Xilinx Zynq FPGA, TI DSP, MCU 기반의 회로 설계 및 임베디드 전문가 과정

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바이폴라 스텝모터 구동법(4017-875)

스텝모터 특징

- 바이폴라 스텝모터
- 4선 스텝모터
- 높은 토크값
- 낮은 최대 RPM

- 유니폴라 스텝모터
- 5~6선 스텝모터
- 낮은 토크값
- 높은 최대 RPM

4017-875 스텝모터 특징

스텝모터(4017-875)

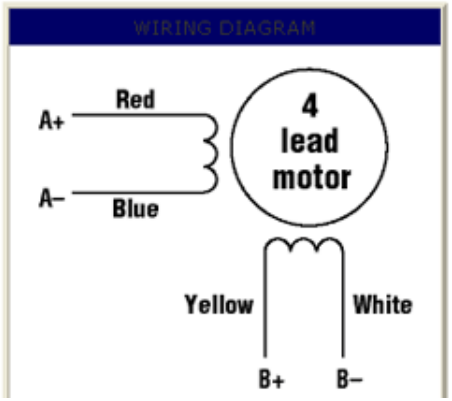
RECOMMENDED MOTORS

RECOMMENDED MOTORS								
Part #	Motor Length (inches)	Minimum Holding Torque (oz-in)	Leads	Step Angle (deg)	Volts	Amps	Ohms	Motor Weight (lbs)
4017-875	1.28	8.0	4	1.8	3.5	0.35	10	0.33

결선도

4 Lead Wire Configuration - Bipolar Drive

STEP TABLE				
STEP	Red	Blue	Yellow	White
0	+	-	+	-
1	-	+	+	-
2	-	+	-	+
3	+	-	-	+
4	+	-	+	-



- 권장 전압 : 3.5V
- 권장 전류 : 0.35A

4017-875 스텝모터 구동법

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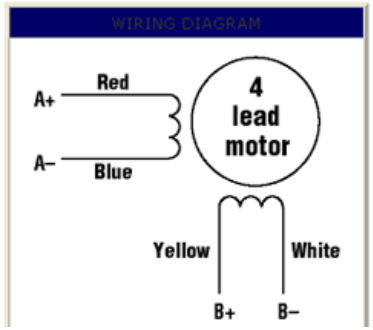
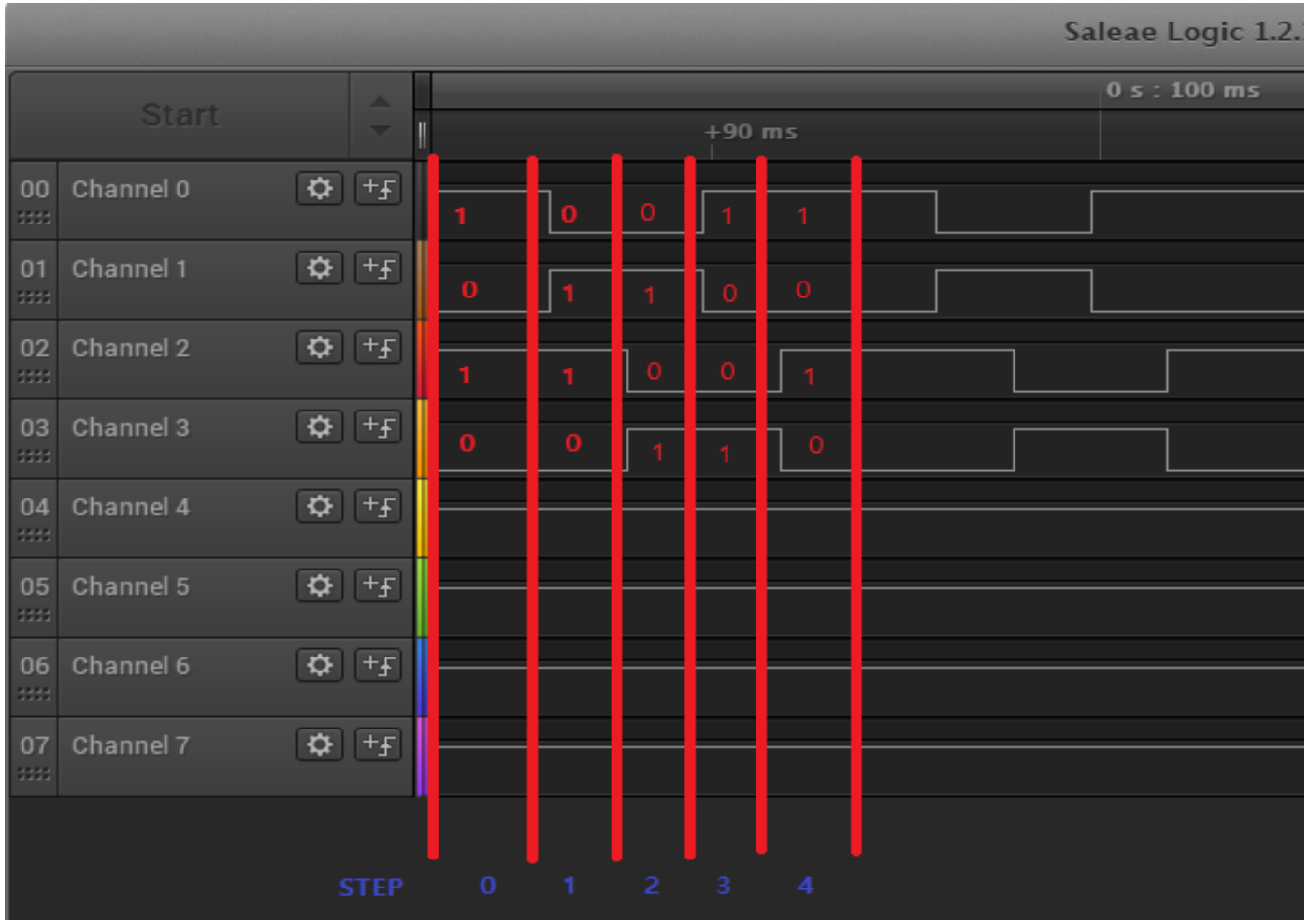


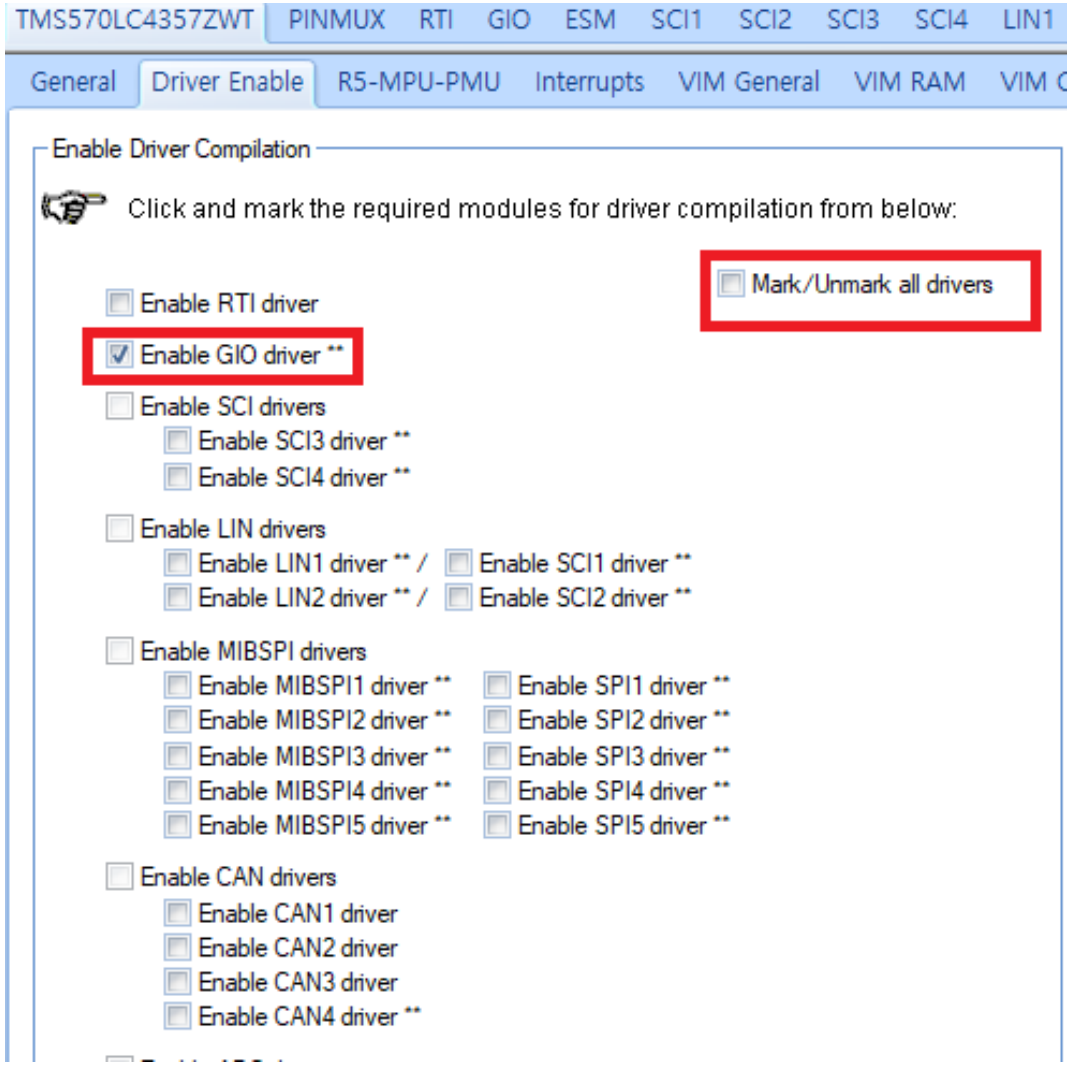
- 결선도를 보면, 각 선에 대한 정보가 나와있다
- Red = A+
  Blue = A-
  Yellow = B+
  White = B-
- 0~4까지 5가지 단계의 STEP이 있는데, 각 STEP에 맞춰 4선의 펄스만 잘 넣어주면 된다.

Pin signal 주는 방법

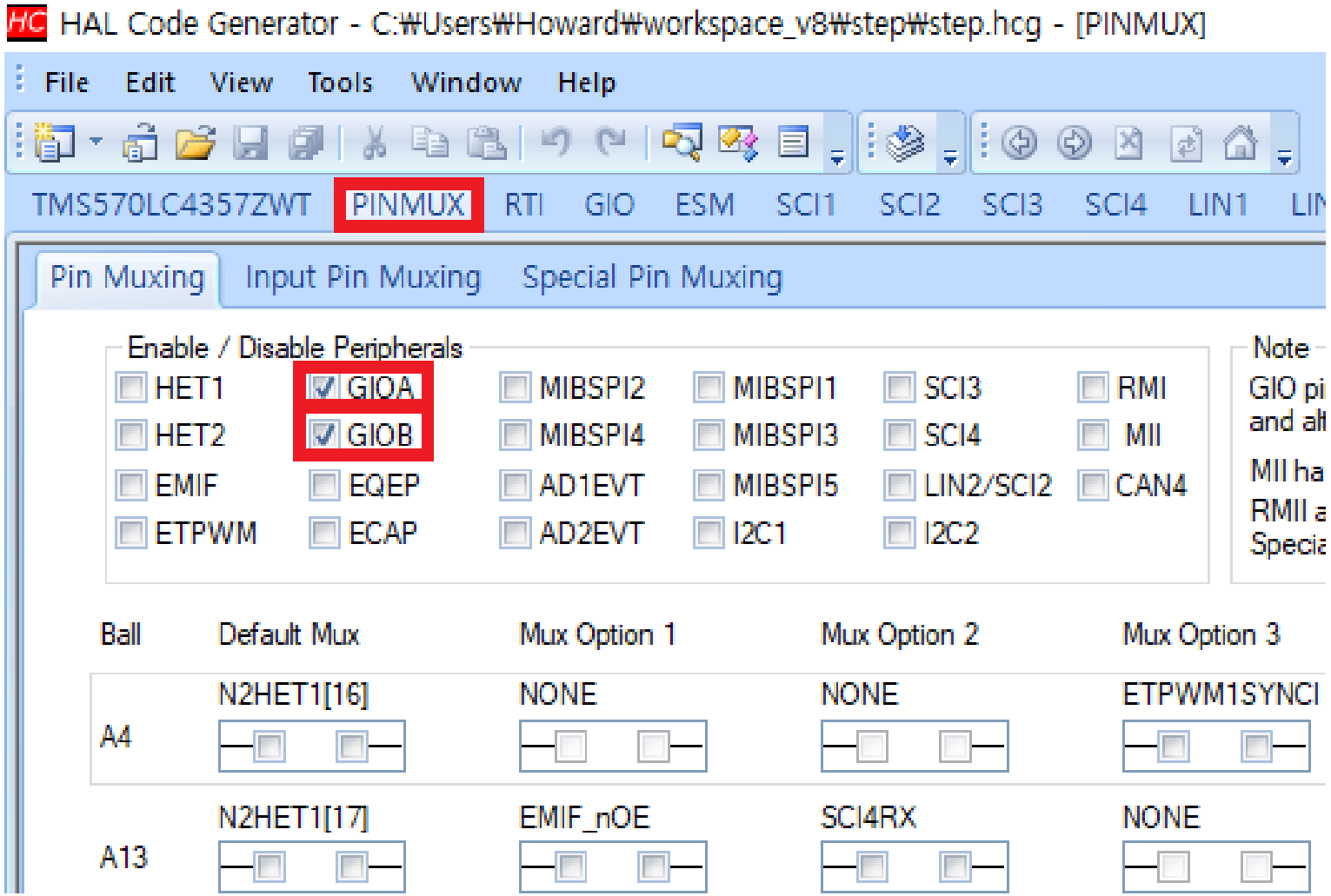


- 왼쪽과 같이 결선도의 각 STEP에 따라 PUSLE를 인가하면 된다.

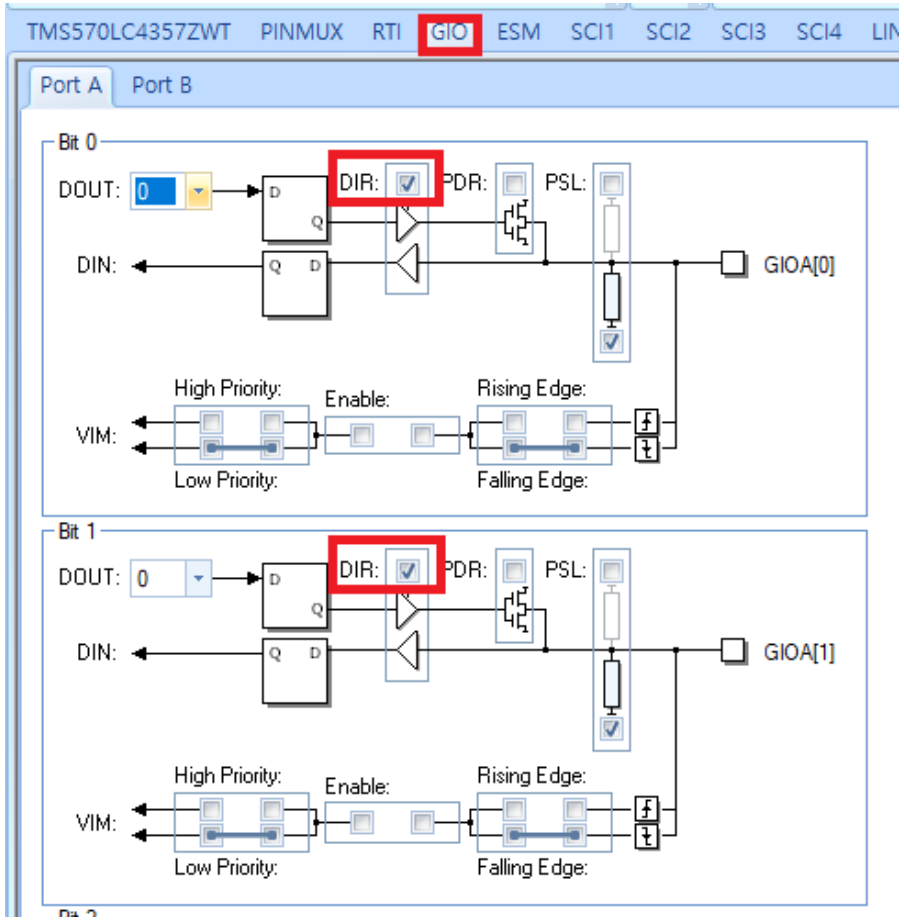
HalCoGen 설정


TMS570LC4357ZWT
PINMUX
RTI
GIO
ESM
SCI1
SCI2
SCI3
SCI4
LIN1
General
Driver Enable
R5-MPU-PMU
Interrupts
VIM General
VIM RAM
Enable Driver Compilation
Click and mark the required modules for driver compilation from below:
Mark/Unmark all drivers
Enable RTI driver
Enable GIO driver **
Enable SCI drivers
Enable SCI3 driver **
Enable SCI4 driver **
Enable LIN drivers
Enable LIN1 driver ** /
Enable SCI1 driver **
Enable LIN2 driver ** /
Enable SCI2 driver **
Enable MIBSPI drivers
Enable MIBSPI1 driver **
Enable SPI1 driver **
Enable MIBSPI2 driver **
Enable SPI2 driver **
Enable MIBSPI3 driver **
Enable SPI3 driver **
Enable MIBSPI4 driver **
Enable SPI4 driver **
Enable MIBSPI5 driver **
Enable SPI5 driver **
Enable CAN drivers
Enable CAN1 driver
Enable CAN2 driver
Enable CAN3 driver
Enable CAN4 driver **

HalCoGen 설정


HAL Code Generator - C:₩Users₩Howard₩workspace_v8₩step₩step.hcg - [PINMUX]
File Edit View Tools Window Help
TMS570LC4357ZWT PINMUX RTI GIO ESM SCI1 SCI2 SCI3 SCI4 LIN1
Pin Muxing Input Pin Muxing Special Pin Muxing
Enable / Disable Peripherals
HET1 GIOA MIBSPI2 MIBSPI1 SCI3 RMI
HET2 GIOB MIBSPI4 MIBSPI3 SCI4 MII
EMIF EQEP AD1EVT MIBSPI5 LIN2/SCI2 CAN4
ETPWM ECAP AD2EVT I2C1 I2C2
Note
Ball Default Mux Mux Option 1 Mux Option 2 Mux Option 3
A4 N2HET1[16] NONE NONE ETPWM1SYNCI
A13 N2HET1[17] EMIF_nOE SCI4RX NONE

HalCoGen 설정



- GIOA, GIOB 0~7번 핀, 총 16개 핀의 DIR을 체크해준다.

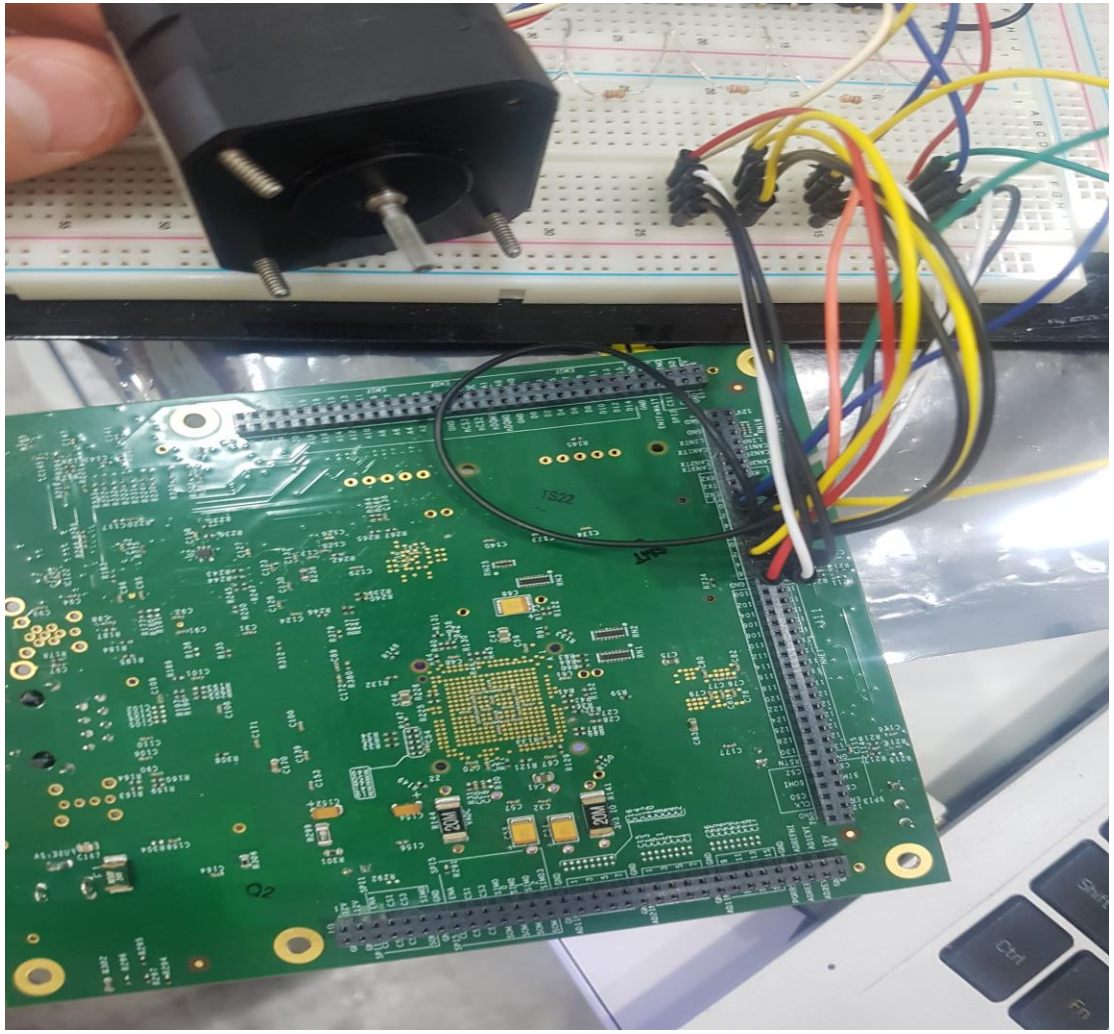
CCS 코드 작성

```c
#include "HL_sys_common.h"
#include "HL_gio.h"

void delay(uint32 delay);
void step(uint8 step);
int main(void)
{
    int cnt = 0;
    gioInit();

    while(1)
    {
        delay(54000);
        step(cnt++);
        cnt %= 5;
    }
    return 0;
}
void delay(uint32 delay)
{
    int i;
    for(i=0;i<delay;i++)
        ;
}
void step(uint8 step)
{
    switch(step)
    {
        case 0:
            gioPORTA->DSET = 0x0000000FU;
            gioPORTB->DSET = 0x0000000FU;
            break;
        case 1:
            gioPORTA->DOUT = 0x000000F0U;
            gioPORTB->DOUT = 0x0000000FU;
            break;
        case 2:
            gioPORTA->DOUT = 0x000000F0U;
            gioPORTB->DOUT = 0x000000F0U;
            break;
        case 3:
            gioPORTA->DOUT = 0x0000000FU;
            gioPORTB->DOUT = 0x000000F0U;
            break;
        case 4:
            gioPORTA->DOUT = 0x0000000FU;
            gioPORTB->DOUT = 0x0000000FU;
            break;
    }
}
```

회로구성



- GIOA0~3 : Red선 연결
- GIOA4~7 : Blue선 연결
- GIOB0~3 : Yellow선 연결
- GIOB4~7 : White선 연결