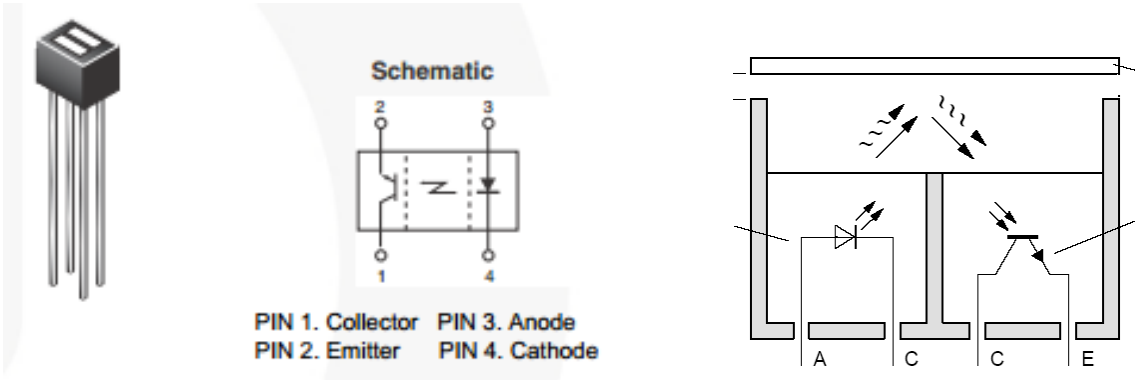
ME 220

Interfacing QRD1114 to Arduino

Objective:
The objective of this lab is to interface QRD1114 to Arduino and use it as a distance / color sensor.

Pre-Lab:
Find the datasheet of QRD1114 on the internet and go over the datasheet.

The operational principal of the QRD1114 is quite simple. There is one LED emitting an IR beam (see figure 1) which then reflects back from a surface. The reflected part of the beam falls on to a photo-transistor. Based on the intensity of the reflection, the transistor will allow a certain amount of current to flow over it.



a) QRD1114 package b) QRD1114 schematic c) Operation principle

Figure 1. QRD1114: an IR transmitter-receiver pair

Lab:

In this lab you will implement the circuit given in Figure 2 and experiment with it under two different conditions.

First implement the circuit shown in Figure 2 on your breadboard. For R1 use a low resistance (such as 100-470Ω which ever available) and for R2 use a larger resistance such as 10K-47KΩ. Once you are done interfacing the QRD1114 to your Arduino, write a program that will send the analog value on port A0 to the PC through the serial port.

Once you verify that you can read values on the PC, start experimenting with the setup.

1) Take an object with a flat face. In a controlled manner move it back and forth in front of the QRD1114 and observe how the reading changes.
2) Get a piece of white paper. With a pencil, create either a linear of circular test pattern similar to the ones shown in figure 3, or just print it if a printer is available. Move the

test pattern at a fixed distance from the sensor and observe that you can detect/count the transitions between black and white regions.

3) Place QRD1114 at a certain distance from surfaces of different colors and observe that sensor located at the same distance to different surfaces result in different sensor readings.
4) Now interface **a pot in series with R1**, and add a **1 KΩ resistance in parallel with the pot**, and **add a 100Ω resistance in parallel with R1**. Explain the effect of changing POT resistance on the detection characteristics of the QRD1114.

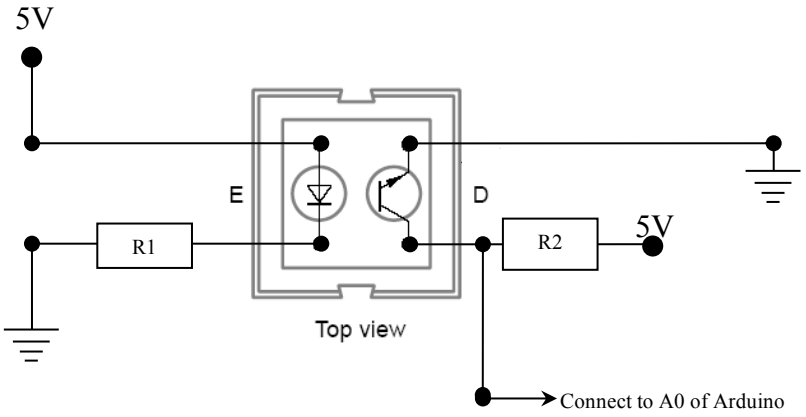


Figure 2. CNY 70 test circuit

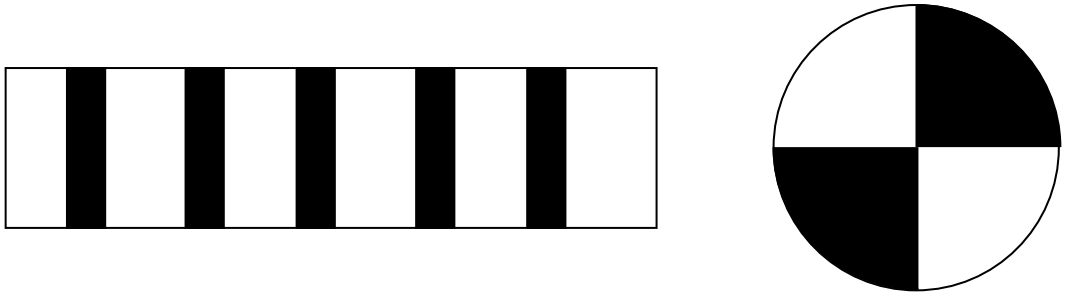


Figure 3. Test patterns