

BE1010 - Fall 2004

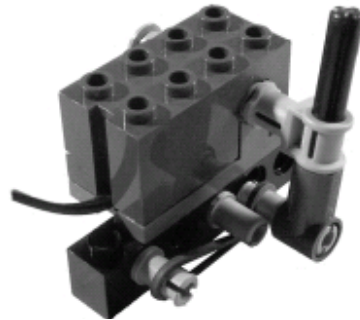
Name: _____

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Quiz # 10 [25 minutes; [open book & course webpage ONLY!](#)]

Solve only one problem (Use the back of this sheet for you solution)

- I. (10 Points) Write an NQC program that allows the rotation sensor assembly shown below to emulate a touch sensor. Assume that the rotation sensor is connected to input Port#1. The RCX should play a sound (of your choice) if the lever is pulled.

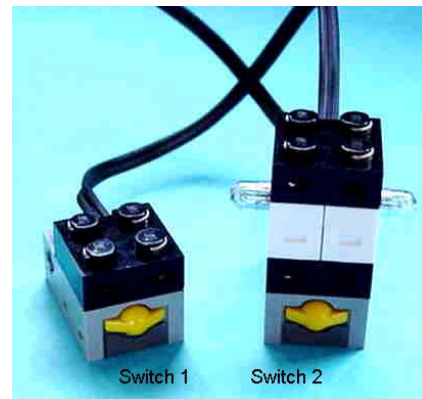


```
task main ()
{
  SetSensorType (SENSOR_1, SENSOR_TYPE_ROTATION);
  ClearSensor (SENSOR_1);

  while (true)
  {
    if(SENSOR_1 > 1 || SENSOR_1 < -1)
    {
      PlaySound (SOUND_DOUBLE_BEEP);
      Wait(50);
    }
  }
}
```

- II. (12 points) Write an NQC program that allows the following touch sensor multiplexer to steer TankBot. Assume the multiplexer has a long connector and is connected to Port #1. Your program should allow you to driver TankBot as follows: if switch#1=1 & switch#2=1, drive forward; if switch#1=0 & switch#2=0, stop; if switch#1=1 & switch#2=0, turn right; if switch#1=0 & switch#2=1, turn left.

Switch#1	Switch#2	Safe NQC Ranges
0	0	RAW >1000
0	1	43 < RAW < 60
1	0	70 < RAW < 200
1	1	RAW < 42



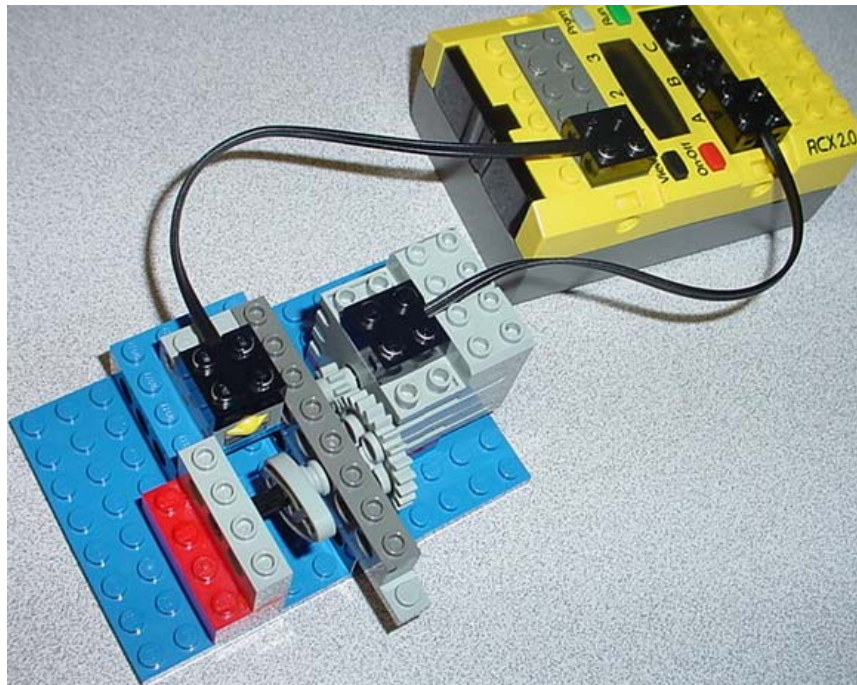
```

task main ()
{
  SetSensorType (SENSOR_1, SENSOR_TYPE_TOUCH);
  SetSensorMode (SENSOR_1, SENSOR_MODE_RAW);

  while (true)
  {
    if (SENSOR_1 > 1000) Off(OUT_A+OUT_C);
    if (SENSOR_1 < 42) OnFwd(OUT_A+OUT_C);
    if (SENSOR_1 > 70 && SENSOR_1 < 200) {OnFwd(OUT_A); OnRev(OUT_C);}
    if (SENSOR_1 > 43 && SENSOR_1 < 60) {OnRev(OUT_A); OnFwd(OUT_C);}
  }
}

```

III. (12 points) Write an NQC program that allows the following touch sensor system to emulate a rotation sensor. Your program should support positive and negative (i.e., clockwise and counter clockwise rotation) readings. Assume the touch sensor is connected to Port #1 and that a motor connected to OUT_A drives the cam's axle.



Solution with uni-directional readings (insensitive to direction of rotation):

```
task main ()
{
  SetSensorType (SENSOR_1, SENSOR_TYPE_TOUCH);
  SetSensorMode (SENSOR_1, SENSOR_MODE_PULSE);

  while (true)
  {
    OnFwd(OUT_A);
    SetUserDisplay (SENSOR_1,0);
  }
}
```

Solution with bi-directional reading (sensitive to the direction of rotation):

```
int x;

task main ()
{
  SetSensorType (SENSOR_1, SENSOR_TYPE_TOUCH);
  SetSensorMode (SENSOR_1, SENSOR_MODE_PULSE);

  start counter_touch;
  while (true)
  {
    OnFwd(OUT_A);
    x = 1;
    Wait(500);
    OnRev(OUT_A);
    x = -1;
    Wait(700);
  }
}

task counter_touch()
{
  int y, sensor_temp, count_value;
  count_value = 0;
  y = 0;
  while(true)
  {
    sensor_temp = SENSOR_1;
    until(SENSOR_1 != sensor_temp);
    if(x == 1) count_value = count_value + 1;
    if(x == -1) count_value = count_value - 1;
    y = count_value;
    SetUserDisplay (Y,0);
  }
}
```