Connecting and Programming the Sensors Board

Introduction

This small board is used to follow a line. It can be used for both, the following line competition and the bonus competition.

Basic description

This small board includes four sensors, referred as LS (left side sensor), LF (left front sensor), RF (right front sensor) and RS (right side sensor). These sensors have an emitter and a receiver embedded, allowing the robot to recognize a black line. The sensors will write a logic 0 in the Basic Stamp when it sees black, it will write a logic 1 when it sees white.

Connecting the board. Cable's color map

- Blue: LS
- Green: LF
- Yellow: RF
- White: RS

To connect the sensors board to the robot you have to plug the cable connector to the 6 pins headers of the board (this is the white part on the bottom of drawing 2. Make sure the red cable is in the left most pin header, where the red mark can be found. Also make sure that the indentation in the inverters chip is on the side of the red cable

The other cables' extremes should be connected as follows:
- Red cable to Vdd*.
- Black cable to Vss.
- The rest of the colors can be connected to any of the ports. Don't use the motors' ports!

*In a previous version of the instructions Vdd was called Vcc. Both are synonyms but Vdd is the one used in the Boe-bot
Programming the Sensors Board

We know that the sensor is going to write a logic 0 when it sees black. Therefore using a simple if statement inside a loop we can make the robot follow a black line until it loses it. An LED will be switched on when a black line is seen by the sensor. When the robot goes off the black the robot will stop the motors and will turn off the LED.

For this program we are going to connect the sensor in PORT7 and an LED (see how to connect an LED on the book) in PORT9.

' {$STAMP BS2}
' {$PBASIC 2.5}

irsensor VAR Bit

DO
  irsensor = IN7
  IF (irsensor = 0) THEN
    HIGH 9
    PULSOUT 12, 700
    PULSOUT 13, 800
  ELSE
    LOW 9
  ENDIF
LOOP
Appendix – Code to follow a line with the U of I sensor board

'Code to be used with the Sensor Board provided by the University of Idaho
'Note that the code is simple and does solve the problem, but it can be improved
'In fact we encourage you to change it and adapt it to your necessities

' ${STAMP BS2}
' {S$PBASIC 2.5}

'Constants definitions
BLACK CON 0
WHITE CON 1
RWHEEL CON 12
'650 is forward, 750 stop, 850 back

LWHEEL CON 13
'850 is forward, 750 stop, 650 back

'Variable definitions
sl VAR Bit 'right side sensor
sr VAR Bit 'left side sensor
fr VAR Bit 'right front sensor
fl VAR Bit 'left front sensor

DO
  fr = IN4   'blue
  sl = IN5   'green
  sr = IN6   'yellow
  fl = IN7   'white

  ' 0 is black
  ' 1 is white

  'DEBUG CLS
  'DEBUG "fr = ",DEC fr, CR
  'DEBUG "fl = ",DEC fl, CR
  'DEBUG "sr = ",DEC sr, CR
  'DEBUG "sl = ",DEC sl, CR

'normal navigation
  IF (fr = BLACK) AND (fl = BLACK) THEN 'move forward
    'DEBUG "Moving forward"
    PULSOUT RWHEEL, 720
    PULSOUT LWHEEL, 780
    'PAUSE 1
  ELSEIF (fr = WHITE) AND (fl = BLACK) THEN 'right out turn left
    PULSOUT RWHEEL, 720
    PULSOUT LWHEEL, 750
    }
' PAUSE 1
ELSEIF (fr = BLACK) AND (fl = WHITE) THEN    'left out turn right
        PULSOUT RWHEEL, 750
        PULSOUT LWHEEL, 780
        'PAUSE 1
ELSE                               'back up
        PULSOUT RWHEEL, 800
        PULSOUT LWHEEL, 700
        'PAUSE 1
ENDIF

'Turn on LED if we're moving forward
IF (sr = BLACK) OR (sl = BLACK) THEN
    HIGH 9
ELSE
    LOW 9
ENDIF

PAUSE 20

LOOP