LDR SENSOR

INTERNET OF THINGS

Time: 60 mins

Introduction

In this class, the student/s will learn how to calculate and display the illumination values on the gauge and chart on the dashboard.

New Commands Introduced

● float ldrVal = analogRead(LDR_PIN);	Reads the analog value on the pin.
● float voltage = ldrVal / 4063. * 3.3;	Converts the light intensity measured by the LDR into a voltage value .
● float resistance = 5000 * voltage / (1 - voltage / 3.3);	Calculate the resistance value using the voltage of the LDR

Vocabulary

- **Ilumination** is the use of light to achieve aesthetic visual effects..
- **LUX** is the unit used to measure the illumination.
- Light intensity is displayed as illumination in gauge and chart format on the node-red dashboard.
- 4063 is the maximum analog value and is used to divide the ldrVal to scale it between 0 and 1.
- 3.3V is the maximum voltage range. It is used to multiply the scaled value to obtain the corresponding voltage value.

Learning Objectives

Student/s should be able to:

- ***Explain*** the LDR sensor and show how to connect it to the circuit connection.
- ***Demonstrate*** calculation of illumination using voltage and other constant values.
- ***Recall*** use of node-red charts and gauges and display the illumination data on the dashboard..

Activities

Class Narrative: *(3 mins)*

- Brief the student/s that Eva shared that few items are sensitive to sunlight where James came up with the sue of light monitoring sensors.

Concept Introduction Activity: *(4 mins)*

- Let the student/s observe that the light intensity is displayed as illumination in gauge and chart format on the node-red dashboard.
- Explain that illumination can be detected and measured using a photoresistor sensor also known as a light dependent resistor(LDR).
- Explain how the LDR sensor works and its applications.
- Using the slides, explain that the student/s will learn:
    - to connect the LDR sensor
    - to calculate the illumination
    - to send the LDR data to Node-Red

Activity 1: Connect the LDR Sensor *(10 mins)*

Teacher Activity: *(5 mins)*

- Explain that the photoresistor sensor module includes a LDR (light-dependant resistor) in series with a 10K resistor and describe its pin.
- Explain how to connect the LDR sensor.

Student Activity: *(5 mins)*

- Guide the student/s to connect the LDR sensor.

Activity 2: Calculate the Illumination *(18 mins)*

Teacher Activity: *(7 mins)*

- Explain that the values on the sensor and LCD do not match due to the difference in voltages of both the devices.
- Demonstrate the correction of LUX values on both the devices.

Student Activity: *(11 mins)*

- Guide the student/s to calculate the LUX value and display the same value on LCD as that of LDR sensor.

Activity 3: Display LDR Data on Node-Red *(12 mins)*

Teacher Activity: *(6 mins)*

- Recall that we send the temperature and humidity data from the MQTT server to node-red js nad represented it on dashboard. Re;ate it to illuminance values on the dashboard.
- Explain how to display the illumination data of LUX values on the dashboard.

Student Activity: *(6 mins)*

- Guide the student/s to add gauge and chart to the dashboard for displaying the illumination data.

Introduce the Post class project: *(2 min)*

- Ring the buzzer when it is exposed to a specific amount of illumination.

Test and Summarize the class learnings: *(5 mins)*

- Check for understanding through quizzes and summarize learning after respective activities.
- Summarize the overall class learning towards the end of the class.

Additional activities:

- Encourage the student/s to turn on the bulb when the illumination is low.
- Encourage the student/s to send the LED status data to the Node-red using MQTT server.

State the Next Class Objective: *(1 min)*

- In the next class, student/s will learn to automate the lights in the home.

U.S. Standards:

CSTA: 2-AP-11, 2-AP-12, 2-AP-13, 2-AP-14, 2-AP-19

Links Table		
Activity	Activity Name	Link
Class Presentation	LDR SENSOR	https://s3-whjr-curriculum-uploads.whjr.online/6055a7d7-17a2-4a39-9b7f-60

		0184ec13de.html
Explore Activity	LDR SENSOR	https://s3.amazonaws.com/media-p.slid.es/uploads/1525749/images/11181937/C141_Activity.gif
Student Activity 1	Connect the LDR Sensor	https://wokwi.com/projects/387250674408184833
Teacher Reference: Student Activity 1 Solution	Connect the LDR Sensor	https://wokwi.com/projects/387248471270100993
Student Activity 2	Calculate Illuminance	https://wokwi.com/projects/387255262020878337
Teacher Reference: Student Activity 2 Solution	Calculate Illuminance	https://wokwi.com/projects/387255278078774273
Student Activity 3	Display LDR Data on Node-RED	https://github.com/Tynker-IOT/TNK-M18-C141-SAS-BP
Teacher Reference: Student Activity 3 Solution	Display LDR Data on Node-RED	https://github.com/Tynker-IOT/TNK-M18-C141-SAS
Student's Additional Activity 1	Automatic Lamp	https://wokwi.com/projects/387619978547968001
Teacher Reference: Student's Additional Activity 1 Solution	Automatic Lamp	https://wokwi.com/projects/387619418910344193
Student's Additional Activity 2	Sync LED to Node-red	https://github.com/Tynker-IOT/TNK-M18-C141-SAS-BP
Teacher Reference: Student's Additional Activity 2 Solution	Sync LED to Node-red	https://github.com/Tynker-IOT/TNK-M18-C141-SAS
Post Class Project	Light Based Alarm	https://wokwi.com/projects/387802209022131201
Teacher Reference: Post Class Project Solution	Light Based Alarm	https://wokwi.com/projects/387797986196515841