UNIT

16

7-Segment FND

로봇SW 교육원

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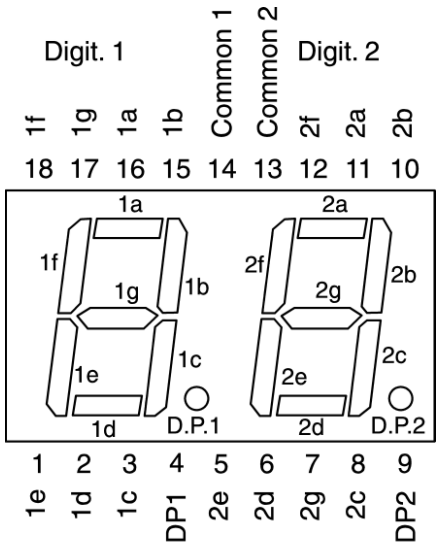
학습 목표

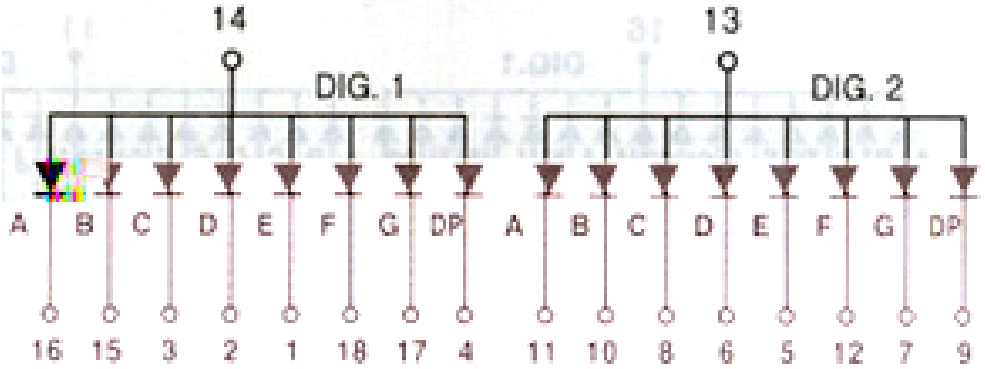
- 7-Segment FND **제어**

7-Segment FND

- 7-Segment FND
  - Anode common
  - 2 digit

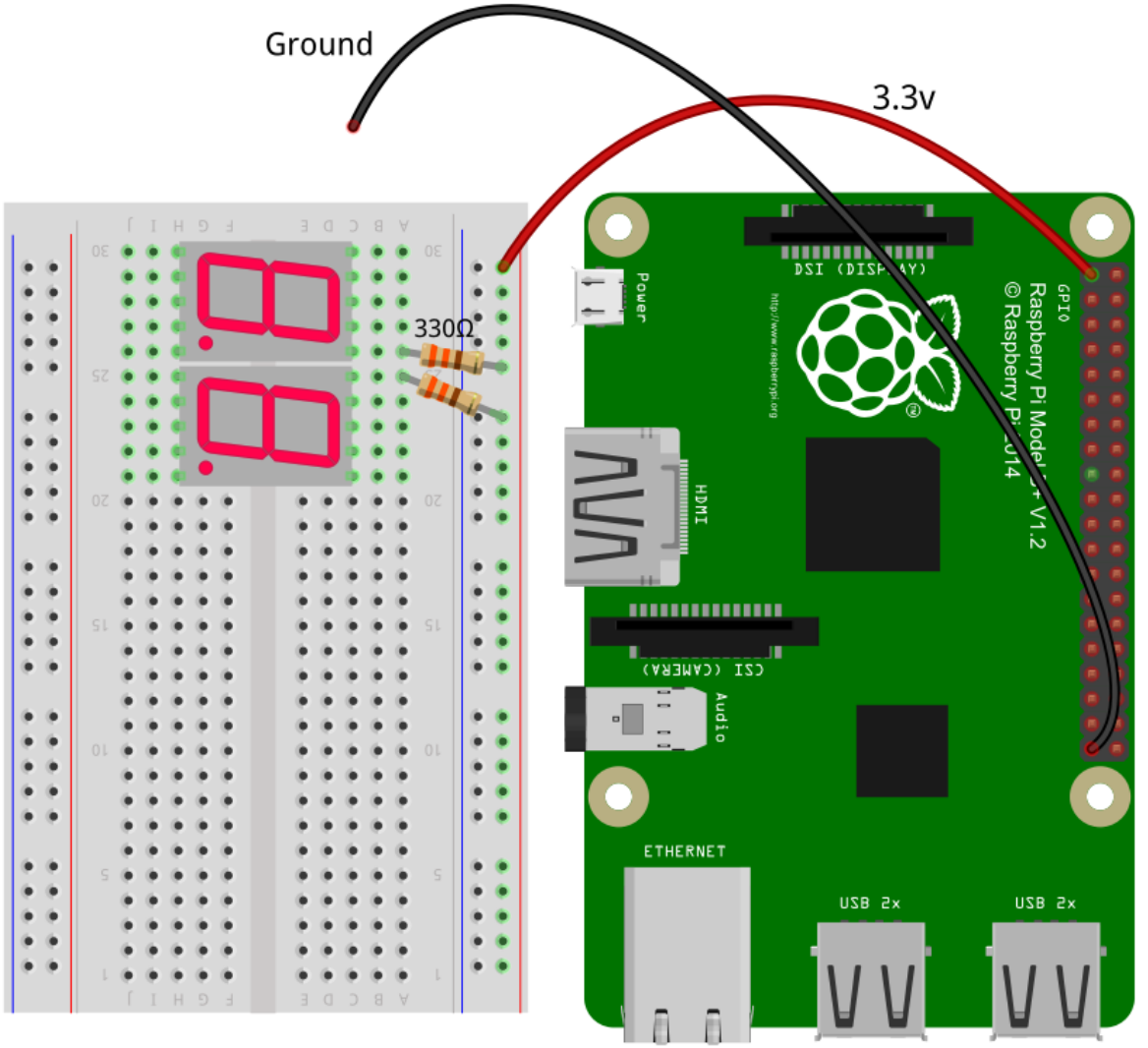


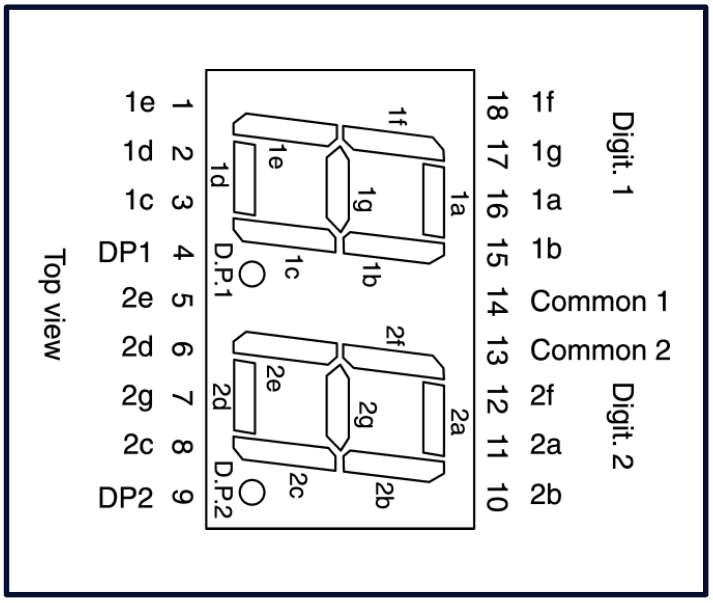
Top view



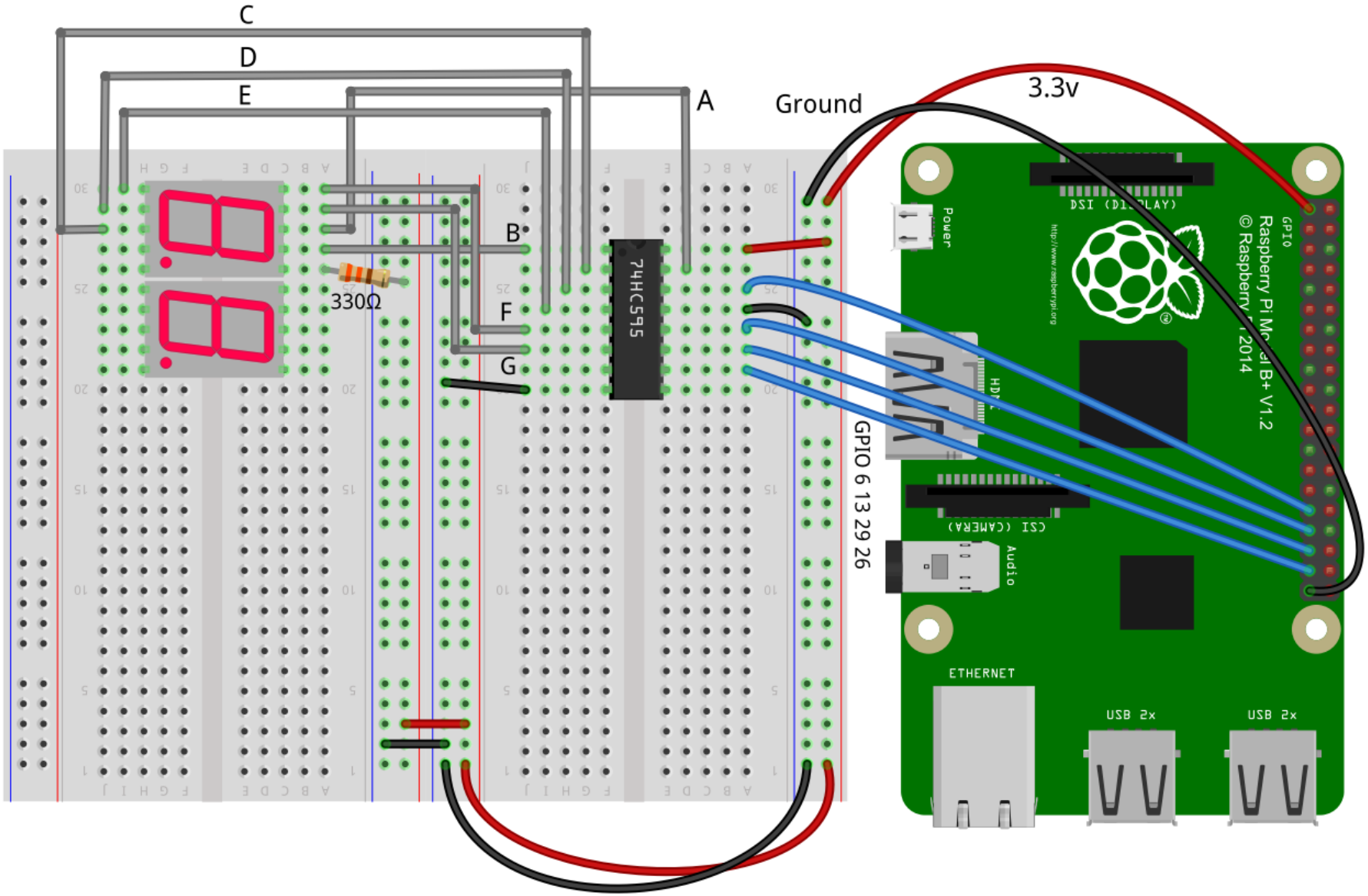
실습1

- 330Ω **저항**
- 2 Digit 7 Segment





실습2-1


C
D
E
A
Ground
3.3v
B
F
G
330Ω
74HC595
GPIO 6 13 29 26
Power
DSI (DISPLAY)
CSI (CAMERA)
Audio
ETHERNET
USB 2x
USB 2x
GPIO
Raspberry Pi Model B+ V1.2
© Raspberry Pi 2014
http://www.raspberrypi.org

실습2-2

파일명 : 7segment_ex1.c

```
#include <stdio.h>
#include <stdlib.h>
#include <wiringPi.h>
#include <stdint.h>
#define SDATA        6    // Serial Input Data
#define STR_CLK      13   // Storage Register Clock(LATCH)
#define SHR_CLK      19   // Shift Register Clock
#define SHR_CLEAR    26   // Shift Register Clear
void allclear(void);

void init(void)
{
    if(wiringPiSetupGpio() == -1){ // wiringPi
        fprintf(stderr, "wiringPiSetupGpio() erorr\n");
        exit(1);
    }
    pinMode(SDATA, OUTPUT);
    pinMode(STR_CLK, OUTPUT);
    pinMode(SHR_CLK, OUTPUT);
    pinMode(SHR_CLEAR, OUTPUT);
    allclear();
}

void allclear(void)
{
    digitalWrite(SHR_CLEAR, 0);
    digitalWrite(SHR_CLEAR, 1);
    digitalWrite(STR_CLK, 0);
    digitalWrite(STR_CLK, 1);    // latch
}
```

실습2-3

파일명 : 7segment_ex1.c

```
// unsinged 8bit int
void set8(uint8_t value)
{
    int i;

    for(i = 0 ; i < 8 ; i++){
        int mask = 0b1 << i;
        if((value & mask) == 0)
            digitalWrite(SDATA, 0);
        else
            digitalWrite(SDATA, 1);
        digitalWrite(SHR_CLK, 0); //
        digitalWrite(SHR_CLK, 1); //
    }

    // letch
    digitalWrite(STR_CLK, 0); //
    digitalWrite(STR_CLK, 1); //
}
```

실습2-4

파일명 : 7segment_ex1.c

```
int
main(void)
{
    int i;
    uint8_t arr[] = {   ~0b10000000,
                        ~0b01000000,
                        ~0b00100000,
                        ~0b00010000,
                        ~0b00001000,
                        ~0b00000100,
                        ~0b00000010,
                        ~0b00000001};

    init();

    for(i = 0 ; i < 8 ; i++){
        set8(arr[i]);
        delay(1000);
    }
    return 1;
}
```

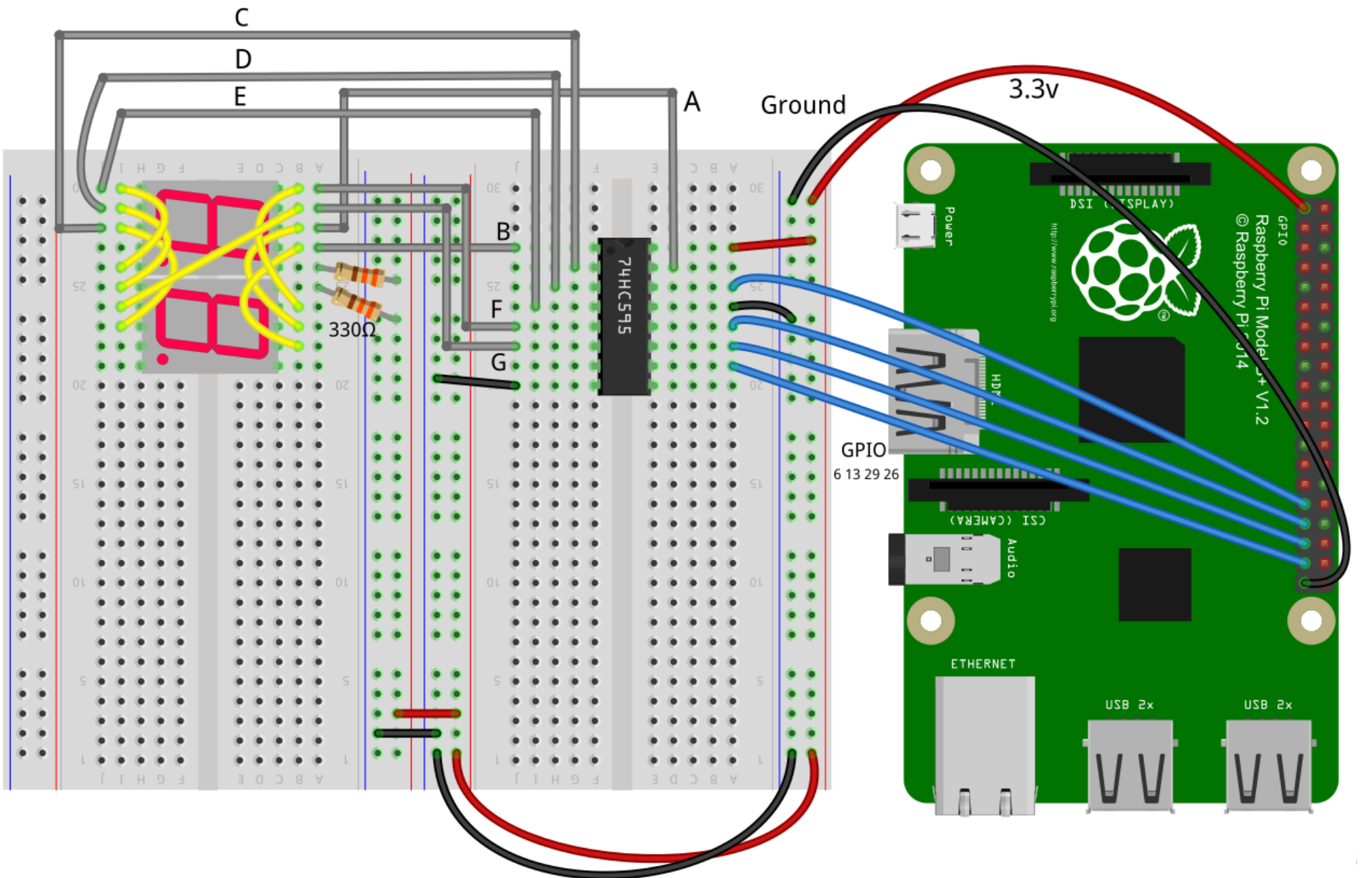
```
pi@robotcode ~ $ gcc -Wall -W -lwiringPi 7segment_ex1.c -o 7segment_ex1
7segment_ex1.c: In function 'main':
7segment_ex1.c:57:2: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex1.c:67:16: warning: comparison between signed and unsigned
integer expressions [-Wsign-compare]
pi@robotcode ~ $ sudo ./7segment_ex1
pi@robotcode ~ $
```

https://youtu.be/-YBLmrPuJ18

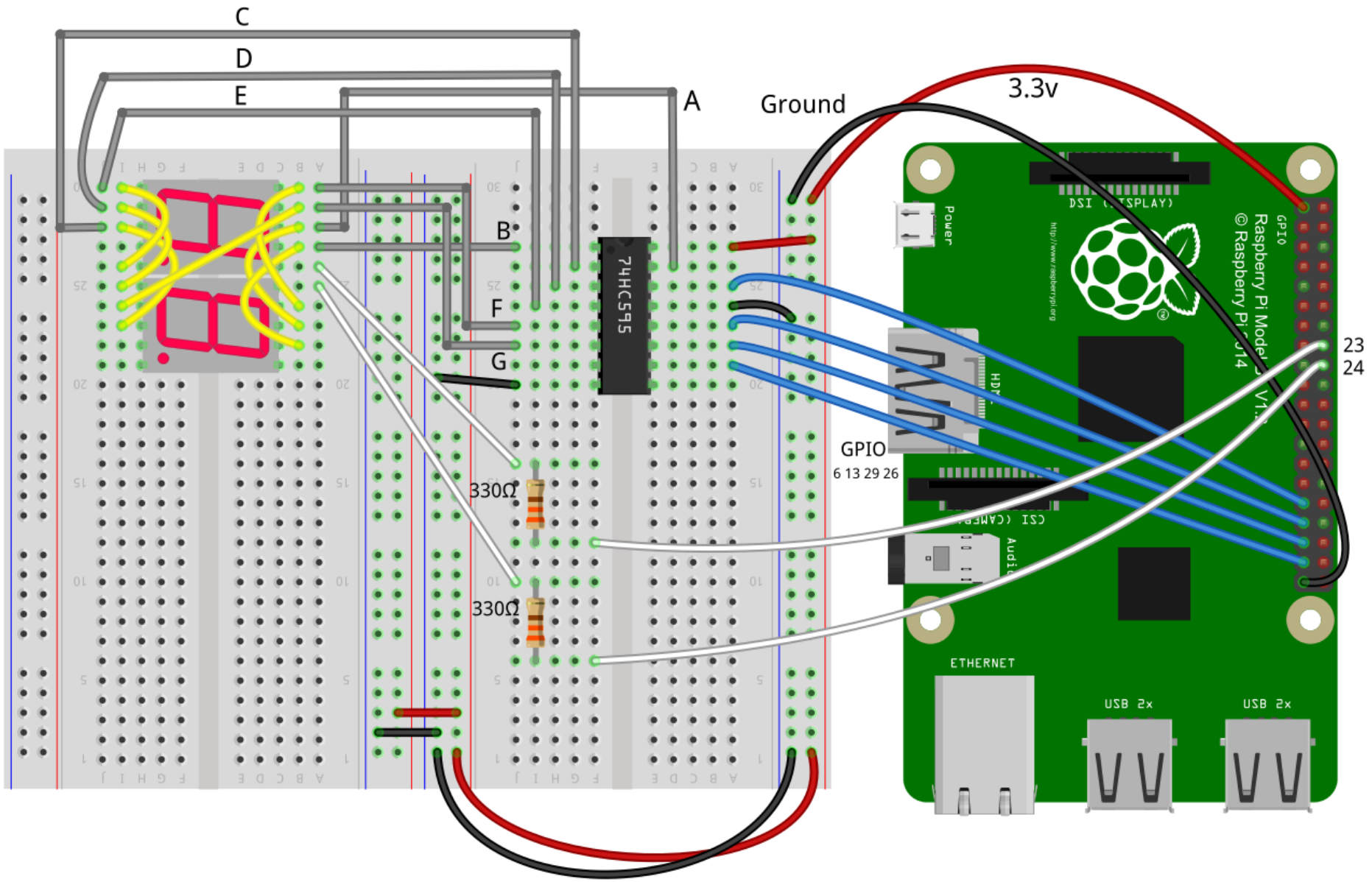
미션1

- https://youtu.be/m71t6Cgns-k
- https://youtu.be/nKpMCEoR_sI

실습3-1 : 2Digit


C
D
E
A
Ground
3.3v
B
F
G
330Ω
74HC595
GPIO
6 13 29 26
Power
DSI (DISPLAY)
GPIO
Audio
ETHERNET
USB 2x
USB 2x

실습3-2 : 2Digit


C
D
E
A
Ground
3.3v
B
F
G
74HC595
330Ω
330Ω
GPIO
6 13 29 26
23
24
Power
DSI (DISPLAY)
GPIO
ETHERNET
USB 2x
USB 2x

실습3-3 : 2Digit

파일명 : 7segment_ex2.c

```
#include <stdio.h>
#include <stdlib.h>
#include <wiringPi.h>
#include <stdint.h>
#define SDATA        6     // Serial Input Data
#define STR_CLK      13    // Storage Register Clock(LATCH)
#define SHR_CLK      19    // Shift Register Clock
#define SHR_CLEAR    26    // Shift Register Clear
#define DIGIT1       23    // first digit
#define DIGIT2       24    // second digit
void allclear(void);
void init(void)
{
    if(wiringPiSetupGpio() == -1){ // wiringPi
        fprintf(stderr, "wiringPiSetupGpio() erorr\n");
        exit(1);
    }
    pinMode(SDATA, OUTPUT);
    pinMode(STR_CLK, OUTPUT);
    pinMode(SHR_CLK, OUTPUT);
    pinMode(SHR_CLEAR, OUTPUT);
    allclear();
}
void allclear(void)
{
    digitalWrite(SHR_CLEAR, 0);
    digitalWrite(SHR_CLEAR, 1);
    digitalWrite(STR_CLK, 0);
    digitalWrite(STR_CLK, 1);    // latch
}
```

실습3-4 : 2Digit

파일명 : 7segment_ex2.c

```
// unsinged 8bit int
void set8(uint8_t value)
{
    int i;

    for(i = 0 ; i < 8 ; i++){
        int mask = 0b1 << i;
        if((value & mask) == 0)
            digitalWrite(SDATA, 0);
        else
            digitalWrite(SDATA, 1);
        digitalWrite(SHR_CLK, 0); //
        digitalWrite(SHR_CLK, 1); //
    }

    // letch
    digitalWrite(STR_CLK, 0); //
    digitalWrite(STR_CLK, 1); //
}
```

실습3-5 : 2Digit

파일명 : 7segment_ex2.c

```
int
main(void)
{                              //abcdefg
    uint8_t arr[] = {    ~0b11111100,  //0
                         ~0b01100000,  //1
                         ~0b11011010,  //2
                         ~0b11110010,  //3
                         ~0b01100110,  //4
                         ~0b10110110,  //5
                         ~0b00111110,  //6
                         ~0b11100100,  //7
                         ~0b11111110,  //8
                         ~0b11100110 };//9
                         };
    init();
    pinMode(DIGIT1, OUTPUT);
    pinMode(DIGIT2, OUTPUT);
    for(;;){
        digitalWrite(DIGIT1, HIGH);
        digitalWrite(DIGIT2, LOW);
        set8(arr[0]);
        delay(1000);

        digitalWrite(DIGIT1, LOW);
        digitalWrite(DIGIT2, HIGH);
        set8(arr[1]);
        delay(1000);
    }
    return 1;
}
```

실습3-6 : 2Digit


```
pi@robotcode ~ $ gcc -Wall -W -lwiringPi 7segment_ex2.c -o 7segment_ex2
7segment_ex2.c: In function 'main':
7segment_ex2.c:61:2: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex2.c:63:7: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex2.c:64:7: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex2.c:66:7: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex2.c:68:7: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex2.c:69:7: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
7segment_ex2.c:71:7: warning: large integer implicitly truncated to
unsigned type [-Woverflow]
pi@robotcode ~ $ sudo ./7segment_ex2
```

https://youtu.be/c_YBDjMNsoU

실습3-7 : 2Digit

파일명 : 7segment_ex2.c

```
int
main(void)
{                              //abcdefg
    uint8_t arr[] = {    ~0b11111100,  //0
                         ~0b01100000,  //1
                         ~0b11011010,  //2
                         ~0b11110010,  //3
                         ~0b01100110,  //4
                         ~0b10110110,  //5
                         ~0b00111110,  //6
                         ~0b11100100,  //7
                         ~0b11111110,  //8
                         ~0b11100110 };//9
                         };
    init();
    pinMode(DIGIT1, OUTPUT);
    pinMode(DIGIT2, OUTPUT);
    for(;;){
        digitalWrite(DIGIT1, HIGH);
        digitalWrite(DIGIT2, LOW);
        set8(arr[0]);
        delay(100);

        digitalWrite(DIGIT1, LOW);
        digitalWrite(DIGIT2, HIGH);
        set8(arr[1]);
        delay(100);
    }
    return 1;
}
```

100ms https://youtu.be/9foTIHpYZVQ

10ms https://youtu.be/ptNQHFeZEQI

실습4-1 : 시계 (초)

파일명 : 7segment_ex3.c

```
#include <stdio.h>
#include <stdlib.h>
#include <wiringPi.h>
#include <stdint.h>
#include <time.h>

#define SDATA        6    // Serial Input Data
#define STR_CLK      13   // Storage Register Clock(LATCH)
#define SHR_CLK      19   // Shift Register Clock
#define SHR_CLEAR    26   // Shift Register Clear

#define DIGIT1       23   // first digit
#define DIGIT2       24   // second digit

void allclear(void);

void init(void)
{
    if(wiringPiSetupGpio() == -1){ // wiringPi
        fprintf(stderr, "wiringPiSetupGpio() erorr\n");
        exit(1);
    }
    pinMode(SDATA, OUTPUT);
    pinMode(STR_CLK, OUTPUT);
    pinMode(SHR_CLK, OUTPUT);
    pinMode(SHR_CLEAR, OUTPUT);

    allclear();
}
```

실습4-2 : 시계 (초)

파일명 : 7segment_ex3.c

```
void allclear(void)
{
    digitalWrite(SHR_CLEAR, 0);
    digitalWrite(SHR_CLEAR, 1);
    digitalWrite(STR_CLK, 0);
    digitalWrite(STR_CLK, 1);   // latch
}

// unsinged 8bit int
void set8(uint8_t value)
{
    int i;

    for(i = 0 ; i < 8 ; i++){
        int mask = 0b1 << i;
        if((value & mask) == 0)
            digitalWrite(SDATA, 0);
        else
            digitalWrite(SDATA, 1);
        digitalWrite(SHR_CLK, 0); //
        digitalWrite(SHR_CLK, 1); //
    }

    // letch
    digitalWrite(STR_CLK, 0); //
    digitalWrite(STR_CLK, 1); //
}
```

실습4-3 : 시계 (초)

파일명 : 7segment_ex3.c

```
int
main(void)
{
    time_t t;
    struct tm *tmp;
                          //abcdefg
    uint8_t arr[] = {   ~0b11111100, //0
                        ~0b01100000, //1
                        ~0b11011010, //2
                        ~0b11110010, //3
                        ~0b01100110, //4
                        ~0b10110110, //5
                        ~0b00111110, //6
                        ~0b11100100, //7
                        ~0b11111110, //8
                        ~0b11100110  //9
                        };
    int digit1, digit2;

    init();

    pinMode(DIGIT1, OUTPUT);
    pinMode(DIGIT2, OUTPUT);

    setbuf(stdout, NULL);
```

실습4-3 : 시계 (초)

파일명 : 7segment_ex3.c

```
    for(;;){
        time(&t);
        tmp = localtime(&t);
        printf("%02d:%02d:%02d\r", tmp->tm_hour, tmp->tm_min, tmp->tm_sec);

        digit1 = tmp->tm_sec / 10;
        digit2 = tmp->tm_sec % 10;

        digitalWrite(DIGIT1, HIGH);
        digitalWrite(DIGIT2, LOW);
        set8(arr[digit1]);
        delay(10);

        digitalWrite(DIGIT1, LOW);
        digitalWrite(DIGIT2, HIGH);
        set8(arr[digit2]);
        delay(10);
    }

    return 1;
}
```

```
pi@robotcode ~ $ gcc -Wall -W -lwiringPi 7segment_ex3.c -o 7segment_ex3
.....
pi@robotcode ~ $ sudo ./7segment_ex3
11:17:54
```

https://youtu.be/jC-MMj-BCyg

미션2

- https://youtu.be/-bGLibFWK-Q