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Week 9 Studio 2

Group 4b

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**Activity #1: IR Proximity Sensor Characterization**

8.

|  |  |
| --- | --- |
| Distance between object & sensor(cm) | Vout(V) |
| 1 | 0.194 |
| 2 | 0.809 |
| 3 | 2.15 |
| 4 | 2.64 |
| 5 | 3.08 |
| 6 | 3.27 |
| 7 | 3.41 |
| 8 | 3.48 |
| 9 | 3.58 |
| 10 | 3.60 |
| 11 | 3.60 |
| 12 | 3.60 |
| 13 | 3.61 |
| 14 | 3.62 |
| 15 | 3.64 |
| No object within 15 cm | 3.70 |

9.

When distance of the white board from the IR sensor increases, the Vout increases linearly in the working range of 1 to 5 cm. After this point, Vout still increases but at a decreasing rate until reaching a constant.

10. The optimal working range for this IR sensor is about 1 to 5 cm as within this range, Vout increases linearly when distance increases, thus we can determine the distance of the sensor from the white board by referring to the Vout. Outside the range of 1 to 5 cm, Vout is not in a linear relationship with the distance, thus we cannot determine the exact distance of sensor from the white board.

**Activity #2: LDR Colour Sensor**

A.

10.

11. From the graph, the time the LDR stabilised is around 400ms

B.

1. The function responsible for the sensor calibration is setBalance()

2. No. The calibration function is necessary as the sensor is not ideal so it requires a reference value. Calibration is required to nominalise the maximum intensity of the RGB value.

3. If a not-so-white object and a not-so-black object are used, the reference value will be incorrect. The white reference point will be lower and the black reference point will be higher. Thus there will be some RGB value out of range, resulting in a not white object detected as white and a not black object detected as black since they are out of range. For example, if a not-so-white object is used, when an actual white object is put in place, its RGB value will be higher than 255, if a not-so-black object is used, an actual black ample will have RGB value lower than 0.

4. We may use flashlight as white sample instead of physical object, depending on its intensity. If the intensity of the flashlight is similar to the intensity of the reflected light, it can be used. Otherwise, it cannot be used. If it is too bright, it will cause the non-white object to be seen as white by the sensor.