Projekt współfinansowany w ramach programu Unii Europejskiej „Erasmus+”

ROBOSTEM IO2 – Programowanie mikrokontrolerów

Tytuł

Zbudowanie prostej gry “kółko I krzyżyk” za pomocą Arduino

Wymagane elementy

- Arduino Uno
- Ekran dotykowy 2.8”

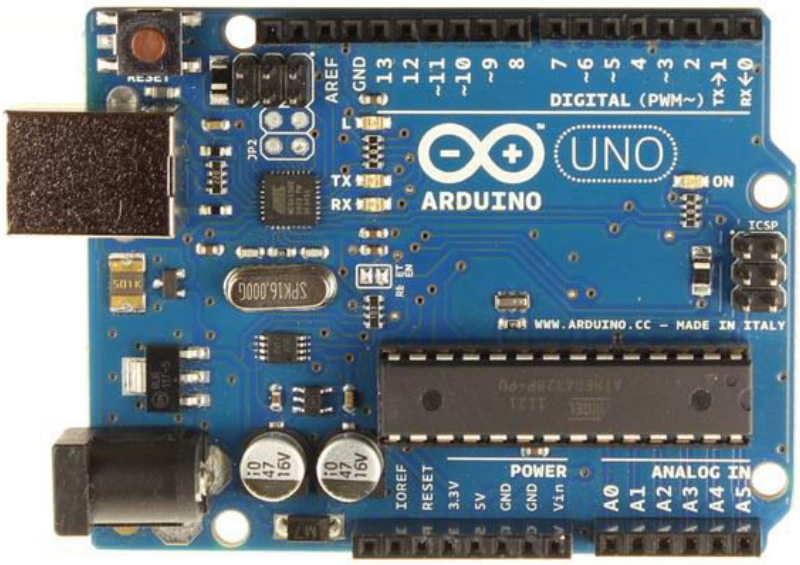
Inne:

- Komputer + kabel do programowania Arduino
- Podstawowa wiedza z zakresu elektroniki
- Podstawy programowania Arduino

Etapy montażu

Krok 1

Przygotuj Arduino UNO [1] i ekran dotykowy 2.8” [2]. Płytka powinna być ustawiona w taki sposób, aby dodatnia szyna napięciowa znajdowała się bliżej Ciebie

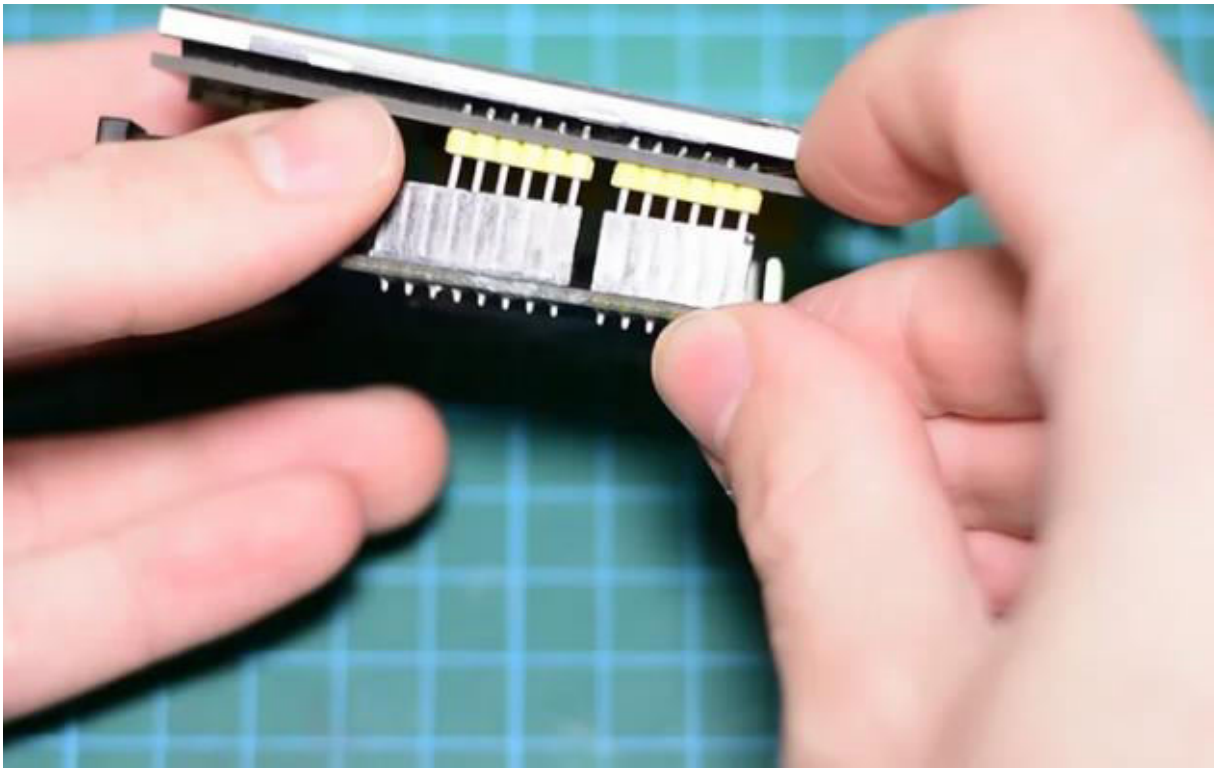


[1] Arduino UNO

[2] Ekran dotykowy2.8”

Krok 2

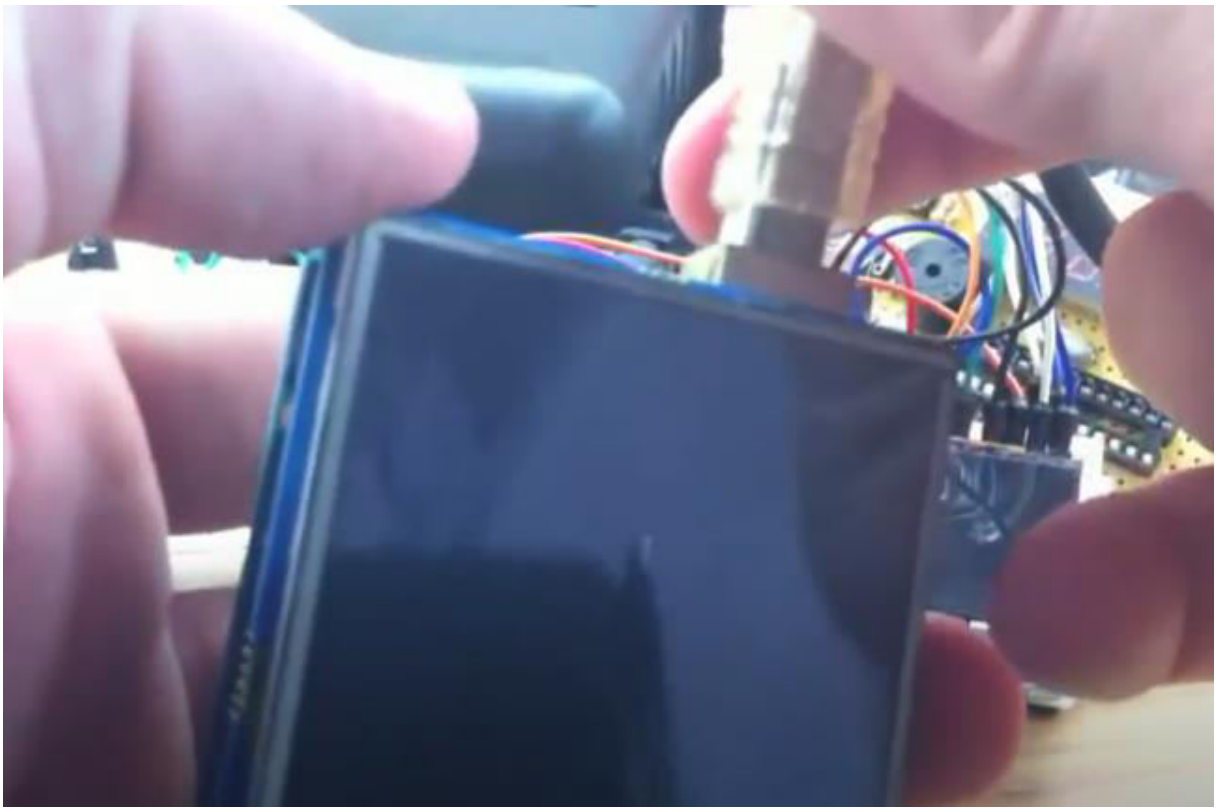
Podłącz Arduino UNO i ekran dotykowy 2.8”. [3]



[3] Montaż

Krok 3

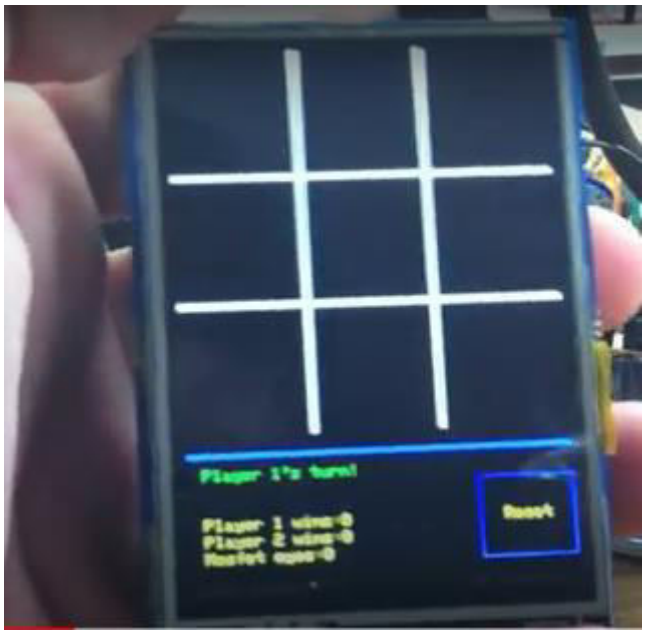
Połącz kable z komputerem.



[4] Podłączenie zmontowanych części do komputera

Krok 4

Po połączeniu, możemy załadować kod i jesteśmy gotowi do gry. *[5]*



[5] Gra jest gotowa!

Etapy kodowania

Krok 1

Dołącz niezbędne biblioteki

```
#include "TFTLCD.h"
#include "TouchScreen.h"
#include <EEPROM.h>
#if not defined USE_ADAFRUIT_SHIELD_PINOUT
#error "For use with the shield, make sure to #define USE_ADAFRUIT_SHIELD_PINOUT in the
TFTLCD.h library file"
#endif
```

Krok 2

To są piny dla ekranu!

```
#define YP A1  // must be an analog pin, use "An" notation!
#define XM A2  // must be an analog pin, use "An" notation!
#define YM 7   // can be a digital pin
#define XP 6   // can be a digital pin

#define TS_MINX 150
#define TS_MINY 120
#define TS_MAXX 920
#define TS_MAXY 940
```

Krok 3

Aby uzyskać lepszą precyzję nacisku, musimy znać rezystancję pomiędzy X+ i X- Użyj dowolnego multimetru, aby ją odczytać. W przypadku tego, którego używamy, jest to 300 omów na płytce X.

```
TouchScreen ts = TouchScreen(XP, YP, XM, YM, 300);

#define LCD_CS A3
#define LCD_CD A2
#define LCD_WR A1
#define LCD_RD A0
```

Krok 4

Kolory - 5:6:5.

```
#define  BLACK           0x0000
#define  BLUE            0x001F
#define  RED             0xF800
#define  GREEN           0x07E0
#define CYAN            0x07FF
#define MAGENTA         0xF81F
#define YELLOW          0xFFE0
#define WHITE           0xFFFF
#define TEST            0x1BF5
#define JJCOLOR         0x1CB6
#define JJORNG          0xFD03
```

```
TFTLCD tft(LCD_CS, LCD_CD, LCD_WR, LCD_RD, 0);
int i = 0;
int backlight = 3;

int upperleft = 0;
int uppermid = 0;
int upperright = 0;
int midleft = 0;
int center = 0;
int midright = 0;
int lowerleft = 0;
int lowermid = 0;
```

```
int lowerright = 0;
int ul = 1;
int um = 1;
int ur = 1;
int ml = 1;
int cent = 1;
int mr = 1;
int ll = 1;
int lm = 1;
int lr = 1;
int turn = 1;
int gameover = 0;
int ponewins = 0;
int ptwowins = 0;
int mosfets = 0;
char playerone [10];
char playertwo [10];
char eyes [10];
void setup(void) {
  tft.reset();
  pinMode(backlight, OUTPUT);
  Serial.begin(9600);
  for(i = 0 ; i <= 255; i+=1) {
    analogWrite(backlight, i);
    delay(2);
  }
  tft.reset();
  tft.initDisplay();
  tft.fillScreen(BLACK);
  tft.drawString(40, 150, "Tic Tac Touch", WHITE, 2);
  delay(1500);
  drawboard();
 // tft.drawChar(28, 20, 'X', RED, 5);
 // tft.drawChar(108, 20, 'X', RED, 5);
 // tft.drawChar(188, 20, 'X', RED, 5);
 // tft.drawChar(28, 100, 'X', RED, 5);
 // tft.drawChar(108, 100, 'X', RED, 5);
 // tft.drawChar(188, 100, 'X', RED, 5);
 // tft.drawChar(28, 180, 'X', RED, 5);
 // tft.drawChar(108, 180, 'X', RED, 5);
 // tft.drawChar(188, 180, 'X', RED, 5);
  pinMode(13, OUTPUT);
}
#define MINPRESSURE 10
#define MAXPRESSURE 1000
void loop()
{

  digitalWrite(13, HIGH);
  Point p = ts.getPoint();
  digitalWrite(13, LOW);
```

Krok 5

Jeśli udostępniasz piny, będziesz musiał ustalić kierunki pinów ekranu dotykowego!

```
//pinMode(XP, OUTPUT);
pinMode(XM, OUTPUT);
pinMode(YP, OUTPUT);
//pinMode(YM, OUTPUT);
// we have some minimum pressure we consider 'valid'
// pressure of 0 means no pressing!
if (p.z > MINPRESSURE && p.z < MAXPRESSURE) {

  /*
  Serial.print("X = ");
   Serial.print(p.x);
   Serial.print("\tY = ");
   Serial.print(p.y);
   Serial.print("\tPressure = ");
   Serial.println(p.z);
   */
  // turn from 0->1023 to tft.width
  p.x = map(p.x, TS_MINX, TS_MAXX, 240, 0);
  p.y = map(p.y, TS_MINY, TS_MAXY, 320, 0);

  Serial.print("p.y:");
```

Krok 6

Ten kod pomoże Ci uzyskać numery y i x dla ekranu dotykowego.

```
   Serial.print(p.y);
   Serial.print("   p.x:");
   Serial.println(p.x);


  // Upper Left
  if ((p.y > -4 && p.y < 74 && p.x > 3 && p.x < 82) && (ul == 1) && (gameover == 0)) {
    if (turn == 1) {
    tft.drawChar(28, 20, 'O', GREEN, 5);
    upperleft = 1;
    }
    if (turn == 2) {
    tft.drawChar(28, 20, 'X', RED, 5);
    upperleft = 2;
    }
    ul = 0;
    turntoggle();
    showturn();
  }




  // Upper Mid
  if ((p.y > -4 && p.y < 74 && p.x > 91 && p.x < 164) && (um == 1) && (gameover == 0)) {
    if (turn == 1) {
    tft.drawChar(108, 20, 'O', GREEN, 5);
    uppermid = 1;
    }
    if (turn == 2) {
    tft.drawChar(108, 20, 'X', RED, 5);
    uppermid = 2;
    }
    um = 0;
    turntoggle();
    showturn();
  }
```

```
    // Upper Right
    if ((p.y > -4 && p.y < 74 && p.x > 166 && p.x < 243) && (ur == 1) && (gameover == 0)) {
      if (turn == 1) {
      tft.drawChar(188, 20, 'O', GREEN, 5);
      upperright = 1;
      }
      if (turn == 2) {
      tft.drawChar(188, 20, 'X', RED, 5);
      upperright = 2;
      }
      ur = 0;
      turntoggle();
      showturn();
    }


    // Mid Left
    if ((p.y > 80 && p.y < 153 && p.x > 3 && p.x < 82) && (ml == 1) && (gameover == 0)) {
      if (turn == 1) {
      tft.drawChar(28, 100, 'O', GREEN, 5);
      midleft = 1;
      }
      if (turn == 2) {
      tft.drawChar(28, 100, 'X', RED, 5);
      midleft = 2;
      }
      ml = 0;
      turntoggle();
      showturn();
    }


    // Center
    if ((p.y > 80 && p.y < 153 && p.x > 91 && p.x < 164) && (cent == 1) && (gameover == 0))
{
      if (turn == 1) {
      tft.drawChar(108, 100, 'O', GREEN, 5);
      center = 1;
      }
      if (turn == 2) {
      tft.drawChar(108, 100, 'X', RED, 5);
      center = 2;
      }
      cent = 0;
      turntoggle();
      showturn();
    }


    // Mid Right
    if ((p.y > 80 && p.y < 153 && p.x > 166 && p.x < 243) && (mr == 1) && (gameover == 0))
{
      if (turn == 1) {
      tft.drawChar(188, 100, 'O', GREEN, 5);
      midright = 1;
      }
      if (turn == 2) {
      tft.drawChar(188, 100, 'X', RED, 5);
      midright = 2;
      }
      mr = 0;
      turntoggle();
      showturn();
    }
```

```
    // Lower Left
    if ((p.y > 162 && p.y < 240 && p.x > 3 && p.x < 82) && (ll == 1) && (gameover == 0)) {
      if (turn == 1) {
      tft.drawChar(28, 180, 'O', GREEN, 5);
      lowerleft = 1;
      }
      if (turn == 2) {
      tft.drawChar(28, 180, 'X', RED, 5);
      lowerleft = 2;
      }
      ll = 0;
      turntoggle();
      showturn();
    }


    // Lower Mid
    if ((p.y > 162 && p.y < 240 && p.x > 91 && p.x < 164) && (lm == 1) && (gameover == 0))
{
      if (turn == 1) {
      tft.drawChar(108, 180, 'O', GREEN, 5);
      lowermid = 1;
      }
      if (turn == 2) {
      tft.drawChar(108, 180, 'X', RED, 5);
      lowermid = 2;
      }
      lm = 0;
      turntoggle();
      showturn();
    }


    // Lower Right
    if ((p.y > 162 && p.y < 240 && p.x > 166 && p.x < 243) && (lr == 1) && (gameover == 0))
{
      if (turn == 1) {
      tft.drawChar(188, 180, 'O', GREEN, 5);
      lowerright = 1;
      }
      if (turn == 2) {
      tft.drawChar(188, 180, 'X', RED, 5);
      lowerright = 2;
      }
      lr = 0;
      turntoggle();
      showturn();
    }


    // Reset Area
    if (p.y > 270 && p.y < 318 && p.x > 189 && p.x < 246) {
      turn = 1;
      ul = 1;
      um = 1;
      ur = 1;
      ml = 1;
      cent = 1;
      mr = 1;
      ll = 1;
      lm = 1;
      lr = 1;
      upperleft = 0;
      uppermid = 0;
```

```
      upperright = 0;
      midleft = 0;
      center = 0;
      midright = 0;
      lowerleft = 0;
      lowermid = 0;
      lowerright = 0;
      gameover = 0;
      drawboard();
    }



    if ((upperleft == 1) && (uppermid == 1) && (upperright == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((upperleft == 2) && (uppermid == 2) && (upperright == 2) && (gameover == 0)) {
      playertwowin();
    }
    if ((midleft == 1) && (center == 1) && (midright == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((midleft == 2) && (center == 2) && (midright == 2) && (gameover == 0)) {
      playertwowin();
    }
    if ((lowerleft == 1) && (lowermid == 1) && (lowerright == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((lowerleft == 2) && (lowermid == 2) && (lowerright == 2) && (gameover == 0)) {
      playertwowin();
    }
    if ((upperleft == 1) && (midleft == 1) && (lowerleft == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((upperleft == 2) && (midleft == 2) && (lowerleft == 2) && (gameover == 0)) {
      playertwowin();
    }
    if ((uppermid == 1) && (center == 1) && (lowermid == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((uppermid == 2) && (center == 2) && (lowermid == 2) && (gameover == 0)) {
      playertwowin();
    }
    if ((upperright == 1) && (midright == 1) && (lowerright == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((upperright == 2) && (midright == 2) && (lowerright == 2) && (gameover == 0)) {
      playertwowin();
    }

    if ((upperleft == 1) && (center == 1) && (lowerright == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((upperleft == 2) && (center == 2) && (lowerright == 2) && (gameover == 0)) {
      playertwowin();
    }

    if ((upperright == 1) && (center == 1) && (lowerleft == 1) && (gameover == 0)) {
      playeronewin();
    }
    if ((upperright == 2) && (center == 2) && (lowerleft == 2) && (gameover == 0)) {
      playertwowin();
    }
    if ((upperleft != 0) && (uppermid != 0) && (upperright != 0) && (midleft != 0) &&
(center != 0) && (midright != 0) && (lowerleft != 0) && (lowermid != 0) && (lowerright !=
0) && (gameover == 0)) {
```

```
    catseye();
  }

}
}

void catseye() {
  tft.fillRect(10, 260, 96, 8, BLACK);
  tft.drawString(10, 275, "Mosfet Eye!", WHITE, 2);
  mosfets++;
  updatewins();
  gameover = 1;
}

void playeronewin() {
  tft.fillRect(10, 260, 96, 8, BLACK);
  tft.drawString(10, 275, "Player 1 wins!", WHITE, 2);
  ponewins++;
  updatewins();
  gameover = 1;
}
void playertwowin() {
  tft.fillRect(10, 260, 96, 8, BLACK);
  tft.drawString(10, 275, "Player 2 wins!", WHITE, 2);
  ptwowins++;
  updatewins();
  gameover = 1;
}
void turntoggle() {
  if (turn == 1) {
    turn = 2;
    return;
  }
  if (turn == 2) {
    turn = 1;
  }
}
void updatewins() {
  tft.fillRect(94, 290, 24, 8, BLACK);
  itoa (ponewins, playerone, 10);
  tft.drawString(94, 290, playerone, YELLOW);

  tft.fillRect(94, 300, 24, 8, BLACK);
  itoa (ptwowins, playertwo, 10);
  tft.drawString(94, 300, playertwo, YELLOW);

  tft.fillRect(82, 310, 24, 8, BLACK);
  itoa (mosfets, eyes, 10);
  tft.drawString(82, 310, eyes, YELLOW);
}



void showturn() {
  if (turn == 1) {
    tft.fillRect(10, 260, 96, 8, BLACK);
    tft.drawString(10, 260, "Player 1's turn!", GREEN);
  }
  if (turn == 2) {
    tft.fillRect(10, 260, 96, 9, BLACK);
    tft.drawString(10, 260, "Player 2's turn!", RED);
  }
}
void drawboard() {
  tft.fillScreen(BLACK);
tft.fillRect(78, 0, 4, 240, WHITE);
```

```
tft.fillRect(158, 0, 4, 240, WHITE);
tft.fillRect(0, 78, 240, 4, WHITE);
tft.fillRect(0, 158, 240, 4, WHITE);
tft.fillRect(0, 250, 240, 4, BLUE);
tft.drawRect(180, 270, 60, 50, BLUE);
tft.drawString(196, 290, "Reset", YELLOW);
showturn();
tft.drawString(10, 290, "Player 1 wins:", YELLOW);
tft.drawString(10, 300, "Player 2 wins:", YELLOW);
tft.drawString(10, 310, "Mosfet eyes:", YELLOW);
updatewins();
}
```