Integrated Design Project
Electrical Documentation

IDP Group L102

Downing College

Team: root g

Robots: e, π

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Modules in use

Module	Purpose / Components
Arduino	Micro controller - bridge between software and hardware
Motor Shield	Bridge between motors and Arduino
1308 Motor	High rpm motor to drive wheels
Servo Motor	Control orientation of distance sensor for mapping
LED indicators	Indicate which part of the code is being executed
Colour Sensor	LEDs + Colour Filter + LDR & Phototransistor Detect colours (red & blue)
Distance Sensor	Ultrasonic Distance Sensor – detect walls IR Distance Sensor -detect blocks

Table 1. List of modules and their components

Protoboard

Parts List

Part Number	Value	Notes
R1, R5	10kΩ	Set a potential divider together with LDR / Phototransistor
R2, R3, R4, R6	150Ω	Value calculated below
J1	-	Header Right Angle 4-Pole to connect Ultrasonic Distance Sensor
J2	-	Header Right Angle 3-Pole to connect IR distance sensor
T1	SFH 313A	IR NPN Phototransistor
T2	NSL 5112	LDR
LED1, LED4	-	LED 3mm Red / Blue (depends on the colour of the robot)
LED2	-	LED 3mm Blue used as indicator
LED3	-	LED 3mm Red used as indicator
Sensor	-	IR Distance Sensor GP2Y0A02YK0F 150cm
Sensor	-	Ultrasonic Distance Sensor

Table 2. Parts list for the protoboard

Calculations:

$$\text{R2 = R3= ... = R7 = } \frac{V_{cc}-V_{LED}}{I} = \frac{5-2}{20\times10^{-3}} = 150\ \Omega$$

Circuit Diagram:

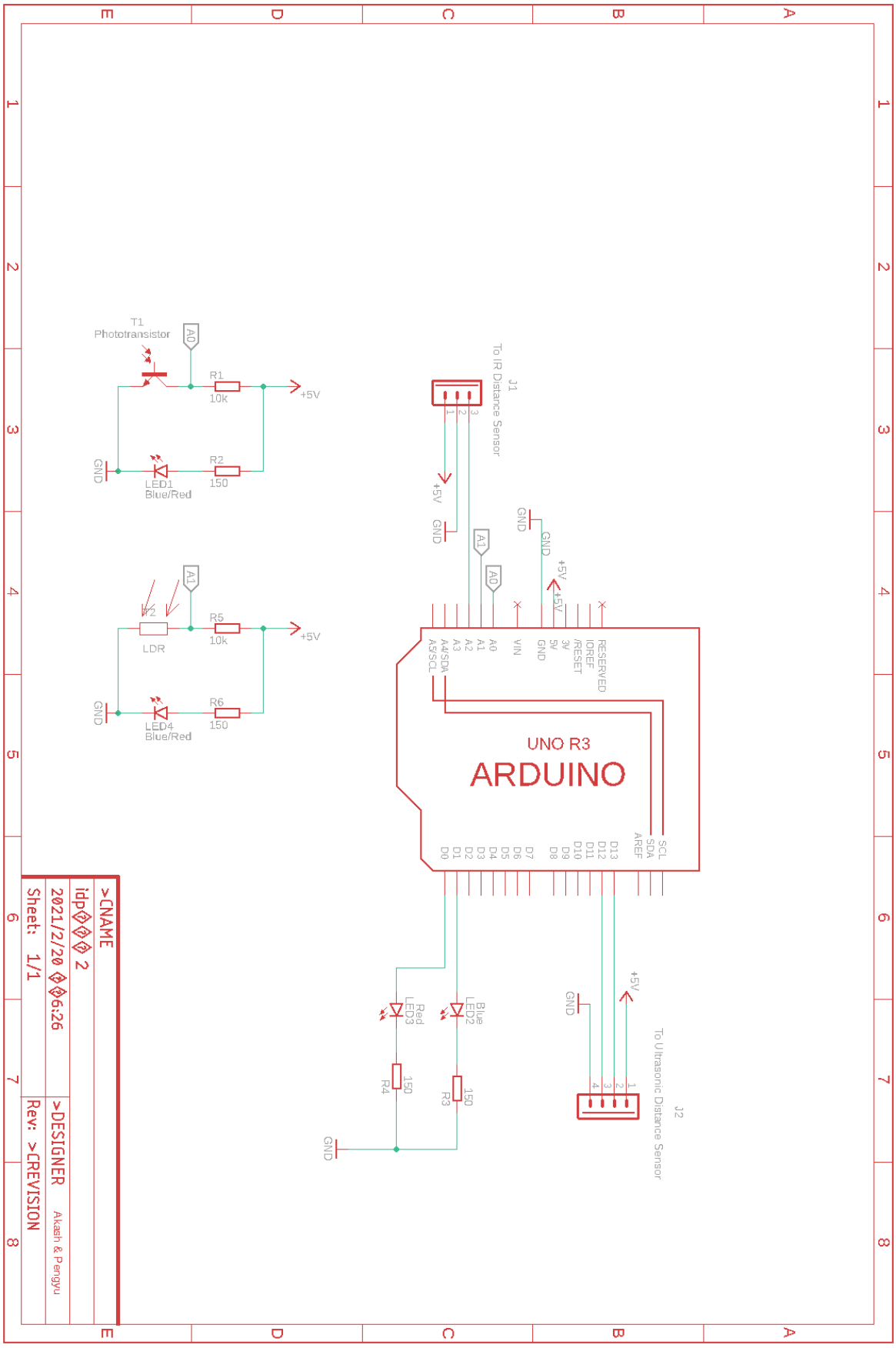

Figure 1. Circuit Diagram

Board Layout:

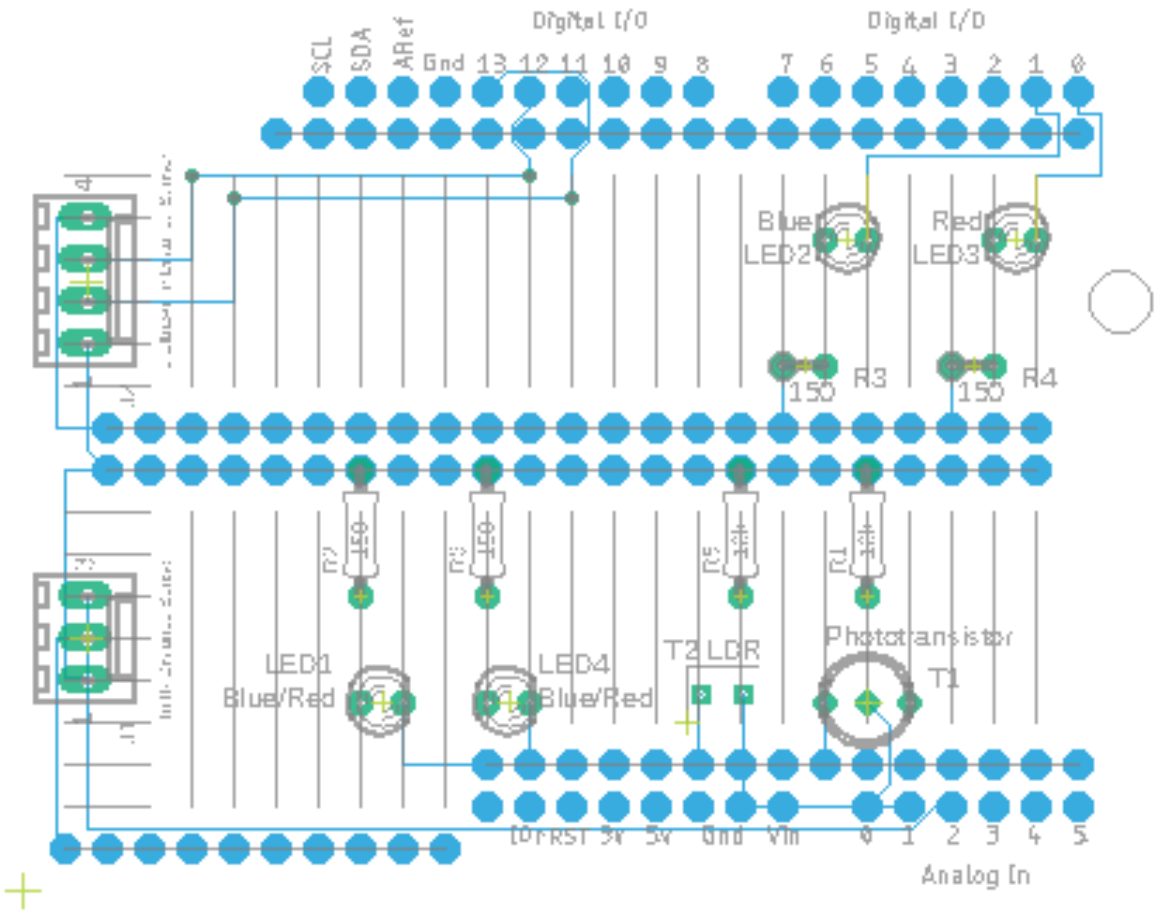

Figure 2. Connections of the layout of the circuit board