

CampbellFinalProject.c

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/*
 * CampbellFinalProject.c
 * Peter Campbell
 *
 * A program that makes a robot autonomous. There are two photo-resistors on the
 * front
 * of the robot close to the ground. The robot follows the path laid out for
 * it by electrical tape.
 */
#include <hidef.h> /* for EnableInterrupts macro */
#include "derivative.h" /* includes peripheral declarations */
#include "Lib245QG.h" /* includes declarations for local library */
/*
 */

int leftSensor; /*Variable for left sensor ADC
int rightSensor; /*Variable for right sensor ADC

short leftTime = 158; /*Determines the pulse width to send to the
left motor
short rightTime = 148; /*Determines the pulse width to send to the
right motor

short leftFast = 164; /*Pulse width to turn the robot to the right
short rightFast = 133; /*Pulse width to turn the robot to the left

short leftSlow = 155; /*Helps turn left by slowing down left wheel
short rightSlow = 151; /*Helps turn right by slowing down right wheel

void checkWhiskers(void); /* a function to check the whiskers
void checkSensors(void); /* a function to check if the robot is crossing
the tape

void Forward(unsigned short nStep) { /* moves the robot forward
    int i;
    for (i=0; i<nStep; i=i+1) { /*Step forward for nStep
        checkWhiskers(); /*run the checkWhiskers function
        checkSensors(); /*run the checkSensors function
        PTAD |= 0x01; /*start left pulse
        Wait10muS(leftTime);
        PTAD &= 0xFE; /*end left pulse
        PTBD |= 0x20; /*start right pulse
        Wait10muS(rightTime);
        PTBD &= 0xDF; /*end right pulse
        WaitmS(18);
    }
}

void Left(unsigned short nStep) { /* Adjusts the to the robot left
    int i;
    for (i=0; i<nStep; i=i+1) {
        PTAD |= 0x01;
        Wait10muS(leftSlow);
        PTAD &= 0xFE;
        PTBD |= 0x20;

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    Wait10muS(rightFast);
    PTBD &= 0xDF;
    WaitmS(18);
}
}

void Right(unsigned short nStep) {           //Adjusts the robot to the right
    int i;
    for (i=0; i<nStep; i=i+1) {
        PTAD |= 0x01;
        Wait10muS(leftFast);
        PTAD &= 0xFE;
        PTBD |= 0x20;
        Wait10muS(rightSlow);
        PTBD &= 0xDF;
        WaitmS(18);
    }
}

void Back(unsigned short nStep) {           // moves the robot back
    int i;
    for (i=0; i<nStep; i=i+1) {
        PTAD |= 0x01;
        Wait10muS(rightTime);
        PTAD &= 0xFE;
        PTBD |= 0x20;
        Wait10muS(leftTime);
        PTBD &= 0xDF;
        WaitmS(18);
    }
}

void checkWhiskers(void) {                 // checks to see if the whiskers have hit
an object
    if (((PTAD & 0b000000100) == 0) & ((PTBD & 0b000000100) == 0)) {
        // checks if both whiskers have been touched
        Back(50);
        Left(27);
    }
    if (((PTAD & 0b000000100) == 0) & ((PTBD & 0b000000100) != 0)) {
        // checks if the right whisker has been touched
        Back(50);
        Left(27);
    }
    if (((PTAD & 0b000000100) != 0) & ((PTBD & 0b000000100) == 0)) {
        // checks if the left whisker has been touched
        Back(50);
        Right(27);
    }
}

void checkSensors(void) {                 // checks to see if the robot is close to
the tape
    leftSensor = Read1ADC(1);             // read the voltage from the left
photoresistor

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    rightSensor = Read1ADC(3);           // read the voltage from the right
photoresistor

    if (leftSensor > 720) {               //if the left sensor gets close to tape
turn left
        Left(3);
    }
    if (rightSensor > 795 ) {             //if the right sensor gets close to tape
turn right
        Right(3);
    }
}

void main(void) {                        //Main function containing infinite for loop
    EnableADCON(0b00001010);             //Enables pins 1 and 3 for ADC
    PTADD = 0x01;                         //Sets port for motor
    PTBDD = 0x20;                         //Sets port for motor
    SetClock16MHz();
    for(;;) {                             //Infinite
        Forward(10);                     //Goes forward 10 "steps"
    }
}

/*
 *
 * A robot may not injure a human being or, through inaction, allow a human being
to come
 * to harm.
 *
 * A robot must obey orders given to it by a human being except where such orders
 * would conflict with the first law.
 *
 * A robot must protect its own existence as long as such protection does not
conflict
 * with the first or second law.
 * Isaac Asimov's Three Laws of Robotics
 *
 *
 * Unless mankind redesigns itself by changing our DNA through altering our
 * genetic makeup, computer-generated robots will take over our world.
 * Stephen Hawking
 *
 */
```