// PROJECT  :RotaryEncoderPrusaSimulation

// PURPOSE  :Simulates file selection on the Prusa MK3S Console

// DEVICE   :Arduino + (Adafruit 1447) LCD Appliance + Rotary Encoder

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// uC       :328p (Nano)

// COURSE   :ICS3U

// STATUS   :Working

#include <LiquidCrystal.h>  //LCD Library...

#define LCD\_COLUMNS 16      //Number of columns in Character LCD screen

#define LCD\_ROWS 2          //Number of rows on LCD screen

#define DEBUG false         //Conditional use of Serial support

//Pin assignments below are LCD Appliance-compatible

uint8\_t EN = 9, RS = 8, D4 = 7, D5 = 6, D6 = 5, D7 = 4;

LiquidCrystal lcd(RS, EN, D4, D5, D6, D7);

// Sample strings to be displayed and scrolled through...

String files[] = {

  "Andrew, Nathan",

  "Cruz, Austin",

  "Darou-Santos, Julian",

  "Gibson, Hunter",

  "Hooper, Elliott",

  "Ketema, Naol",

  "Lamarre, Thomas",

  "Le-Nguyen, Nathan",

  "Lowry, Thomas",

  "Malcolm, Evan",

  "Mi, Bertram",

  "Mulcahy, Keaton",

  "Noronha, Rhys",

  "Odoemelam, Daniel",

  "Padolina, Joaquin",

  "Park, Theodore",

  "Shen, Anka",

  "Smith, Jack",

  "Triger, Jones",

  "Willis, Nathaniel",

  "Xie, William",

};

uint8\_t numFiles = 21;  //must count them manually....

#define RE\_PINA 2   // A

#define RE\_PINB 3   // B

uint8\_t top = 0;    //index into the array of Strings

boolean CW = true;  //direction: CW or CCW (not CW)

volatile boolean triggered = false;

void setup() {

  if (DEBUG) {

    Serial.begin(9600);

    while (!Serial);

  }

  lcd.begin(LCD\_COLUMNS, LCD\_ROWS);  //initialize LCD screen

  updateDisplay(top);                //display the first two Strings

  // One external interrupt is sufficient to trigger an update

  attachInterrupt(digitalPinToInterrupt(RE\_PINA), ISR\_Rotary, CHANGE);

}

void loop() {

  if (triggered) {

    triggered = false;

    //1. Determine the direction (hardware (logic) strategy)...

    CW = digitalRead(RE\_PINA) ^ digitalRead(RE\_PINB);

    if (DEBUG) {            //Conditional Serial support

      Serial.println(CW);

      displayStates();

    }

    //2. Determine whether to decrement or increment the index of the array

    if (CW)  // Encoder is rotating CW, so increment index

      top = top < numFiles - 2 ? top + 1 : top;

    else {  // Encoder is rotating CCW, so decrement index

      top = top == 0 ? 0 : top - 1;

    }

    //3. Update the LCD...

    updateDisplay(top);

  }

}

void ISR\_Rotary() {  //Keep ISR bodies as short as possible

  triggered = true;

}

void updateDisplay(uint8\_t t) {

  lcd.clear();              //erase the LCD screen

  lcd.setCursor(0, 0);      //position display cursor at home

  lcd.print(files[t]);      //display (top) String on the first row

  lcd.setCursor(0, 1);      //position display cursor on second row

  lcd.print(files[t + 1]);  //display (top+1) String on the second row

}

//for Debugging purposes if necessary...

void displayStates() {

  uint8\_t stateA = digitalRead(RE\_PINA);

  uint8\_t stateB = digitalRead(RE\_PINB);

  Serial.print(stateA);

  Serial.print(',');

  Serial.println(stateB);

}