가천대학교
Gachon University

Embedded System

Raspberry Pi 3B+ 실습
Smart Home Project
(IoT Device Platform)

2018 2학기

Smart Home System

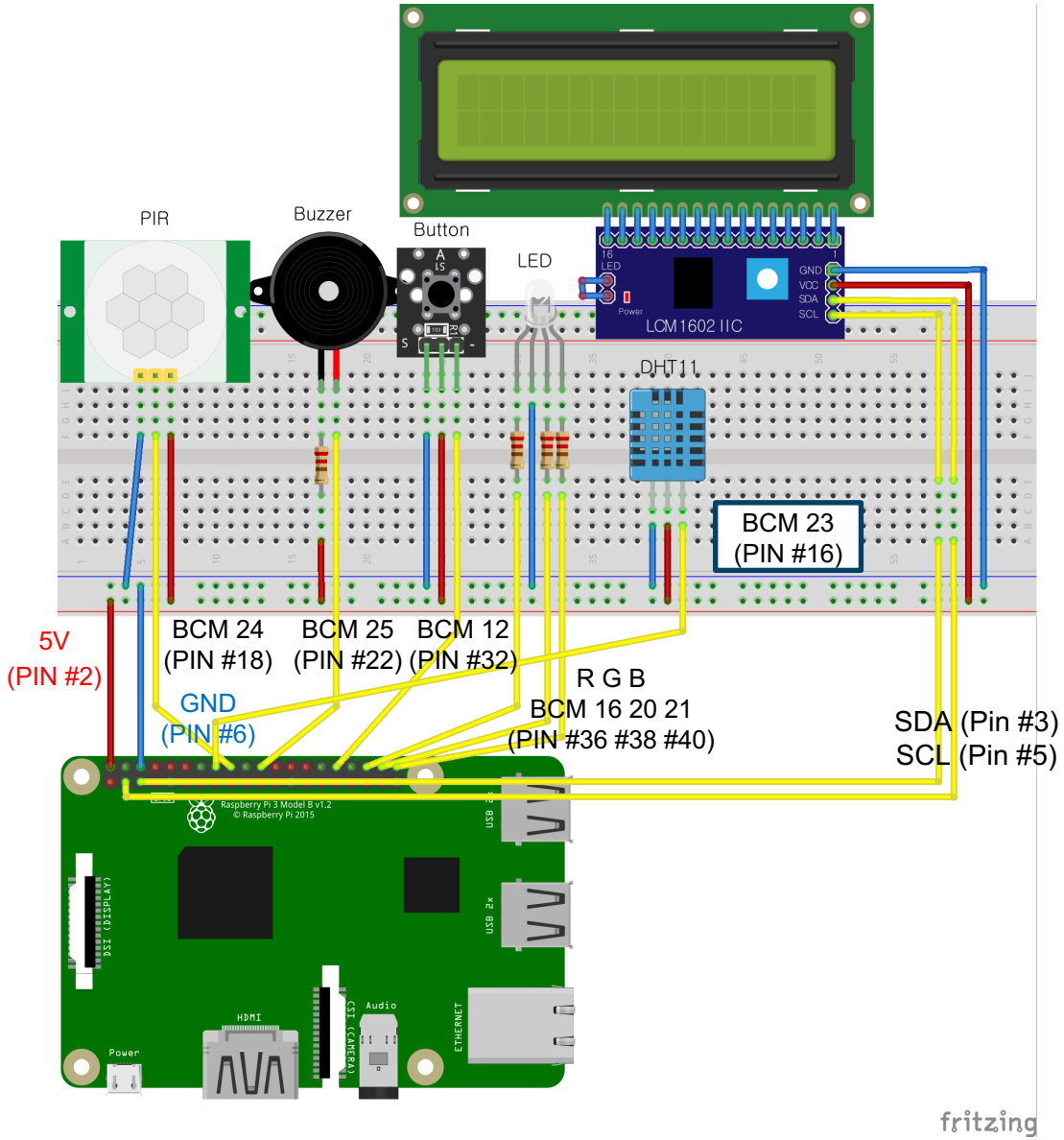
- Scenario – Smart Home version

  - 집 출입문은 1개다.
    LCD에는 집의 온도와 습도가 표시된다.
    출입문에 이동이 감지되면
    비상등이 켜지고 비상벨이 울린다.
    LCD에는 “Intrusion Detection”을 출력하고 그 상황(본인 얼굴)을 카메라로 찍는다.
    버튼을 누르면
    비상등이 꺼지고 울리던 비상벨이 꺼지고,
    다시 LCD에 집의 온도와 습도가 표시된다.

    위 Scenario로 Smart Home System을 구축 하시오.

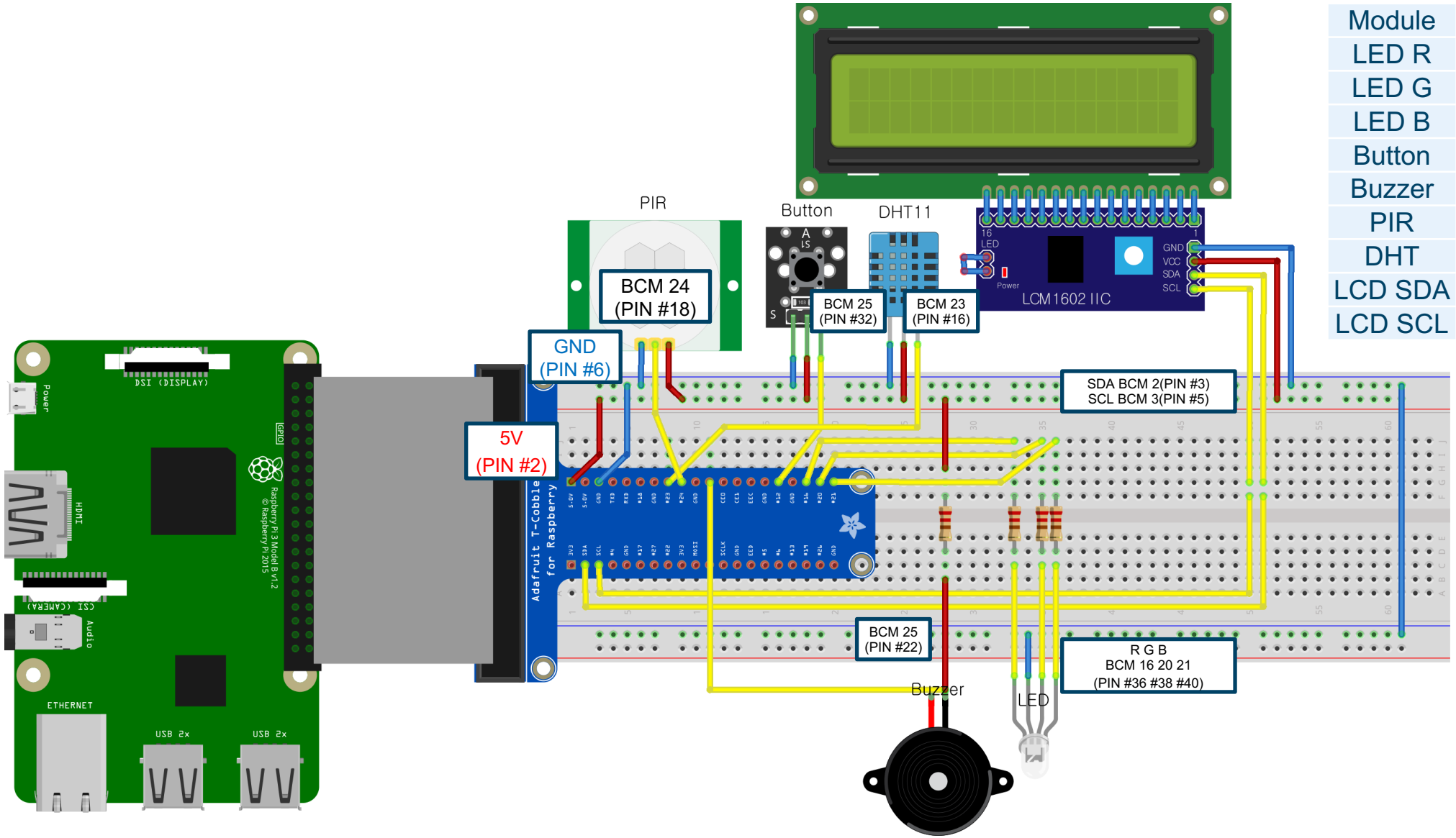
- Report
  - Source Code, 상황 사진(본인 얼굴), 회로 구성 사진,
    LCD 사진(온습도가 출력된 사진, Intrusion Detection이 출력된 사진)

Smart Home System



Module	BCM	PIN
LED R	16	36
LED G	20	38
LED B	21	40
Button	12	32
Buzzer	25	22
PIR	24	18
DHT	23	16
LCD SDA	2	3
LCD SCL	3	5

Smart Home System



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Smart Home System

hss.py

```
import picamera
import time
import Adafruit_DHT
import RPi.GPIO as GPIO
from RPLCD.i2c import CharLCD
GPIO.setmode(GPIO.BCM)
GPIO.setup(16,GPIO.OUT) # LED R
GPIO.setup(12,GPIO.IN,pull_up_down=GPIO.PUD_UP) # BUTTON
GPIO.setup(24,GPIO.IN)  # PIR
GPIO.setup(25,GPIO.IN)  # BUZZER
GPIO.setup(25,GPIO.OUT) # BUZZER
lcd = CharLCD("PCF8574", 0x27)
camera = picamera.PiCamera()
camera.resolution = (2592,1944)
intrusion_control = 0
timer = 0
dht_type = 11           # DHT 타입
bcm_pin = 23            # 핀 번호
def buzz():
    pitch = 1000
    duration = 0.1
    period = 1.0 / pitch
    delay = period / 2
    cycles = int(duration * pitch)
    for i in range(cycles):
        GPIO.output(25,True)
        time.sleep(delay)
        GPIO.output(25,False)
        time.sleep(delay)
```

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Smart Home System

hss.py

```
try:
    while True:
        if GPIO.input(24) == True:
            print("SENSOR ON!!")
            while True:
                buzz()
                GPIO.output(16,True)
                if intrusion_control == 0:          # 움직임이 감지되면 그 순간 LCD, 사진 한번 찍는다
                    lcd.clear()
                    camera.capture("theif.jpg")
                    lcd.write_string('Intrusion')
                    lcd.crlf()
                    lcd.write_string('Detection')
                    intrusion_control += 1
                if GPIO.input(12) == False:
                    print("button pressed")
                    lcd.clear()
                    GPIO.output(16,False)
                    intrusion_control = 0
                    time.sleep(2)
                    break
                time.sleep(0.3)
        else:
            GPIO.output(25,False)
            GPIO.output(16,False)
            if timer > 3:                               # 3초마다 온습도 측정
                timer = 0
                lcd.clear()
                humidity, temperature = Adafruit_DHT.read_retry(dht_type, bcm_pin)
                humid = round(humidity,1)
                temp = round(temperature,1)
                print(humid,temp)
                lcd.write_string('TEMP ')
                lcd.write_string(str(temp))
                lcd.write_string('C ')
                lcd.crlf()
                lcd.write_string('HUMID ')
                lcd.write_string(str(humid))
                lcd.write_string('% ')
            timer+=0.3
            time.sleep(0.3)

except KeyboardInterrupt:
    lcd.clear()
    GPIO.cleanup()
finally:
    GPIO.cleanup()
```

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