Unit 5: Rover's Sensors — Skill Builder 3: The COLORINPUT sensor

In this third lesson of Unit 5, we introduce the COLORINPUT sensor and use its value to cause the Rover to change direction.

Objectives:

- READ COLORINPUT
- Use the value to change the Rover's direction

The Rover has a COLORINPUT sensor on the bottom. The light shining at the floor is used by the sensor to better 'see' the color on the floor. We'll write a program to turn the Rover when it 'sees' a change in color. The color seen by the sensor is converted by the TI-Innovator™ Hub into one of nine possible values that represent colors:

1 = Red
2 = Green
3 = Blue
4 = Cyan
5 = Magenta
6 = Yellow
7 = Black
8 = White
9 = Gray

1. Begin the program in the usual manner.

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
:ClrHome
:Disp "ROVER UNIT5 SB3"
:Send("CONNECT RV")
:Pause "PRESS ENTER TO STA
RT"
:
:
:
:
```

2. We'll use a **For** loop to cause the Rover to move and turn four times.

3. **End** is the end of the **For** loop structure.

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
:ClrHome
:Disp "ROVER UNIT5 SB3"
:Send("CONNECT RV")
:Pause "PRESS ENTER TO STA
RT"
:For(I,1,4)
:
:
:End
```

4. We will use a **While** loop to look for a change in color but first we need to know what color the Rover currently 'sees'. We **READ RV.COLORINPUT**, and **Get** its value into the variable ***C*** in the calculator.

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
:ClrHome
:Disp "ROVER UNIT5 SB3"
:Send("CONNECT RV")
:Pause "PRESS ENTER TO STA
RT"
:For(I,1,4)
:Send("READ RV.COLORINPUT"
)
:Get(C)
```

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5. We then initialize another variable, ***D***, to get the **While** loop started. ***D*** will hold the color the Rover sees while it is moving. Initially, we set ***D*** to be the same as ***C***. Then, we start the Rover moving **FORWARD**.

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
:Send("CONNECT RV")
:Pause "PRESS ENTER TO STA
RT"
:For(I,1,4)
:Send("READ RV.COLORINPUT"
)
:Get(C)
:C→D
:Send("RV FORWARD 100")
```

6. We now code the **While** loop to compare ***D*** with ***C*** because, inside the **While** loop, we'll look for a change in the value of ***D***.

   The 'equals' sign is located in the [test] menu ([2nd] [math]).

7. Don't forget to add an **End** statement for the **While** loop (not shown).

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
RT"
:For(I,1,4)
:Send("READ RV.COLORINPUT"
)
:Get(C)
:C→D
:Send("RV FORWARD 100")
:Wait 1
:While D=C
```

8. Inside the **While** loop, we monitor the color sensor as long as the Rover is moving. We store the color value in variable ***D***. The loop ends when ***D*** (the 'current' color) is *different* from ***C*** (the 'original' color).

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
:Get(C)
:C→D
:Send("RV FORWARD 100")
:Wait 1
:While D=C
:Send("READ RV.COLORINPUT"
)
:Get(D)
:End
```

9. At the end of the **While** loop, we tell the Rover to **STOP** and go **RIGHT**. Notice that these two statements fall between the two **End**s of the program. The second **End** is the end of the **For** loop, so the program causes the Rover to turn right four times when it detects a change in the color of the surface.

10. Add a **FORWARD 1** command and a **Wait 1** statement so that the Rover moves *away* from the colored spot before the program loops back to detect the new 'original' color (***C***) again.

```
NORMAL FLOAT AUTO REAL RADIAN MP
EDIT MENU: [alpha] [f5]
PROGRAM:ROVER53
:Send("READ RV.COLORINPUT"
)
:Get(D)
:End
:Send("RV STOP ")
:Send("RV RIGHT ")
:Send("RV FORWARD 1")
:Wait 1
:End
```

11. Test your program on the floor on a surface of uniform color (white). Place an approximately 5 cm by 5 cm contrasting color (black) spot on the floor in the Rover's path so that the COLORINPUT sensor will see it. When the Rover passes over the spot, it should stop, and then turn and go again. Pick up the color spot, and place it in front or the Rover again. This will have to happen four times for the program to complete.

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Teacher Tip: The completed program:

VAR NAME: ROVER53

```
ClrHome
Disp "ROVER UNIT5 SB3"
Send("CONNECT RV")
Pause "PRESS ENTER TO START"
For(I,1,4)
   Send("READ RV.COLORINPUT")
   Get(C)
   C→D
   Send("RV FORWARD 100")
   Wait 1
   While D=C
      Send("READ RV.COLORINPUT")
      Get(D)
   End
   Send("RV STOP ")
   Send("RV RIGHT ")
   Send("RV FORWARD 1")
   Wait 1
End
```

Indentations are for illustration only.

Teacher Tip: It's possible that small variations in the surface might cause the Rover to turn unexpectedly. Even a line between tiles on a floor can result in a color change. The COLORINPUT sensor is very sensitive.