Oide
Tacú leis an bhFoghlaim Ghairmiúil i measc Ceannairí Scoile agus Múinteoirí
Supporting the Professional Learning of School Leaders and Teachers

Applied Technology

Professional Learning Booklet

2025-2026

- **Session 1**: Experience the benefits of an integrated approach to both the practical and theoretical aspects of the specification, through the lens of electronics and mechanisms.
- **Session 2**: Consider teaching approaches when creating control solutions to identified problems.
- **Session 3**: Further develop teachers' skills in the provision of feedback to support student learning.

Western Rail Corridor Prototype Bridge

After many years, the Western Rail Corridor is being reopened. This will be a major boost to local economies in the West of Ireland. However, it also creates challenges, as rail infrastructure needs to be designed and upgraded. Iarnród Éireann is seeking the help of Applied Technology students to evaluate and test the control systems/mechanisms used.

Control System

Iarnród Éireann engineers are seeking assistance with a bridge's control system. They want to use a DPDT switch alongside limit switches. They have been given a schematic diagram (Fig. 1) and want help converting it to a pictorial circuit diagram (Fig. 2). Using colored pens/pencils, illustrate the wiring in Fig. 2.

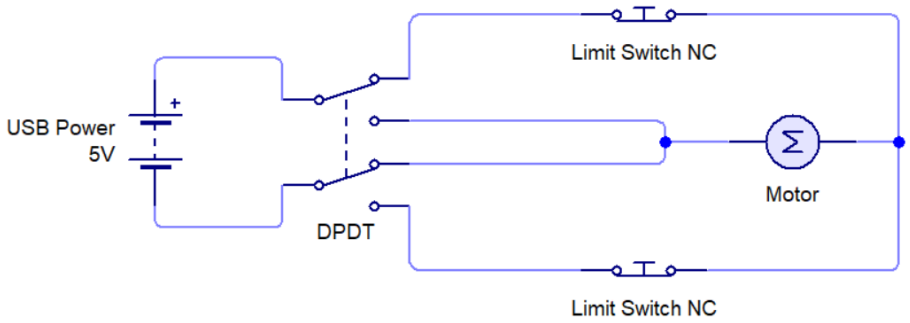


Fig. 1

Fig. 2

Indirect Drive Mechanism

An indirect drive mechanism is when a motor or handle doesn't turn something directly. Can you identify three examples of an indirect drive?

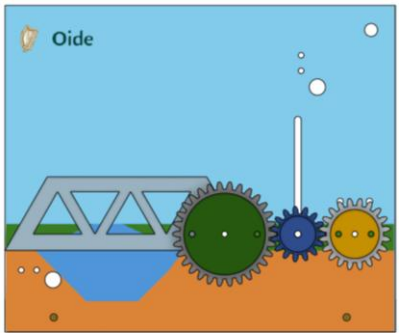
1._____

2._____

3._____

Mechanisms

Now that the electronics element of the control system is finished, let's look at the mechanisms. Using the prototype bridge kit, test the three mechanisms and answer the following questions:



What is the advantage of using a mechanism to raise and lower the bridge?

Which mechanism would you recommend to Iarnród Éireann and why?

The driver gear has 20 teeth, and the driven gear has 30 teeth.

A. Calculate the mechanical advantage (gear ratio) of the gear system.

B. The driver gear rotates at 80 RPM. Calculate the speed of the driven gear.

Idler Gear

The idler gear transfers motion from one gear to another. Explore the use of different-sized idler gears and evaluate their impact.

Tensioners

Tensioners are used to tension chain and belt drives in a wide range of machines and mechanisms. Why would Iarnród Éireann need one in this case?

Bridge Design

The model bridge design was based on the Brian Boru Bridge in Cork, which was built in 1911 for trains to pass over the River Lee. Using notes and sketches, explain some reasons how the bridge is still in use today, 115 years later?

Train Design

Iarnród Éireann is always looking to upgrade its fleet to keep up to date with modern standards. The train pictured is an intercity train designed to travel at high speeds. Using notes and sketches, explain the design features that make these high speeds possible.

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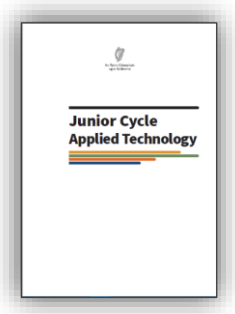
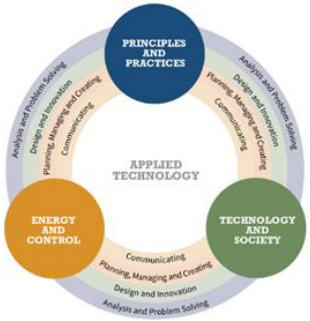
Applied Technology – Learning Outcomes





Action Verbs:

Analyse: study or examine something in detail, break down in order to bring out the essential elements or structure; identify parts and relationships, and to interpret information to reach conclusions

Apply: select and use information and/or knowledge and understanding to explain a given situation or real circumstances

Communicate: use visual gestural, verbal or other signs to share meaning or exchange information; interaction between sender and recipient; both work together to understand

Consider: think carefully about something, typically before making a decision

Create: process and give form to the topic of what is to be created using selected methods and material and/or to give the material used a new form

Demonstrate: prove or make clear by reasoning or evidence, illustrating with examples or practical application

Design: planning the features of a solution that solves a perceived user problem

Develop: advance a piece of work or an idea from an initial state to a more advanced state

Discuss: offer a considered, balanced review that includes a range of arguments, factors or hypotheses; opinions or conclusions are supported by appropriate evidence

Document: a piece of written, printed, or electronic matter that provides information or evidence

Execute: to carry out fully, to put completely into effect

	Strand 1: Principles and practices	Strand 2: Energy and control	Strand 3: Technology and society
	In this strand, students will learn about and employ the fundamental principles and practices associated with the study of Applied Technology. Students will apply their knowledge of materials and equipment to create solutions that consider the end-user experience. The study of principles and practices facilitates the application of knowledge of existing and emerging technologies which will help students to decide the best means to creatively solve a real-world problem and realise a solution.	In this strand, students explore sources of energy which, when changed or controlled, enable devices to perform tasks safely and efficiently. Students are encouraged to recognise the need for economic and sustainable use of energy and materials. Students will create controlled solutions using the skills, knowledge, values and attitudes developed through the study of the other strands.	In this strand, students experience the interaction between technology and society. Students examine the environmental impacts of their design choices and consider user needs related to solutions. Students acquire a basic understanding of, and curiosity about, some of the issues which society faces as a result of technological developments and explore their potential use in society.
	Students should be able to:	*Students should be able to:*	*Students should be able to:*
Analysis and problem solving The learning outcomes in this element encourage students to investigate ideas and relationships that assist students in refining their solutions to problems. Students will learn to develop systematic approaches to analysis of problems that aid the development of solutions. This element encourages learning that is fundamental to Applied Technology and promotes the development of skills for lifelong learning.	1.1 **develop** a design solution drawing on experience and using evidence, reasoning, and decision making 1.2 **analyse** problems using a systematic approach 1.3 **refine** ideas through the use of prototyping 1.4 **review** planning decisions throughout	2.1 **investigate** relationships between the inputs, transformations, and outputs occurring within simple control systems 2.2 **evaluate** ideas through the use of simulation[1] [1] (such as mechanical, electrical or digital modelling)	3.1 **analyse** the impact of constraints on the design of solutions 3.2 **evaluate** the effectiveness of solutions
Design and innovation The learning outcomes in this element encourage students to 'think outside the box'. Students will have the opportunity not only to study the existing technologies relevant to the subject, but also to explore new and emerging developments. The design solutions developed by students will be influenced by their learning across the three strands.	1.5 **consider** the end-user experience at each stage of the design process 1.6 **understand** the role, impact and potential of existing and emerging technologies 1.7 **apply** innovative approaches in design solutions	2.3 **recognise** the principles of control systems when developing their solution 2.4 **design** a logical sequence of instructions to control a device or system 2.5 **apply** innovative approaches to designing control system solutions	3.3 **explain** how human, societal and environmental considerations affect solutions and outcomes 3.4 **explore** applications of technology in local contexts
Planning, managing, and creating The learning outcomes in this element encourage students to develop a range of project management skills while taking their designs to the creation stage. Students will develop the necessary skills needed to manipulate materials and select appropriate equipment in the realisation of solutions.	1.8 **develop** a plan for the realisation of a solution 1.9 **select** appropriate materials, equipment and processes in solving a problem 1.10 **execute** a plan using appropriate tools, materials and processes 1.11 **demonstrate** adherence to recognised health and safety standards	2.6 **explore** energy conservation and efficiency 2.7 **identify** appropriate energy and control systems for design solutions 2.8 **create** control solutions to identified problems	3.5 **justify** their selection of materials and processes based on factors such as environmental, economic and ethical considerations 3.6 **consider** user needs at all stages of design 3.7 **recognise** their responsibility for ensuring security and privacy of personal data
Communicating The learning outcomes in this element encourage students to select and use appropriate media to relay technical information, design ideas and learn about the impact technology has on the environment around them.	1.12 **document** progression from concept to realisation 1.13 **communicate** evidence of the iterative process of design	2.9 **communicate** technical information in appropriate forms 2.10 **explain** the transformation of inputs and outputs	3.8 **evaluate** the impact of technologies on their lives, society and the environment 3.9 **discuss** the potential of technology to affect society and the environment

Scan or click on the QR code to access the Junior Cycle Applied Technology specification at curriculumonline.ie

Action Verbs:

Evaluate: (data) collect and examine data to make judgements and appraisals; describe how evidence supports or does not support a conclusion in an inquiry or investigation; identify the limitations of data in conclusions; make judgements about the ideas, solutions or methods

Explain: give a detailed account including reasons or causes

Explore: to think or talk about something in order to find out more about it

Evaluate: (ethical judgement) collect and examine evidence to make judgements and appraisals; describe how evidence supports or does not support a judgement; identify the limitations of evidence in conclusions; make judgements about the ideas, solutions or methods

Identify: recognise patterns, facts, or details; provide an answer from a number of possibilities; recognise and state briefly a distinguishing fact or feature

Investigate: observe, study, or make a detailed and systematic examination, to establish facts and reach new conclusions

Justify: give valid reasons or evidence to support an answer or conclusion

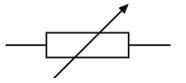
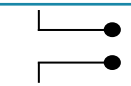
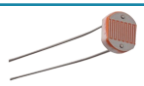
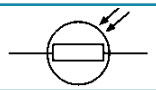
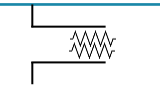
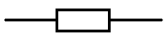
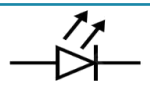
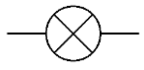
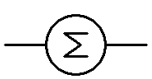
Recognise: identify facts, characteristics or concepts that are critical (relevant/ appropriate) to the understanding of a situation, event, process or phenomenon

Refine: make minor changes so as to improve or clarify

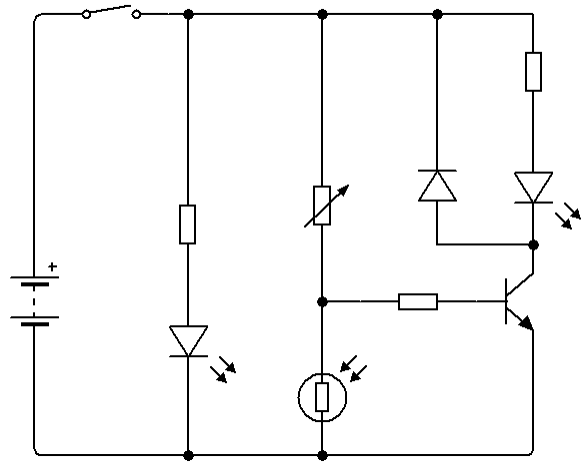
Review: looking over or through material in order to correct, improve or revise

Select: carefully choose as being the best or most suitable based on judgement

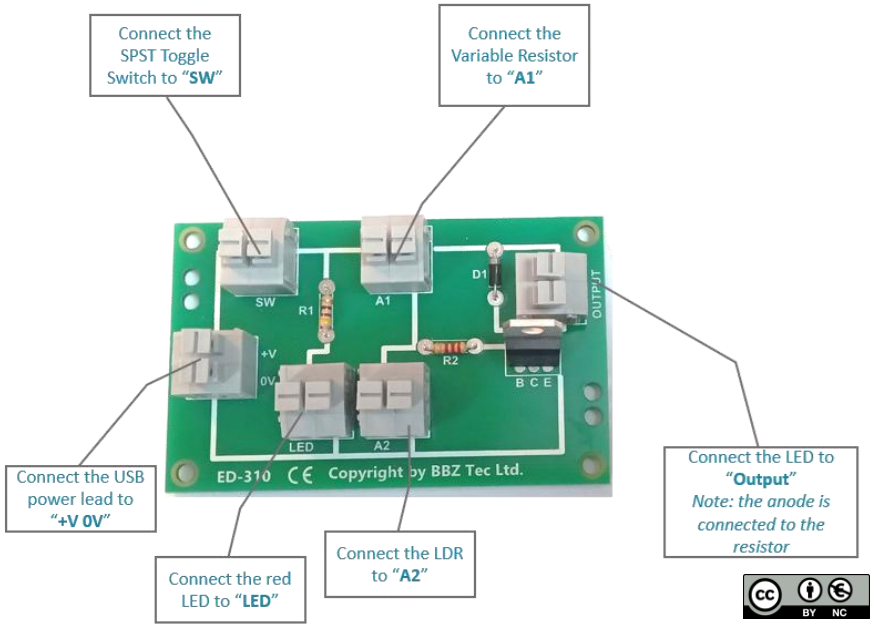
Understand: have and apply a well-organised body of knowledge

	Component	Name	Symbol	Description
INPUTS				
				
				
				
				
				
				
PROCESSES				
				
				
OUTPUTS				
				
				
				
				

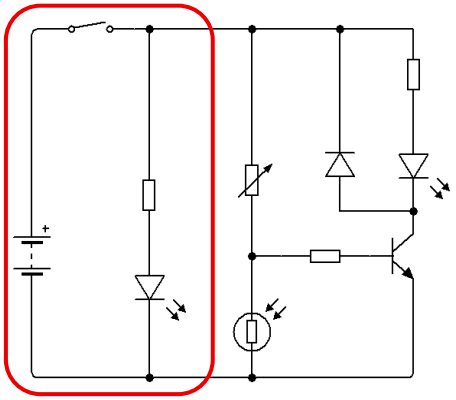
Circuit Diagram: Identify and label the components.



Printed Circuit Board: Build and test the automatic night light circuit.



Describe why the first half of this circuit is important.



Using the words Emitter, Base, and Collector, explain how the transistor works in this circuit.

Input sensors change their resistance in response to conditions. Use the sensor board to help fill in the table below.

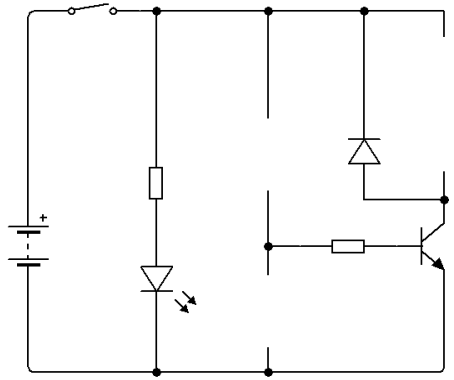
Component	Resistance High	Resistance Low
LDR		
NTC Thermistor		
Moisture Sensor		
Vibration Sensor		
Microphone		

Why is a variable resistor (potentiometer) used instead of a fixed resistor?

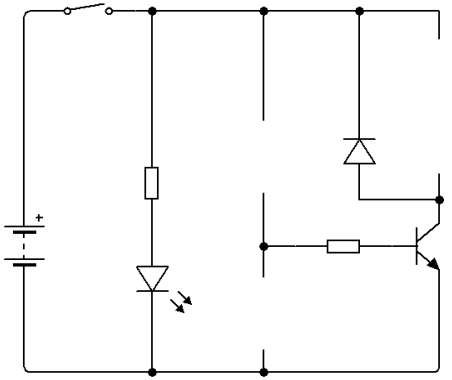
Circuit Diagrams

Using circuit symbols, complete the circuit diagrams below. Test each circuit on the sensor board.

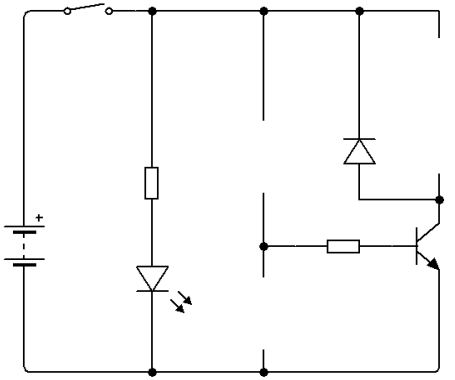
Q1. An MES LED that switches on when loud and off when it's quiet.



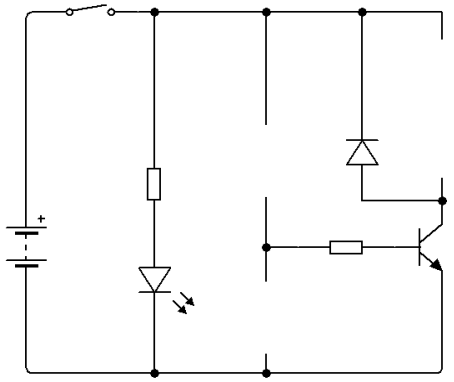
Q2. A motor that switches on in light and off in darkness.



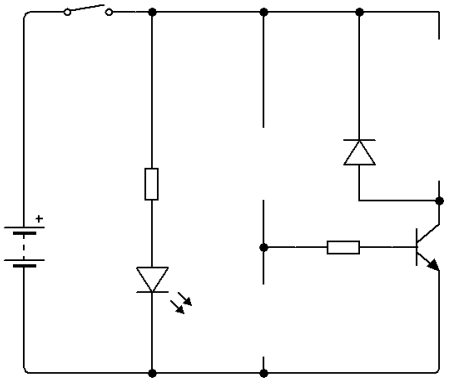
Q3. A fan that switches on when it's warm and off when it's cold.



Q4. A buzzer that switches on when shaken and off when stable.

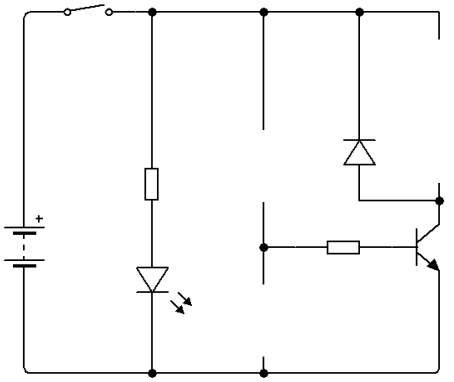


Q5. A rainbow LED that switches on in dry soil and off in wet soil.



Q6. _____

_____



Teacher Design Challenge

Design a project brief, for a 2nd year group, that integrates a sensing circuit as part of the control system.

Brief:

Identified possible inputs and outputs needed:

Possible Solution: Use annotated sketches to explain your design.

Creating Clear Success Criteria for Student Projects

As a group, discuss the given brief. Agree on specific areas that students need to consider and demonstrate. These specific areas will make up the success criteria rubric. Formative feedback can then be given to students as each section is completed.

Success Criteria Rubric
Portfolio

Criteria Explained	Formative Feedback
Research	
Design Ideas	
Justification of Final Idea	
Evaluation / Reflection	

Notes:

Success Criteria Rubric
Artefact

Criteria Explained	Formative Feedback

Notes: