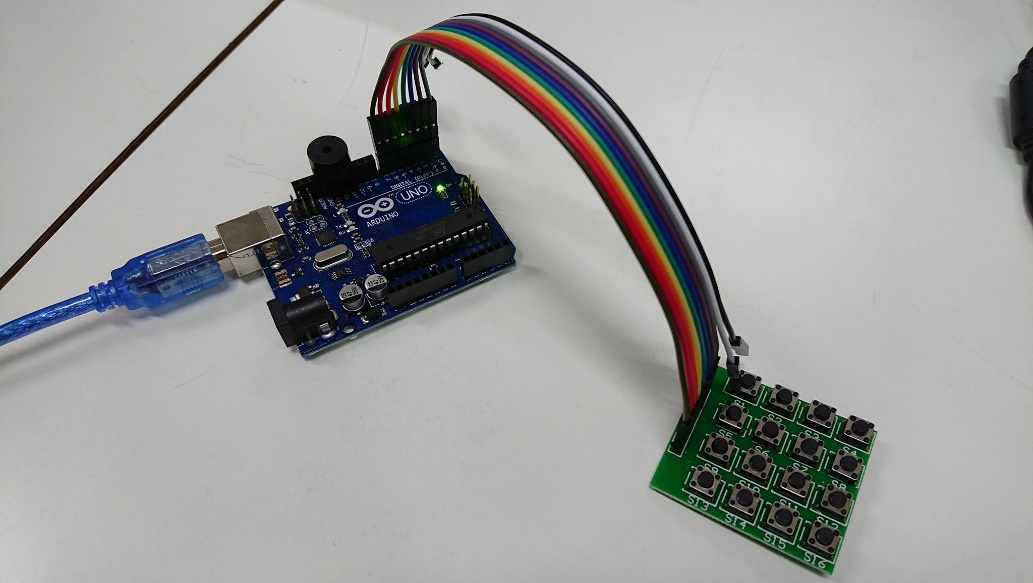
**ASSIGNMENT 1:** วงจร Music Keypad

**อุปกรณ์**

1. บอร์ด Arduino UNO R3 X 1
2. Buzzer X 1
3. 4 X 4 Keypad X 1
4. สายไฟ X 8

**ลักษณะวงจร**



**หลักการทำงานของวงจร**

วงจรรอรับค่าจาก Keypad 4 X 4 แล้วแสดงผลลัพธ์เป็นเสียงที่แตกต่างกันจากปุ่มที่แตกต่างกัน

**โค้ดของวงจร**

.INCLUDE "m328Pdef.inc"

.DEF TMP = r16

.DEF READ\_V = r17

.DEF VAR\_A = r18

.DEF DISTANCE = r19

.DEF TL = r20

.DEF TA = r21

.DEF TB = r22

.MACRO COMPARE\_AND\_BRANCH\_IF\_KEYPRESSED

cpi VAR\_A, 0xff

brne KEYPRESSED

.ENDMACRO

.CSEG

.ORG 0x0000

rjmp RESET

RESET:

ldi TMP, 0x28

out DDRB, TMP

ldi TMP, 0x00

out PORTB, TMP

ldi TMP, 0xf0

out DDRD, TMP

READ\_KEY\_PAD:

;----- row A

ldi TMP, 0b11101111

ldi DISTANCE, 0

call SCAN\_KEYPAD

COMPARE\_AND\_BRANCH\_IF\_KEYPRESSED

;----- row B

ldi TMP, 0b11011111

ldi DISTANCE, 9

call SCAN\_KEYPAD

COMPARE\_AND\_BRANCH\_IF\_KEYPRESSED

;----- row C

ldi TMP, 0b10111111

ldi DISTANCE, 18

call SCAN\_KEYPAD

COMPARE\_AND\_BRANCH\_IF\_KEYPRESSED

;----- row D

ldi TMP, 0b01111111

ldi DISTANCE, 27

call SCAN\_KEYPAD

COMPARE\_AND\_BRANCH\_IF\_KEYPRESSED

ldi TMP, 0x00

out PORTB, TMP

rjmp READ\_KEY\_PAD

KEYPRESSED:

call VOL\_UP

rjmp READ\_KEY\_PAD

VOL\_UP:

ldi TL, 0x28

out PORTB, TL

rcall \_settime

rcall \_delay

ldi TL, 0x00

out PORTB, TL

rcall \_settime

rcall \_delay

ret

\_settime:

ldi TA, 0xff

mov TB, VAR\_A

ret

\_delay:

dec TA

brne \_delay

dec TB

brne \_delay

ret

SCAN\_KEYPAD:

ldi ZL, low(KEYPAD\_TABLE\*2)

ldi ZH, high(KEYPAD\_TABLE\*2)

out PORTD, TMP

nop

in READ\_V, PIND

ldi TMP, 0x0f

and READ\_V, TMP

add READ\_V, DISTANCE

subi READ\_V, 7

ldi TMP, 0x00

add ZL, READ\_V

adc ZH, TMP

lpm VAR\_A, Z

ret

KEYPAD\_TABLE:

.DB 0x0f, 0xff, 0xff, 0xff, 0x10, 0xff, 0x11, 0x12, 0xff, 0x13, 0xff, 0xff, 0xff, 0x14, 0xff, 0x15, 0x16, 0xff

.DB 0x17, 0xff, 0xff, 0xff, 0x18, 0xff, 0x19, 0x1a, 0xff, 0x1b, 0xff, 0xff, 0xff, 0x1c, 0xff, 0x1d, 0x1e, 0xff