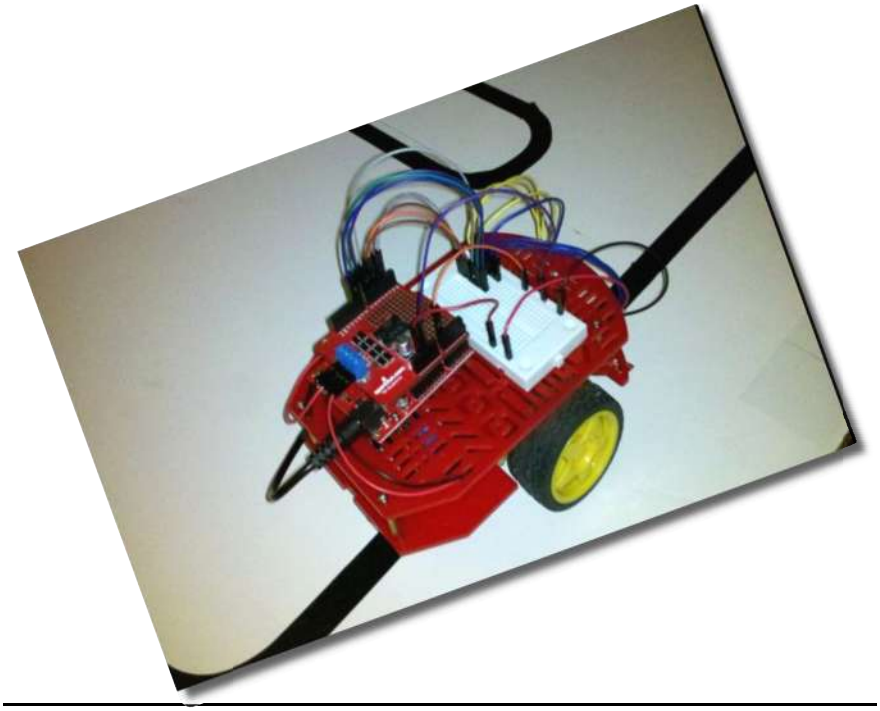

Problems Onsite

Subset A

Prerequisite :

structure of a C program, variables, data types, scanf(), printf()

1)Given 2 integers and 2 floating point numbers, print them in reverse order of input.

I/P

2 3 3.1416 2.7184

O/P

2.7184 3.1416 3 2

Subset B

Prerequisite :

Operators + , - , * , / , %

2)Given 2 integers, print their sum, difference, multiplication, division, remainder (MOD operator)

I/P

4 3

O/P

7

1

12

1

1

2A)Do the same with two floating point numbers.

Subset 3

Prerequisite : looping (For loop, While loop)

3)An arithmetic sequence can be defined as

starting number As, last term Ae, difference d

For example : 3 5 7 9 11 is an arithmetic sequence. Now you are given As, Ae and d. You have to print the sequence.

I/P

3 10 2

3 5 7 9

10 -5 -3

10 7 4 1 -2 -5

3)A geometric sequence can be defined as,

starting number As, last term Ae, ratio r

For example : 1 3 9 27 is an geometric sequence. Now you are given As, Ae and r you have to print the sequence .

I/P

5 50 3

5 15 45

3A)Print the sum of the previous two series.

$$\sum_{i=1}^{n} A_i$$ (Assuming there are n terms in the series)

4)You will be given 4 integers in each turn, Lets say these are analog inputs from a 4-Array IR sensor. And the threshold value of sensor is set to 500. So, if a value is >= 500 the sensor is in ON state else the sensor is in OFF state.

So, 123 456 678 123 -> here only 3rd sensor is ON.

567 123 908 32 -> here 1st and 3rd sensor are ON.

Your task is to define a logical step for left turn in a LFR.

For example , You will take inputs without any feedback till you get 1st sensor in ON state, if you get 1st sensor in ON state that means it's a condition for left turn. So, you print "Left turn" then you keep printing "Go forward" until you get all the sensors in OFF state. When you have all sensors OFF then you keep printing "Rotate left" until have two middle sensors (sensor no 2 and sensor 3) in ON state. Then you print "Go forward" and exit the program.

I/P	O/P
456 343 535 242	(No feedback)
342 534 534 535	(No feedback)

324 646 746 453	(No feedback)
512 635 536 245	("Left turn")
512 500 815 415	("Go forward")
512 565 953 20	("Go forward")
512 575 911 21	("Go forward")
512 565 913 24	("Go forward")
512 535 963 24	("Go forward")
32 32 32 32	("Rotate Left")
132 32 32 32	("Rotate Left")
232 32 32 32	("Rotate Left")
678 34 54 65	("Rotate Left")
678 334 54 65	("Rotate Left")
678 554 54 65	("Rotate Left")
678 794 54 65	("Rotate Left")
34 567 789 31	("Go forward")

End

Subset 4

Prerequisite : Array

5)Given an integer N. There are N integers. Then you are given another integer K. You have to print the Kth integer that was taken as input.

I/P

5

23 64 7547 353 -34

3

O/P

7547

5A)Given an integer N. There are N integers. Then you are given another integer K. You have to print the Kth even integer that was taken as input.

Extra : Exception handling : What if there are L even integers and L < K.

I/P

5

23 64 7542 353 34

3

O/P

34

I/P

5

23 64 7542 353 34

5

O/P

L < K

6)Given an integer N. Then you are given values of a N-array IR sensor. Threshold value T is given next. You have to print the number of sensors in ON state and then their index, same for OFF sensors.

I/P

6	<- N
354 657 345 688 575 657	<- Sensor values
400	<- K

O/P

4	<- In ON state

2 4 5 6

2

1 3

7) Given an integer N (N is always even). Threshold value T is given next. After that you are given an integer Q.

Assume you have an N-array IR sensor.

The weights of (N/2)th sensor is - 100 and (N/2 + 1)th sensor is +100.

The weights of (N/2 - 1) th sensor is -200 and (N/2 + 2) th sensor is +200.

The weights of (N/2 - 2) th sensor is -300 and (N/2 + 3) th sensor is +300.

Sensor Index : 1 2 3 4 5 6 7 8

Sensor Weight : -400 -300 -200 -100 100 200 300 400

The Current position of sensor is calculated based on ,

$$\sum_{i=1}^{n} \text{Weight}(i) * \text{State}(i)$$

Where, Weight(i) denotes the weight of the ith sensor and State(i) denotes the state of the ith sensor. And, when the analog value of

ith sensor is >= T (Threshold value) the sensor is in ON state and State(i) = 1 else State(i) = 0.

Now, you need to write a logical code segment that can be used as a basic Controller.

Hints :

For our LFR, we want our robot to be in the middle position of line so (N/2)th sensor and (N/2 + 1)th sensor should be in ON state (Assuming in default setup our 2 sensors can catch line or only two sensors stay on line) then position = -100 + 100 = 0

And that's our desired state.

So, if our position is 0 we print "Go forward".

If position is < 0 that means left sensors are on line (left sensors have (-) weight) so we must move to right, we print "Right MOVE" .

If position is > 0 that means right sensors are on line (right sensors have (+) weight) so we must move left, we print "Left MOVE".

When, all the sensors are in ON state, then position = ... -300 -200 -100 + 100 + 200 + 300 ..... = 0. (Think about this state later)

So, After these you are given Q queries (A sensor state), N integers in next Q lines containing the sensor states for that iteration.

You need to print the position of sensor based on above formula and also print the statements ["Go forward" , "Right MOVE" , "Left MOVE"] based on current sensor position .

I/P Format Again

N T Q

s1 s2 s3 s4 ..... sn

s1 s2 s3 s4 ..... sn

s1 s2 s3 s4 ..... sn

.....(Q-1 times)

s1 s2 s3 s4 ..... sn

O/P Format Again

300 <- Position

Left MOVE <- Action

I/P

4 600 4

945 675 646 454

600 900 800 600

89 780 980 32

450 390 890 610

Subset 5

Prerequisite : Function

8)Write a motor_drive() function with four arguments right_motor_speed, left_motor_speed, right_motor_direction, left_motor_direction which will given as input.

If ***t_motor_direction == 1 then print , "*** motor forward"

else If ***t_motor_direction == -1 then print , "*** motor backward"

Print in the following format ,

Right Motor Speed : 167

Right motor forward/backward

Left Motor Speed : 67

Left motor forward/backward

I/P

120 <- Right Motor Speed

1 <- Right Motor Direction

60 <- Left Motor Speed

-1 <- Left Motor Direction

O/P

Right Motor Speed : 120

Right motor forward

Left Motor Speed : 60

Left motor backward

9)Calculate the mathematical function ,

F(x,y,z) = √[(x+y+z)/(x*y*z)]

I/P

3 5 6

O/P

.3944

Prepared by :

Zabir Al Nazi Nabil, ECE 2k14.

zabiralnazi@codeassign.com

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