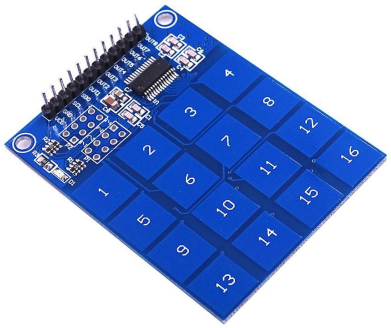
Capacitive Keypad
(Technical Note)

Introduction



A capacitive keypad is a type of keypad that uses a change of capacitance on the capacitor pad to detect a pressed key on the keypad. Electricity is always flowing in capacitive keypads unlike traditional mechanical keypads, where electricity flow initiates internally when a key is pressed. Under each key, static charges are stored in capacitors. The keypad identifies and registers a specific key when the key is pressed, which connects with the capacitor pads and changes the capacitance at that specific point on the capacitor pad.

Scientific Fact and Applications

A capacitive switch consists of three main layers: an upper graphics overlay layer, a circuit layer (flexible printed circuit or printed circuit board), and a backer layer. Normally, the overlay layer is made of a durable material like plastic or glass.

Application

There are numerous advantages of capacitive keypads over their mechanical counterparts, which includes better durability and longer life span due to the absence of mechanical components. As such, this type of keypads are widely used in various field such as:

- Aerospace
- Military equipment
- Medical instruments
- Consumer electronics
- Household appliances

Reference

1. http://csikeyboards.com/what-are-capacitive-touch-switches/
2. https://www.eecoswitch.co.uk/product/custom-membrane-switches/
3. https://forum.hobbycomponents.com/viewtopic.php?t=1781

AN-047 Rev 1.0

Z2M Part Number: **EMS-016-A**

Capacitive Keypad
(Application Note)

Components Required

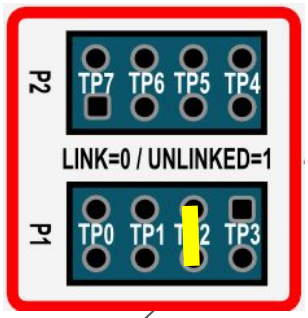
Component	Part No.	Qty
Arduino UNO	EMX-001-A	1
Alcohol Sensor	EMS-011-B	1
LED	EDM-002-A	1

Project

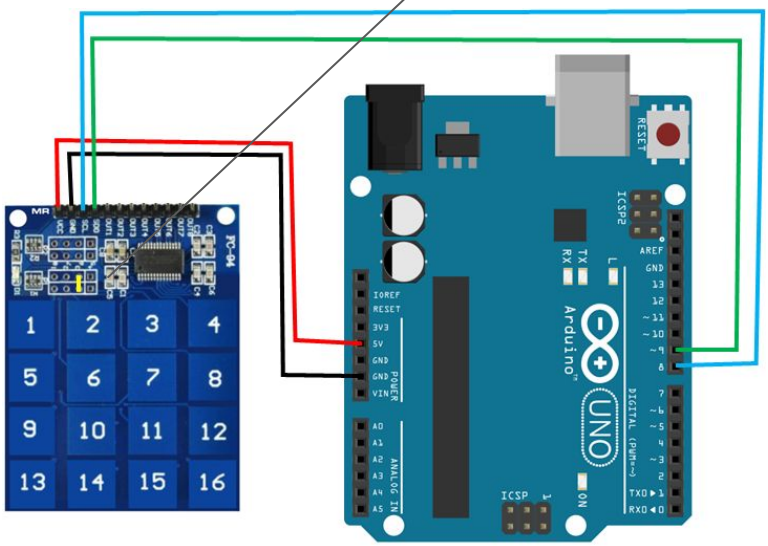
Print the key number on Serial Monitor when a certain number of keypad is touched.

Procedure

1. Connect capacitive keypad to Arduino
   - VCC -> 5V
   - GND -> GND
   - SCL -> Pin 8
   - SDO -> Pin 9
2. Link TP 2 with a wire/jumper wire to enable 16 inputs key mode.



Schematic



Code

```
/* Define the digital pins used for the clock and data
*/
#define SCL_PIN 8
#define SDO_PIN 9
/* Used to store the key state */
byte Key;

void setup()
{
  /* Initialise the serial interface */
  Serial.begin(9600);
  /* Configure the clock and data pins */
  pinMode(SCL_PIN, OUTPUT);
  pinMode(SDO_PIN, INPUT);
}

void loop()
{
  /* Read the current state of the keypad */
  Key = Read_Keypad();
  /* If a key has been pressed output it to the serial
port */
  if (Key)
    Serial.println(Key);
  /* Wait a little before reading again so not to flood
the serial port*/
  delay(100);
}

/* Read the state of the keypad */
byte Read_Keypad(void)
{
  byte Count;
  byte Key_State = 0;

  /* Pulse the clock pin 16 times (one for each key of
the keypad)and read the state of the data pin on each
pulse */
  for(Count = 1; Count <= 16; Count++)
  {
    digitalWrite(SCL_PIN, LOW);

    /* If the data pin is low (active low mode) then
store the current key number */
    if (!digitalRead(SDO_PIN))
      Key_State = Count;

    digitalWrite(SCL_PIN, HIGH);
  }
  return Key_State;
}
```

Challenge Yourself

1. Use capacitive keypad to control different lights.
2. Create a simple piano using the capacitive keypad.