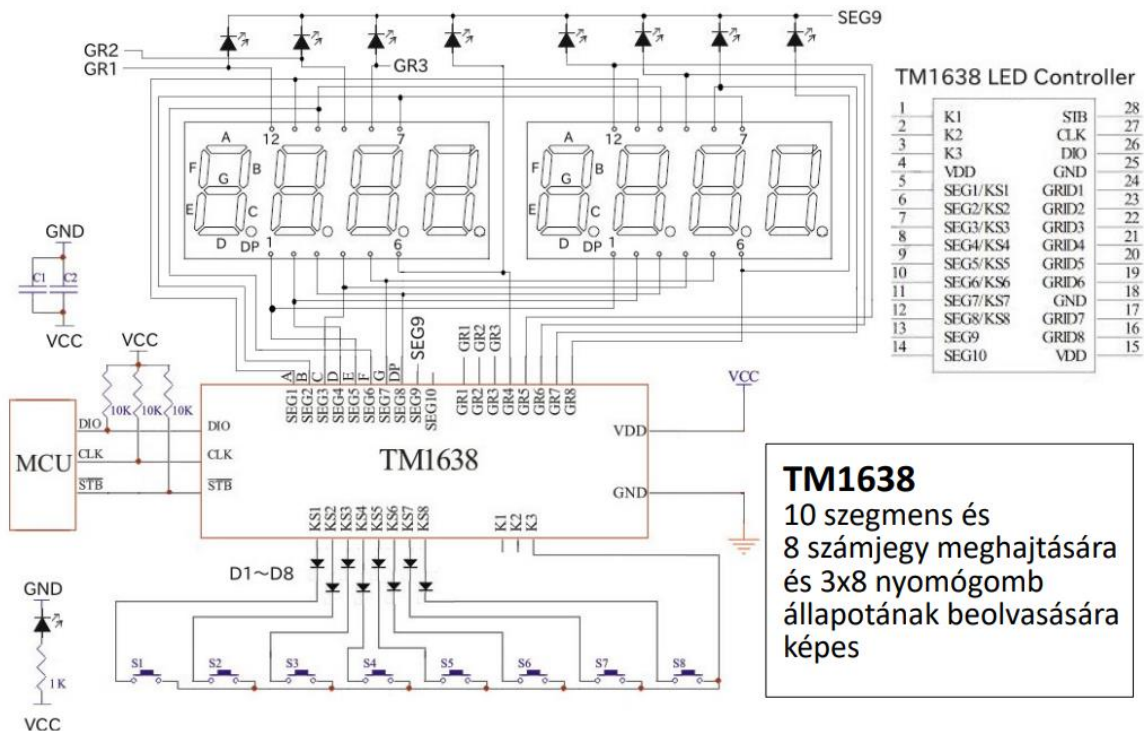


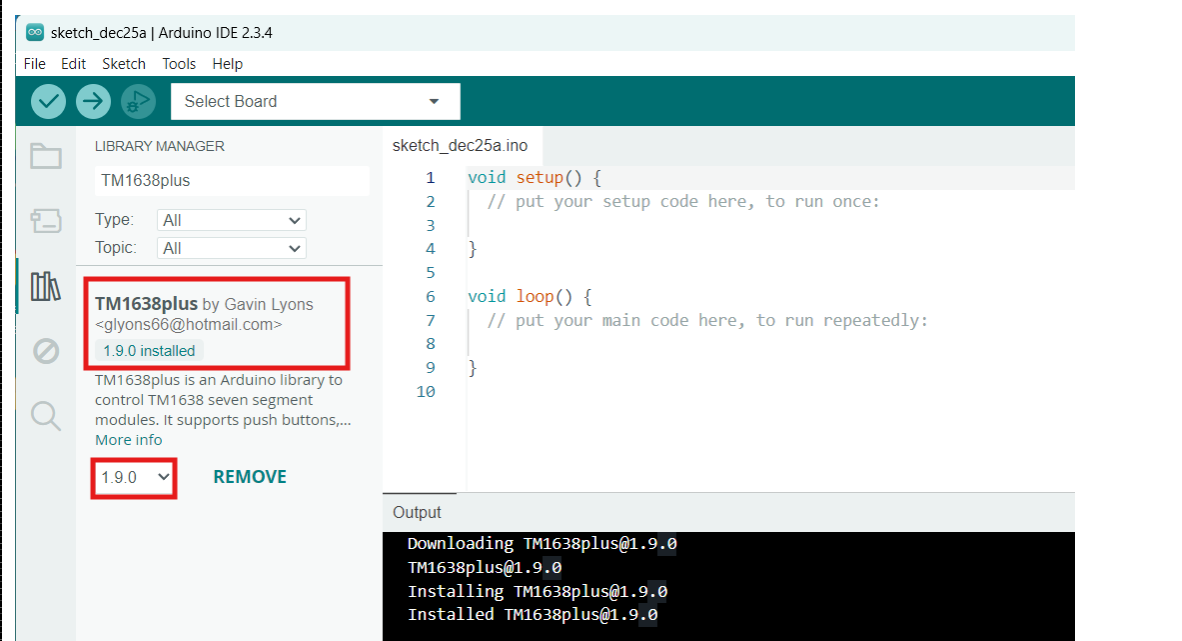
Getting Start ESP32: ESP32 GPIO + ESP32 Interface

Mission 5/12 – ESP32 + TM1638 7Segment Display Keypad & LED

1. 8-Digit 7 Segment Display with 8 LED and 8 Push Switches TM1638 BOARD
2. Read <https://www.cybertice.com/p/1350>
3. Read <https://www.allnewstep.com/p/1157>
4. Read https://megtestesules.info/hobbielektronika/2023/h2023_10.pdf



5. Add Library: Sketch → Include Library → Manage
6. Filter with “tm1638plus”, Select TM1638plus by Gavin Lyons Version 1.9.0

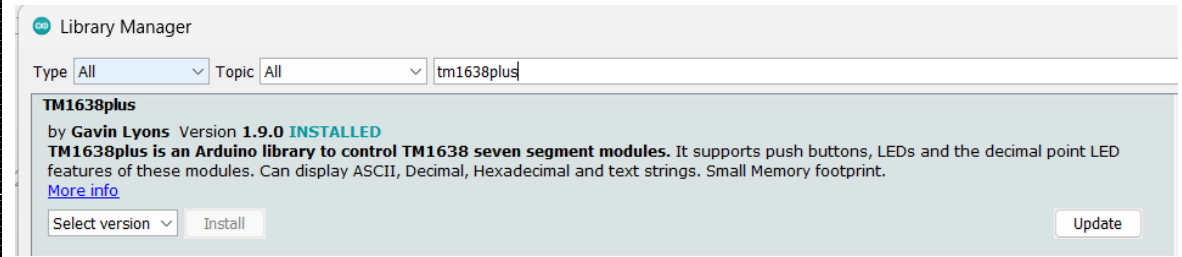


The screenshot shows the Arduino IDE 2.3.4 interface. The Library Manager is open, displaying the TM1638plus library by Gavin Lyons. The library is listed as "1.9.0 installed". The code editor shows a sketch named "sketch_dec25a.ino" with the following code:

```
1 void setup() {  
2   // put your setup code here, to run once:  
3 }  
4  
5  
6 void loop() {  
7   // put your main code here, to run repeatedly:  
8 }  
9  
10
```

The Output window at the bottom right shows the following messages:

```
Downloading TM1638plus@1.9.0  
TM1638plus@1.9.0  
Installing TM1638plus@1.9.0  
Installed TM1638plus@1.9.0
```



The close-up screenshot shows the Library Manager with the search filter set to "tm1638plus". The library "TM1638plus" by Gavin Lyons is listed as "Version 1.9.0 INSTALLED". The description states: "TM1638plus is an Arduino library to control TM1638 seven segment modules. It supports push buttons, LEDs and the decimal point LED features of these modules. Can display ASCII, Decimal, Hexadecimal and text strings. Small Memory footprint." The "Select version" dropdown is set to "1.9.0" and the "Install" button is visible.

TM1638plus by Gavin Lyons Version 1.9.0

7. Test Code 1 “Test01-Hello TM1638”

```
#include <TM1638plus.h>
#define pin_STB 21
#define pin_CLK 19
#define pin_DIO 18

TM1638plus tm(pin_STB, pin_CLK, pin_DIO);

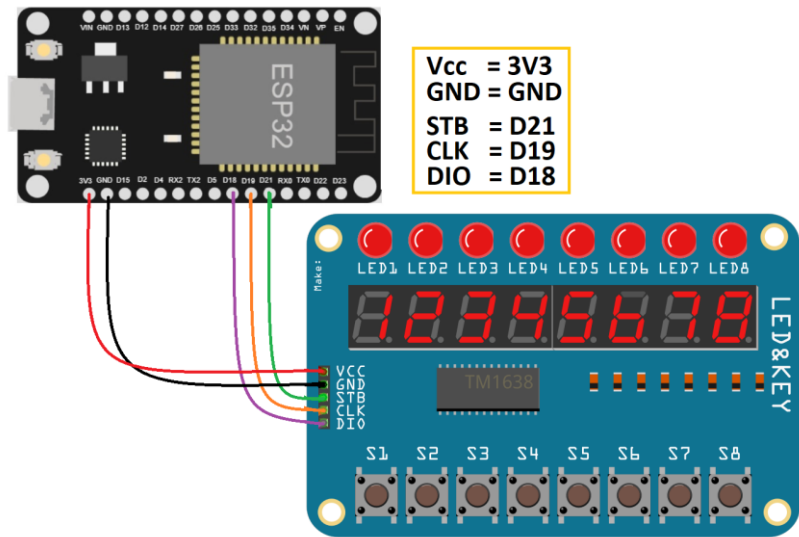
void setup() {
  Serial.begin(115200);
  tm.displayBegin();
  tm.brightness(6);
}

void loop() {
  tm.reset();
  tm.displayText("-Arduino");
  delay(2000);

  tm.reset();
  tm.displayASCIIwDot(0, '2');
  tm.displayASCII(1, '3');
  tm.displayASCII(2, '4');
  tm.displayASCII(3, '2');
  delay(2000);

  tm.reset();
  tm.displayHex(0, 0);
  tm.displayHex(1, 1);
  tm.displayHex(2, 2);
  tm.displayHex(3, 3);
  tm.displayHex(4, 4);
  tm.displayHex(5, 5);
  tm.displayHex(6, 6);
  tm.displayHex(7, 7);
  delay(2000);

  tm.reset();
  tm.displayHex(0, 8);
  tm.displayHex(1, 9);
  tm.displayHex(2, 0x0A);
  tm.displayHex(3, 0x0B);
  tm.displayHex(4, 0x0C);
  tm.displayHex(5, 0x0D);
  tm.displayHex(6, 0x0E);
  tm.displayHex(7, 0x0F);
  delay(2000);
}
```



8. Test Code 2 “Test02-Switch on Board”

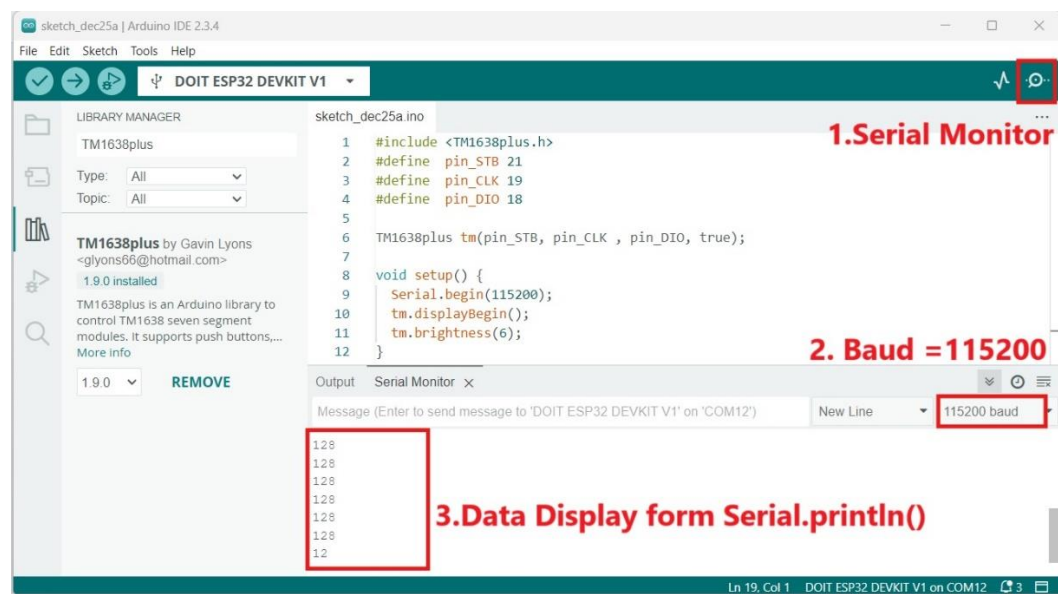
```
#include <TM1638plus.h>
#define pin_STB 21
#define pin_CLK 19
#define pin_DIO 18

TM1638plus tm(pin_STB, pin_CLK, pin_DIO, true);

void setup() {
  Serial.begin(115200);
  tm.displayBegin();
  tm.brightness(6);
}

void loop() {
  uint8_t buttons = tm.readButtons();
  Serial.println(buttons);
  delay(250);
}
```

- แสดงผลการทำงานที่ Serial Monitor



9. Test Code 3 “Test03-LED on Board”

```
#include <TM1638plus.h>
#define pin_STB 21
#define pin_CLK 19
#define pin_DIO 18

TM1638plus tm(pin_STB, pin_CLK, pin_DIO, true);

void setup() {
  Serial.begin(115200);
  tm.displayBegin();
  tm.brightness(6);
}

void loop() {
  uint8_t buttons = tm.readButtons();
  Serial.println(buttons);
  tm.reset();
  tm.displayText("-----");
  tm.setLED(0, ((buttons >> 0) & 1));
  tm.setLED(1, ((buttons >> 1) & 1));
  tm.setLED(2, ((buttons >> 2) & 1));
  tm.setLED(3, ((buttons >> 3) & 1));
  tm.setLED(4, ((buttons >> 4) & 1));
  tm.setLED(5, ((buttons >> 5) & 1));
  tm.setLED(6, ((buttons >> 6) & 1));
  tm.setLED(7, ((buttons >> 7) & 1));
  delay(250);
}
```

- >> คือ Shift Right
- & คือ bit and
- สมมุติ button = asdf ghij = 11011111
 - # (buttons >> 7) & 1) จะได้ a = 1
 - # (buttons >> 6) & 1) จะได้ s = 1
 - # (buttons >> 5) & 1) จะได้ d = 0
 - # (buttons >> 4) & 1) จะได้ f = 1
 - # (buttons >> 3) & 1) จะได้ g = 1
 - # (buttons >> 2) & 1) จะได้ h = 1
 - # (buttons >> 1) & 1) จะได้ i = 1
 - # (buttons >> 0) & 1) จะได้ j = 1

10. Test Code 4 “Test04-Switch, LED and Display”

```
#include <TM1638plus.h>
#define pin_STB 21
#define pin_CLK 19
#define pin_DIO 18

TM1638plus tm(pin_STB, pin_CLK, pin_DIO, true);

void setup() {
  Serial.begin(115200);
  tm.displayBegin();
  tm.brightness(6);
}

void loop() {
  uint8_t buttons = tm.readButtons();
  Serial.println(buttons);
  tm.reset();
  tm.displayText("-----");
  for (int i = 0; i < 8; i++) {
    bool DataBit = (buttons >> i) & 1;
    tm.setLED(i, DataBit);
    if (DataBit) tm.displayHex(i, i);
  }
  delay(250);
}
```

11. Test Code 5 “Test05-Switch Counter”

```
#include <TM1638plus.h>
#define DebounceDelay 100
#define Counter_Switch 0 // D0 or BOOT
#define pin_STB 21
#define pin_CLK 19
#define pin_DIO 18

int nCounter = 1234;
TM1638plus tm(pin_STB, pin_CLK, pin_DIO);

void TM1638_Display(int Temp) {
  int singleDigit;
  tm.reset();
  singleDigit = Temp % 10; Temp /= 10; tm.displayHex(7, singleDigit);
  singleDigit = Temp % 10; Temp /= 10; tm.displayHex(6, singleDigit);
  singleDigit = Temp % 10; Temp /= 10; tm.displayHex(5, singleDigit);
  singleDigit = Temp % 10; Temp /= 10; tm.displayHex(4, singleDigit);

  tm.displayASCII(0, 'C');
  tm.displayASCII(1, '\n');
  tm.displayASCIIwDot(2, 't');
  tm.display7Seg(3, 0b01001000); //tgfe dcba
}

void setup() {
  pinMode(Counter_Switch, INPUT_PULLUP);
  Serial.begin(115200);
  tm.displayBegin();
  tm.brightness(6);
  Serial.begin(115200);
  TM1638_Display(nCounter);
}

void loop() {
  if (digitalRead(Counter_Switch) == LOW) { // If Switch Press
    delay(DebounceDelay); // Debounce Delay H->L
    while (digitalRead(Counter_Switch) == LOW); // wait until release
    delay(DebounceDelay); // Debounce Delay L->H
    nCounter++;
    Serial.println(nCounter);
    TM1638_Display(nCounter);
  }
}
```

- กดปุ่ม BOOT จะนับจำนวนขึ้น +1
- How are the following commands different?
 - tm.displayASCII(0, 'C');
 - tm.displayASCIIwDot(2, 't');
 - tm.displayHex(4, singleDigit);
 - tm.display7Seg(3, 0b01001000); //tgfe dcba