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ColorPAL (#28380) and VGA Spin Demo

Please note: This demo was created to support the 2013 National microMedic Contest kits, which are no longer available.

The ColorPAL sensor can be used to allow your microcontroller project to discern the color of an object positioned under its sensing area. The sensor returns its readings in 24-bit RGB color.

This demo will show you how to wire the ColorPal to your Propeller Board of Education and demonstrate the use of the included Spin language demo code. This demo reports the raw color readings to both the serial terminal and to a VGA display. The VGA display also changes its background color to a 6-bit match of what the sensor is seeing. Since color information is lost in the conversion between 24-bit to 6-bit color, the VGA display's background colors will be an approximation.
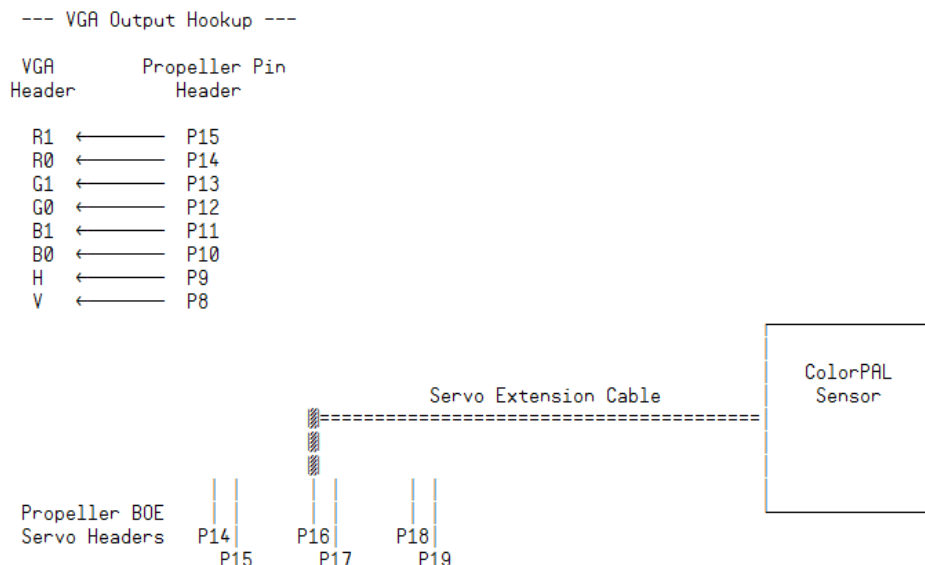
Demo Part Requirements

(1) Propeller Board of Education
(1) ColorPAL Sensor
(1) Servo Extension Cable
(8) Jumper Wires
(1) VGA Display

Note: In the code download, unzip the Spin archive before opening the programs.
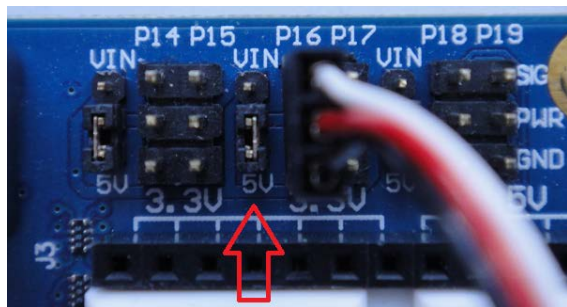
Connections

The connection diagram below shows how to connect the Propeller microcontroller I/O pins to the VGA header on the Propeller Board of Education. The connection diagram also shows you which servo header to connect the ColorPAL sensor to, via the servo extension cable. The diagram can also be found in the source code file "ColorPAL DEMO.spin".

```
--- VGA Output Hookup ---

VGA             Propeller Pin
Header              Header

  R1  ←————————  P15
  R0  ←————————  P14
  G1  ←————————  P13
  G0  ←————————  P12
  B1  ←————————  P11
  B0  ←————————  P10
  H   ←————————  P9
  V   ←————————  P8

                                                    ┌──────────┐
                                                    │ ColorPAL │
                            Servo Extension Cable   │  Sensor  │
                      ▓══════════════════════════════│          │
                      ▓                              │          │
                      ▓                              │          │
                                                    │          │
         │ │      │ │      │ │                       └──────────┘
Propeller BOE │ │      │ │      │ │
Servo Headers  P14│    P16│    P18│
                 P15     P17     P19
```

When connecting the ColorPAL sensor with the servo extension cable, make sure that you connect the sensor to the cable, and the cable to the Propeller Board of Education correctly. There are labels on the back of the ColorPAL sensor that tell you which way the servo extension cable should be connected, but it is a little less obvious on the Propeller Board of Education. On the upper right-hand corner of the Propeller Board of Education, there is a servo port with six servo headers, in three groups of two. Connect the servo extension cable to the "P16" port, with the white wire closest to the "P16" label.

Additionally, make sure that servo port that the ColorPAL is plugged into is configured to output 5 volts. Do this by verifying that the tiny jumper just to the left of the ColorPAL's extension cable is set to the 5V setting. The following image is a close-up of how this jumper should be configured:

Programming

Once you have correctly wired the jumper wires from the Propeller's I/O pins to the VGA header on the Propeller Board of Education and connected to the ColorPAL, download the demonstration program to the Propeller Board of Education. To do this, open the "ColorPAL DEMO.spin" source code file with the Propeller Tool. To download the program, click Run>>Compile Current>>Load RAM, or press the F10 key on your keyboard. After you have programmed the Propeller BOE, the demo program will start and you should see the board come to life - the ColorPAL sensor should turn on and take readings and the VGA LEDs will light up.
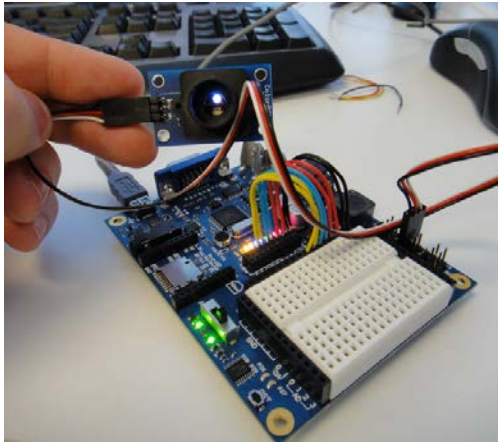
Try sampling different colors by moving the ColorPAL's sensor opening over different colored objects. I've noticed that the best readings seem to come from non-reflective objects while positioning the sensor about 1/4 inch above the object.

To see output on your VGA monitor, simply connect the monitor to the Propeller BOE's VGA port on the left side of the board. The background color on the VGA display will change to a rough representation of the color that the sensor is reading, while the text color will be inverted to keep a high contrast with the background color.

To see output on the Parallax Serial Terminal, open the Parallax Serial Terminal program, or press F12 on your keyboard. Then select the correct COM port and Baud Rate. The baud rate you select should match the PC_BAUD setting in the source code; the default baud rate in the source code is 115,200 baud. Here is a screenshot of what you should see on the Parallax Serial Terminal, should you choose to open it.