Lecture 5 – Subprograms

Why Subprograms?

- If you have a common block of code that appears several times at different locations in your program, you may want to move that block of code into a subprogram (also known as subroutines, functions or methods).
- Splitting your program into subprograms usually results in better organized code that is much easier to maintain. It may result in smaller programs that use less memory (and require less typing) too.

PBASIC Subprograms

An example that uses a subprogram:

```plaintext
LOW RtMotor ' Initialization
LOW LtMotor
PAUSE 100
GOSUB GoForward
PAUSE 1000
GOSUB StopMotors
END

GoForward: 'Drive Forward
PULSOUT RtMotor, RtFwdFull
PULSOUT LtMotor, LtFwdFull
RETURN
```

Object Avoidance

- There are two IR emitters and an IR receiver on the front of the Scribbler.
The IR detector has a filter that allows it to see IR light flashing at around 38,500 Hz. We use FREQOUT to generate the proper frequency IR at one of the emitters:

ObsTxRight PIN 14
FREQOUT ObsTxRight, 1, 38500

A short duration (1 ms) is used so that only a short IR burst of light is emitted.

A short duration (1 ms) is used so that only a short IR burst of light is emitted.

The program on the following slides alternately emits a short IR pulse on the right and left emitters. After each pulse is sent we look for a reflection back to the detector.

The detector sends a low signal to PIN 6 (binary 0) if there is reflected IR. A high signal (1) is sent if there is no reflected IR.

Download (02_Eye_Test.bs2) from the web site. Run and then test it by holding a piece of paper about 6” in front of the robot.

I/O Pin Definitions
ObsRx PIN 6 ' IR detector
LedRight PIN 8
LedLeft PIN 10
ObsTxRight PIN 14 ' RT IR emitter
ObsTxLeft PIN 15 ' LT IR emitter

Variable Declarations
eyeRight VAR Bit
eyeLeft VAR Bit

Main Program
DO
GOSUB CheckRightIR 'Look RT
GOSUB TestRightIR 'Set LED
GOSUB CheckLeftIR 'Look LT
GOSUB TestLeftIR 'Set LED
LOOP
END

CheckRightIR:
FREQOUT ObsTxRight, 1, 38500
eyeRight = ObsRx
RETURN

TestRightIR:
IF (eyeRight = 0) THEN
  HIGH LedRight
ELSE
  LOW LedRight
ENDIF
RETURN

CheckLeftIR:
FREQOUT ObsTxLeft, 1, 38500
eyeLeft = ObsRx
RETURN

TestLeftIR:
IF (eyeLeft = 0) THEN
  HIGH LedLeft
ELSE
  LOW LedLeft
ENDIF
RETURN
Lecture 5 – Subprograms
Assignment

• Modify the test program so that the Scribbler turns to the left if there is an object on the right and turns to the right if there is an object on the right. Otherwise the Scribbler should move forward. Also check for a stalled condition and take appropriate action.

• Add bells and whistles as desired...