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/*
 * Program to transfer/receive serial data to/from 1802
 */
#include <avr/io.h>
#include <avr/portpins.h>

const byte Interrupt1802 = A2;
const byte ReadByteFrom1802 = A3;
const byte LatchByte = A5;
const byte ByteFrom1802 = 2;
const byte ACKFrom1802 = 3;
volatile byte ByteFrom1802Flag = 0;
volatile byte ACKfrom1802Flag = 0;
volatile byte TXDataReg;
byte RXDataReg;
const byte LEDpin = 13;

void InterruptFrom1802() {
  digitalWrite(ReadByteFrom1802,LOW);
  //Read Byte from 1802 OUTPUT 74373
  PORTC&=0xF7; //Need an extra delay before reading byte from 74373
  TXDataReg=(PIND & 0xF0) | (PINB & 0x0F);
  PORTC|=0x08;
  ByteFrom1802Flag=1;
}

void ACKInterrupt(){
  ACKfrom1802Flag=1;
}

void setup() {
  //Config Analog pins as Inputs
  pinMode(Interrupt1802,OUTPUT);
  pinMode(ReadByteFrom1802,OUTPUT);
  pinMode(LatchByte,OUTPUT);
  //Interrupt1802 and ReadByteFrom1802 must be HIGH as they are active LOW
signals
  PORTC|=0x0C;
  pinMode(LEDpin,OUTPUT);
  digitalWrite(LEDpin,LOW);
  //Serial.begin(115200);
  Serial.begin(921600);
  Serial.println("Ready");
  pinMode(ByteFrom1802, INPUT_PULLUP);
}

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attachInterrupt(digitalPinToInterrupt(ByteFrom1802), InterruptFrom1802, RISING);
  pinMode(ACKFrom1802, INPUT_PULLUP);
attachInterrupt(digitalPinToInterrupt(ACKFrom1802), ACKInterrupt, RISING);
}

void loop() {
  while (!Serial.available()){
    //While waiting for data from terminal/device, send any new byte in TXDataReg
    if (ByteFrom1802Flag){
      Serial.write(TXDataReg);
      ByteFrom1802Flag=0;
    }
  }
  RXDataReg=Serial.read();
  DDRD|=0xF0; //Pins 4,5,6,7 OUTPUTS
  DDRB|=0x0F; //Pins 8,9,10,11 OUTPUTS
  //Send RXDataReg byte to 1802
  PORTD=RXDataReg & 0xF0;
  PORTB=RXDataReg & 0x0F;
  //Latch byte RXDataReg in INPUT 74373
  PORTC|=0x20;
  PORTC&=0xDF;
  DDRD&=0x0F; //Pins 4,5,6,7 INPUTS
  DDRB&=0xF0; //Pins 8,9,10,11 INPUTS
  //Initiate 1802 INT
  digitalWrite(Interrupt1802, LOW);
  PORTC&=0xFB;
  digitalWrite(LEDpin, HIGH);
  PORTC|=0x04;
  while (!ACKfrom1802Flag){
    //Wait until 1802 ACKnowledges it has read the byte
  }
  digitalWrite(LEDpin, LOW);
}

```