```
import RPi.GPIO as GPIO
import datetime
import time

#set the gpio pins
es_ist = 3
fuenf = 22
zehn = 2
viertel = 23
vor = 19
nach = 18
halb = 14
ein = 25
uhr = 11


#c_and_v = 0

stundeEins = 8
stundeZwei = 27
stundeDrei = 7
stundeVier = 10
stundeFuenf = 4
stundeSechs = 15
stundeSieben = 12
stundeAcht = 24
stundeNeun = 9
stundeZehn = 5
stundeElf = 17
stundeZwoelf = 6

#do not change, if you don't know what you do
gpioPinsHours =
[stundeEins,stundeZwei,stundeDrei,stundeVier,stundeFuenf,stundeSechs,stundeSieben,stundeAcht,stundeNeun,stundeZe
hn,stundeElf,stundeZwoelf,stundeEins,stundeZwei,stundeDrei,stundeVier,stundeFuenf,stundeSechs,stundeSieben,stunde
Acht,stundeNeun,stundeZehn,stundeElf,stundeZwoelf]

gpioPinsMinutes = [es_ist,fuenf,zehn,viertel,vor,nach,halb,ein,uhr]

GPIO.setmode(GPIO.BCM)
GPIO.setup(es_ist, GPIO.OUT)


GPIO.setup(fuenf, GPIO.OUT)
GPIO.setup(zehn, GPIO.OUT)
GPIO.setup(viertel, GPIO.OUT)
GPIO.setup(vor, GPIO.OUT)
GPIO.setup(nach, GPIO.OUT)
GPIO.setup(halb, GPIO.OUT)

GPIO.setup(ein, GPIO.OUT)
GPIO.setup(uhr, GPIO.OUT)

GPIO.setup(stundeEins, GPIO.OUT)
GPIO.setup(stundeZwei, GPIO.OUT)
GPIO.setup(stundeDrei, GPIO.OUT)
GPIO.setup(stundeVier, GPIO.OUT)
GPIO.setup(stundeFuenf, GPIO.OUT)
GPIO.setup(stundeSechs, GPIO.OUT)
GPIO.setup(stundeSieben, GPIO.OUT)
GPIO.setup(stundeAcht, GPIO.OUT)
GPIO.setup(stundeNeun, GPIO.OUT)
GPIO.setup(stundeZehn, GPIO.OUT)
GPIO.setup(stundeElf, GPIO.OUT)
GPIO.setup(stundeZwoelf, GPIO.OUT)
```

```
#methods
def RoundDiv(int_to_round,base=5):                  #divide with 5 and round
    return int(round(float(int_to_round)/base))       #e.g. 46 is 9

currentMinute = RoundDiv(datetime.datetime.now().minute)       #get the current minute and divide it with 5
currentHour = datetime.datetime.now().hour                     #get the current hour


def TurnOnMinute(minuteToTurnOn, currentHour):
    valueToTwelve = RoundDiv(minuteToTurnOn)
    if (valueToTwelve==0 | valueToTwelve==12):      #58-02
        print(datetime.datetime.now(), ": minute: 58-02")
        GPIO.output(fuenf,False)
        GPIO.output(zehn,False)
        GPIO.output(viertel,False)
        GPIO.output(vor,False)
        GPIO.output(nach,False)
        GPIO.output(halb,False)
        CheckHourPlusOne(currentHour)
    if (valueToTwelve==1):      #03-07
        print(datetime.datetime.now(), ": minute: 03-07")
        GPIO.output(fuenf,True)
        GPIO.output(zehn,False)
        GPIO.output(viertel,False)
        GPIO.output(vor,False)
        GPIO.output(nach,True)
        GPIO.output(halb,False)
        CheckHour(currentHour)
    if (valueToTwelve==2):      #08-12
        print(datetime.datetime.now(), ": minute: 08-12")
        GPIO.output(fuenf,False)
        GPIO.output(zehn,True)
        GPIO.output(viertel,False)
        GPIO.output(vor,False)
        GPIO.output(nach,True)
        GPIO.output(halb,False)
        CheckHour(currentHour)
    if (valueToTwelve==3):      #13-17
        print(datetime.datetime.now(), ": minute: 13-17")
        GPIO.output(fuenf,False)
        GPIO.output(zehn,False)
        GPIO.output(viertel,True)
        GPIO.output(vor,False)
        GPIO.output(nach,True)
        GPIO.output(halb,False)
        CheckHour(currentHour)
    if (valueToTwelve==4):      #18-22
        print(datetime.datetime.now(), ": minute: 18-22")
        GPIO.output(fuenf,False)
        GPIO.output(zehn,True)
        GPIO.output(viertel,False)
        GPIO.output(vor,True)
        GPIO.output(nach,False)
        GPIO.output(halb,True)
        CheckHourPlusOne(currentHour)
    if (valueToTwelve==5):      #23-27
        print(datetime.datetime.now(), ": minute: 23-27")
        GPIO.output(fuenf,True)
        GPIO.output(zehn,False)
        GPIO.output(viertel,False)
        GPIO.output(vor,True)
        GPIO.output(nach,False)
        GPIO.output(halb,True)
        CheckHourPlusOne(currentHour)
```

```
if (valueToTwelve==6):      #28-32
    print(datetime.datetime.now(), ": minute: 28-32")
    GPIO.output(fuenf,False)
    GPIO.output(zehn,False)
    GPIO.output(viertel,False)
    GPIO.output(vor,False)
    GPIO.output(nach,False)
    GPIO.output(halb,True)
    CheckHourPlusOne(currentHour)
if (valueToTwelve==7):      #33-37
    print(datetime.datetime.now(), ": minute: 33-37")
    GPIO.output(fuenf,True)
    GPIO.output(zehn,False)
    GPIO.output(viertel,False)
    GPIO.output(vor,False)
    GPIO.output(nach,True)
    GPIO.output(halb,True)
    CheckHourPlusOne(currentHour)
if (valueToTwelve==8):      #38-42
    print(datetime.datetime.now(), ": minute: 38-42")
    GPIO.output(fuenf,False)
    GPIO.output(zehn,True)
    GPIO.output(viertel,False)
    GPIO.output(vor,False)
    GPIO.output(nach,True)
    GPIO.output(halb,True)
    CheckHourPlusOne(currentHour)
if (valueToTwelve==9):      #43-47
    print(datetime.datetime.now(), ": minute: 43-47")
    GPIO.output(fuenf,False)
    GPIO.output(zehn,False)
    GPIO.output(viertel,True)
    GPIO.output(vor,True)
    GPIO.output(nach,False)
    GPIO.output(halb,False)
    CheckHourPlusOne(currentHour)
if (valueToTwelve==10):      #48-52
    print(datetime.datetime.now(), ": minute: 48-52")
    GPIO.output(fuenf,False)
    GPIO.output(zehn,True)
    GPIO.output(viertel,False)
    GPIO.output(vor,True)
    GPIO.output(nach,False)
    GPIO.output(halb,False)
    CheckHourPlusOne(currentHour)
if (valueToTwelve==11):      #53-57
    print(datetime.datetime.now(), ": minute: 53-57")
    GPIO.output(fuenf,True)
    GPIO.output(zehn,False)
    GPIO.output(viertel,False)
    GPIO.output(vor,True)
    GPIO.output(nach,False)
    GPIO.output(halb,False)
    CheckHourPlusOne(currentHour)
```

```
def CheckHour(currentHour):
    #begin logic for hours
    currentH = datetime.datetime.now().hour
    if currentHour == currentH:
        print(datetime.datetime.now(), ": don't change Hour, because it is already up to date: ",
datetime.datetime.now().hour)
    else:
        TurnOnHour(currentH)
        print(datetime.datetime.now(), ": try to turn on hour: ",currentH," Try to turn off hour:  ", currentHour)
    #end logic for hours

def CheckHourPlusOne(currentHour):
    #begin logic for hours
    currentH = datetime.datetime.now().hour
    if currentHour == currentH+1:
        print(datetime.datetime.now(), ": don't change Hour, because it is already up to date: ",
datetime.datetime.now().hour)
    else:
        TurnOnHour(currentH+1)
        print(datetime.datetime.now(), ": try to turn on hour: ",currentH+1," Try to turn off hour:  ", currentHour)
    #end logic for hours

def TurnOnHour(hourToTurnOn):
    if (hourToTurnOn == 0):
        print(datetime.datetime.now(), ": exception hourtoturn on is zero:  set hour to: ", hourToTurnOn)
        TurnOffAllHoursExcept(23)
    else:
        print(datetime.datetime.now(), ": set hour to: ", hourToTurnOn)
        TurnOffAllHoursExcept(hourToTurnOn-1)

def TurnOffAllHoursExcept(currentHour):
    for i in range (0,24):
        if(i != currentHour):
            GPIO.output(gpioPinsHours[i],False)
            print(datetime.datetime.now(), ": turn off hour: ", i+1)
    GPIO.output(gpioPinsHours[currentHour],True)
```

```
#program starts
try:
    for i in range (0,12):
        GPIO.output(gpioPinsHours[i],True)
        print(i+1)
        time.sleep(1)
        GPIO.output(gpioPinsHours[i],False)

    for i in range (0,8):
        GPIO.output(gpioPinsMinutes[i],True)
        time.sleep(1)
        GPIO.output(gpioPinsMinutes[i],False)


    for p in range (0,1):
            for i in range (0,12):
            GPIO.output(gpioPinsHours[i],True)
            print(i+1)
            time.sleep(0.05)
            GPIO.output(gpioPinsHours[i],False)

        for i in range (0,8):
            GPIO.output(gpioPinsMinutes[i],True)
            time.sleep(0.05)
            GPIO.output(gpioPinsMinutes[i],False)

    GPIO.output(es_ist, True)
    print(datetime.datetime.now(), ': initially set time to minute', datetime.datetime.now().minute)
    TurnOnMinute(datetime.datetime.now().minute, 0)
    #TurnOnHour(datetime.datetime.now().hour, 0)
    while True:
        #logic for minutes
        if RoundDiv(datetime.datetime.now().minute) == currentMinute: #if now is same as last check, do nothing
            print(datetime.datetime.now(), ': sleep')
        else:
            currentMinute = RoundDiv(datetime.datetime.now().minute)
            print(datetime.datetime.now(), ': set time to minute', datetime.datetime.now().minute)
            TurnOnMinute(datetime.datetime.now().minute, currentHour)
        #end logic for minutes
        time.sleep(30)

finally:
    for i in range(0,23):
        GPIO.output(gpioPinsHours[i], False)
    GPIO.output(22,False)
    for i in range(0,8):
        GPIO.output(gpioPinsHours[i], False)
GPIO.cleanup()
```