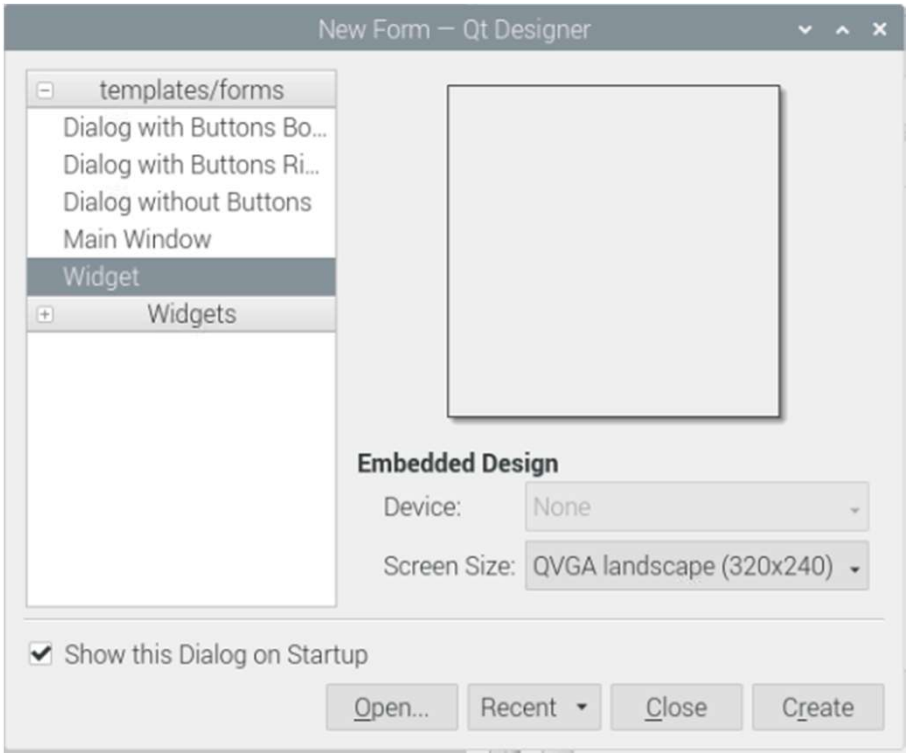
향상된 사용 편의성

통합 시스템

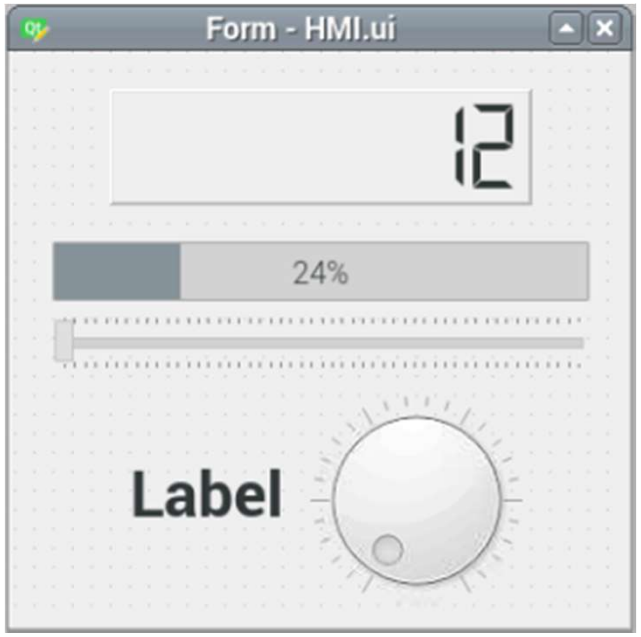
HMI System


PRODUCTION
LATEST MESSAGE
Warning
Machine is producing with reduced performance.
RECIPE
Blendamed 01234 ABC 125g
PIECES
125/1000
SPEED [S/MIN]
12.0
USER [OPERATOR]
Hans Schmidthu...
DEUTSCH
27.07.2010
04:35 AM
Setup
Run
Clear
Clean
OPERATION
SPEED
TAKT 1 [T/MIN] 125
HUM. [G/KG] 10.0
TAKT 2 [T/MIN] 100
HUM. [% RH] 55.4
PRESSURE
PRE 1 [BAR] -0,01
PRE 3 [BAR] 1.00
PRE 2 [BAR] 0.00
PRE 4 [BAR] 42.40
PIECES
Task 1
Task 2
PGM STATE: SYSTEM PREP
STATE TIME: 0-00:00 ON
PGM STATUS:
OPR MSG 1:
OPR MSG 2:
OPR MSG 3:
OPR MSG 4: MANUAL VLVS PROPER POSITION?
OPR MSG 5: ACK TO CONFIRM
START CMD ACCEPTED
VersaTrend
Lab Data
COOK TANK
FLASH VESSEL
HYDRO HEATER
STRAINER B: CIP
SLURRY TANK
WELL WATER
STRAINER A
STRAINER A: PROCESS
Coolmay

New Form – Qt Designer

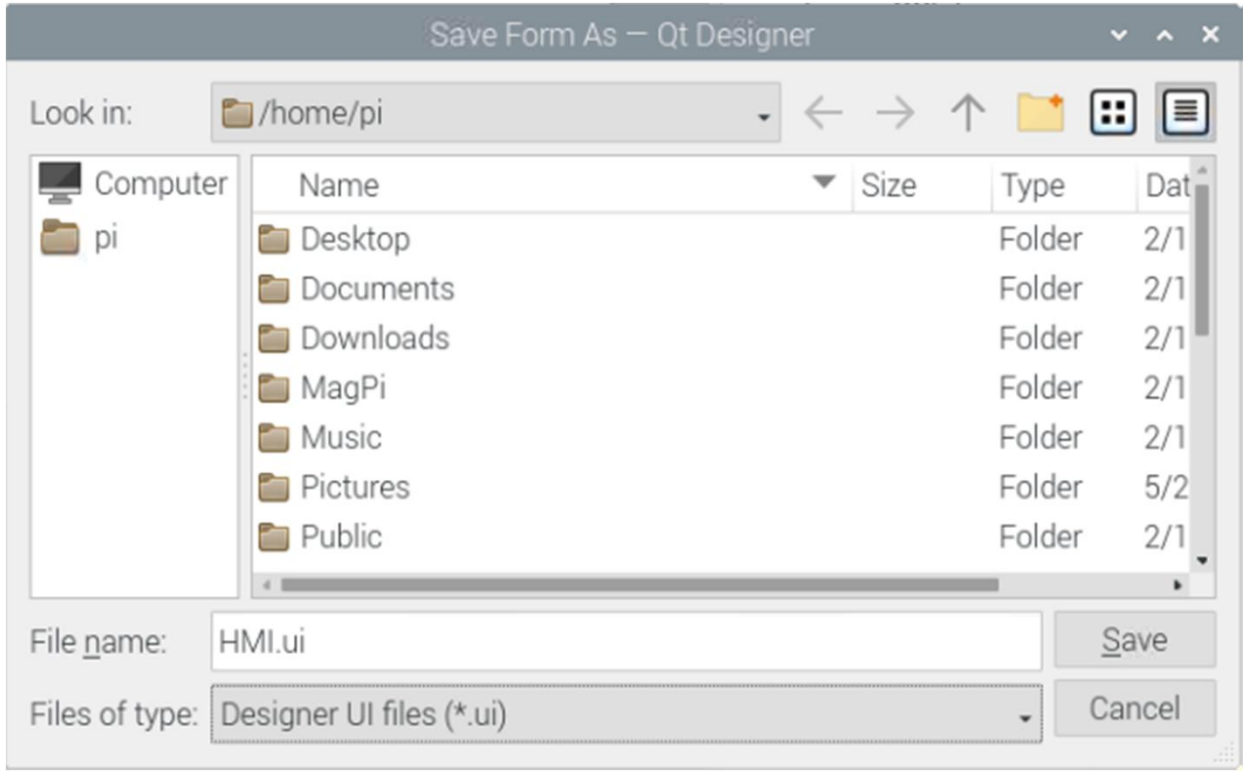


QWidget



QLCDNumber	
objectName	lcdNumber
digitCount	8
QProgressBar	
objectName	progressBar
Minimum/maximum	0,100
QSlider	
objectName	horizontalSlider
Minimum/maximum	0,100
QLabel	
objectName	label
QDial	
objectName	dial
Minimum/maximum	0,100

Save as – HMI.ui



import

```
1  import sys
2  import PyQt5
3  from PyQt5.QtGui import *
4  from PyQt5.QtCore import *
5  from PyQt5.QtWidgets import *
6  from PyQt5 import uic
7
8  uiWidget='HMI.ui'
```

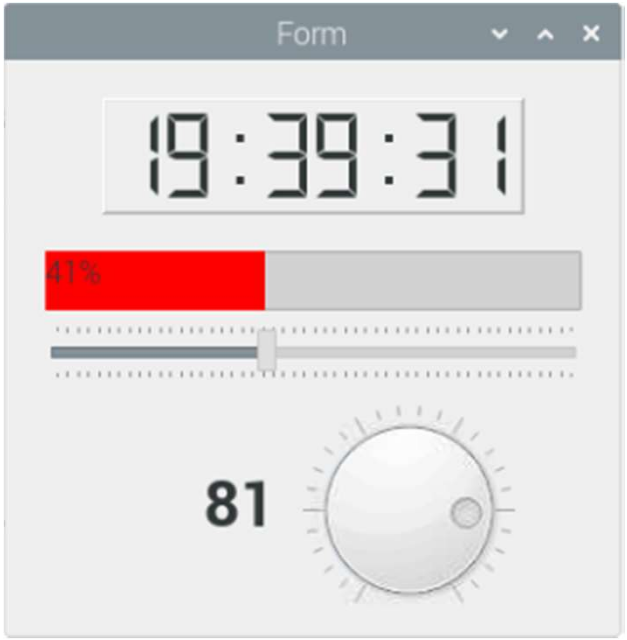
Class MyWindow

```
10  class MyWindow(QWidget):
11      def __init__(self):
12          super().__init__()
13          uic.loadUi(uiWidget,self)
14
15          self.progressBar.setStyleSheet('QProgressBar::chunk{background-color:red;}')
16
17          self.dial.sliderReleased.connect(self.dial_Released)
18          self.horizontalSlider.valueChanged.connect(self.slide_changed)
19
20          self.timer=QTimer(self)
21          self.timer.setInterval(500)
22          self.timer.timeout.connect(self.time_tick)
23          self.timer.start()
24
25      def slide_changed(self):
26          self.progressBar.setValue(self.horizontalSlider.value())
27
28      def dial_Released(self):
29          self.label.setText(str(self.dial.value()))
30
31      def time_tick(self):
32          sender=self.sender()
33          currentTime=QTime.currentTime().toString('HH:mm:ss')
34
35          if id(sender)==id(self.timer):
36              self.lcdNumber.display(currentTime)
```

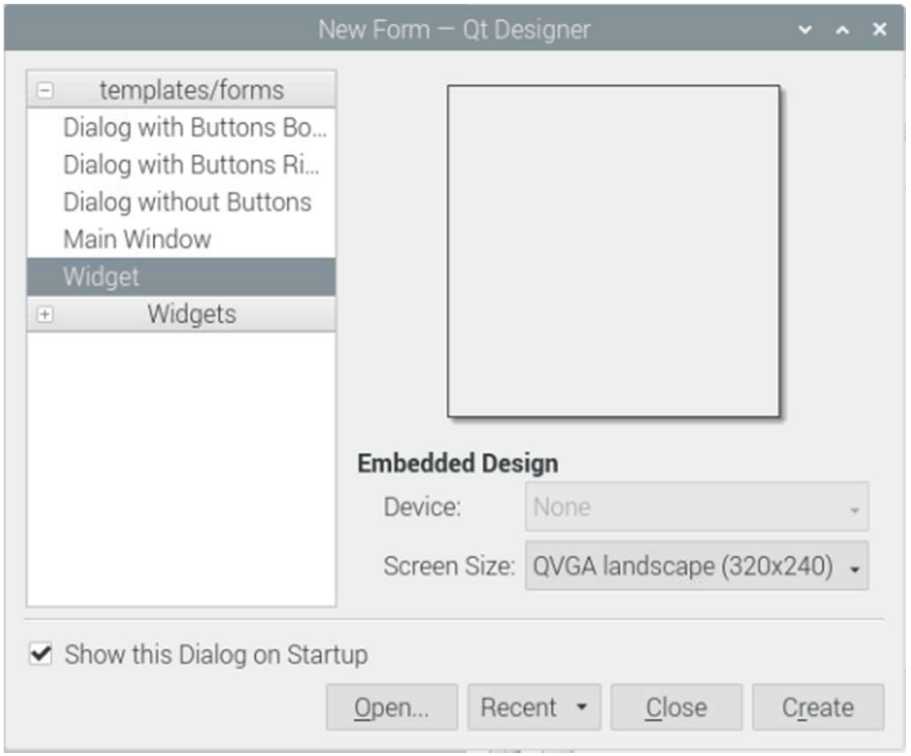
__main__

```
38 if __name__ == '__main__':
39     app=QApplication(sys.argv)
40     form=MyWindow()
41     form.show()
42     sys.exit(app.exec())
```

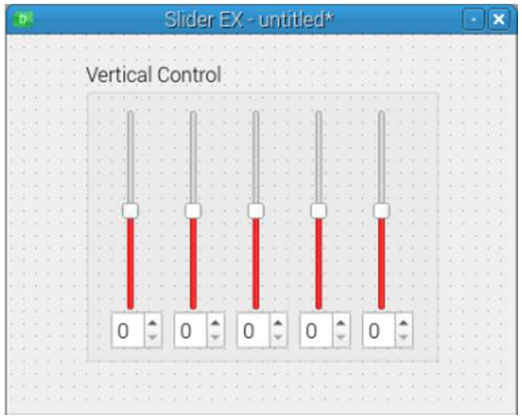
Run



New Form – Qt Designer



QWidget



QGroupBox	
objectName	groupBox
QSlider	
objectName	vSlider_1,5
Minimum/maximum	0,99
QSpinBox	
objectName	spinBox_1,5
Minimum/maximum	0,99

import

```
1  import sys
2  import PyQt5
3  from PyQt5.QtGui import *
4  from PyQt5.QtCore import *
5  from PyQt5.QtWidgets import *
6  from PyQt5 import uic
7
8  uiWidget='Ex_SliderUI.ui'
9
```

Class MyWindow

```
10  class MyWindow(QWidget):
11      def __init__(self):
12          super().__init__()
13          uic.loadUi(uiWidget,self)
14
15          self.vSlider_1.valueChanged.connect(self.slide1_changed)
16          self.vSlider_2.valueChanged.connect(self.slide2_changed)
17          self.vSlider_3.valueChanged.connect(self.slide3_changed)
18          self.vSlider_4.valueChanged.connect(self.slide4_changed)
19          self.vSlider_5.valueChanged.connect(self.slide5_changed)
20
21          self.spinBox_1.valueChanged.connect(self.spinBox1_changed)
22          self.spinBox_2.valueChanged.connect(self.spinBox2_changed)
23          self.spinBox_3.valueChanged.connect(self.spinBox3_changed)
24          self.spinBox_4.valueChanged.connect(self.spinBox4_changed)
25          self.spinBox_5.valueChanged.connect(self.spinBox5_changed)
```

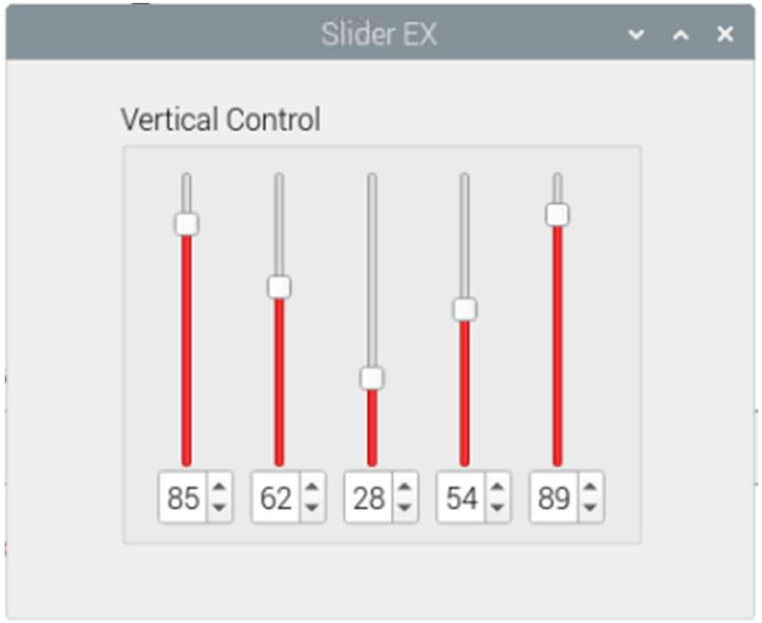
Event Handle

```
27      def slide1_changed(self):
28          self.spinBox_1.setValue(self.vSlider_1.value())
29      def slide2_changed(self):
30          self.spinBox_2.setValue(self.vSlider_2.value())
31      def slide3_changed(self):
32          self.spinBox_3.setValue(self.vSlider_3.value())
33      def slide4_changed(self):
34          self.spinBox_4.setValue(self.vSlider_4.value())
35      def slide5_changed(self):
36          self.spinBox_5.setValue(self.vSlider_5.value())
37
38      def spinBox1_changed(self):
39          self.vSlider_1.setValue(self.spinBox_1.value())
40      def spinBox2_changed(self):
41          self.vSlider_2.setValue(self.spinBox_2.value())
42      def spinBox3_changed(self):
43          self.vSlider_3.setValue(self.spinBox_3.value())
44      def spinBox4_changed(self):
45          self.vSlider_4.setValue(self.spinBox_4.value())
46      def spinBox5_changed(self):
47          self.vSlider_5.setValue(self.spinBox_5.value())
```

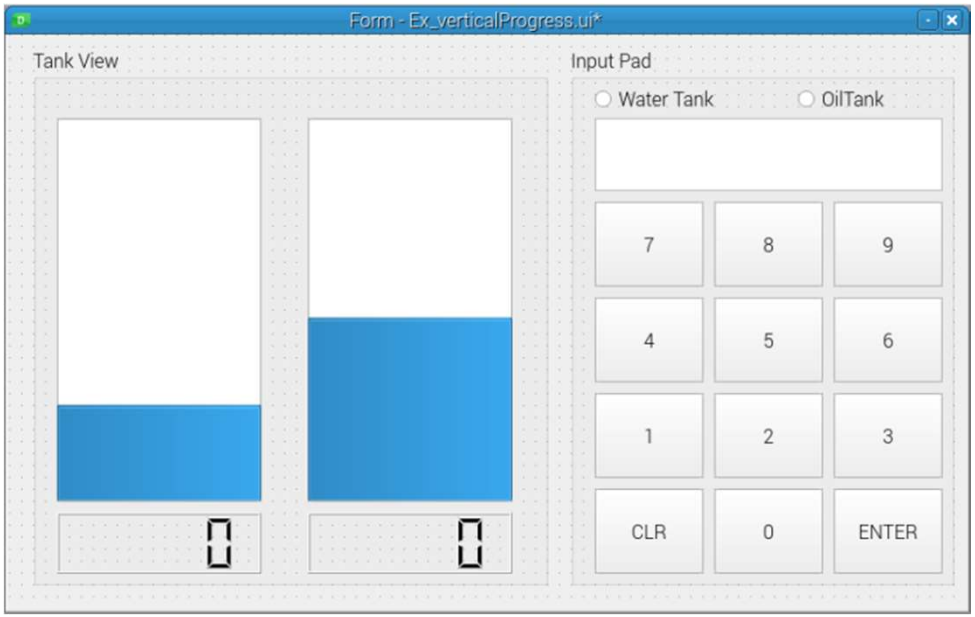
__main__

```
49 if __name__ == '__main__':
50     app=QApplication(sys.argv)
51     form=MyWindow()
52     form.show()
53     sys.exit(app.exec())
```

Run



실습과제



Form:QWidget	
geomatric	800x600
Bar_1,2:QProgressBar	
textVisible	Off
orientation	Vertical
lcd_1,2:QLCDNumber	
checked	[1] true
rButton_1,2:QRadioButton	
objectName	
Btn_0~9,CLR,ENTER:QPushButton	
lineEdit:QlineEdit	

Python Tip

- Radio Button Check

```
def button_Enter_Click(self):
    if self.rButton_1.isChecked( ):
        self.lcd_1.display(self.lineEdit.text( ))
        self.Bar_1.setValue(int(self.lineEdit.text( )))
    else:
        pass
```