

From TikTok Videos to Instruction Manuals: MSc Students Inspired to Reach Beyond the Assessment Framework in an Authentic Learning Assignment

A Physics Education Story

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NASA Earth Observatory image by Robert Simmon, using Suomi NPP VIIRS data provided courtesy of Chris Elvidge (NOAA National Geophysical Data Center)

Money makes the world go round...

- Academics rely on grants
- How do you write a grant proposal?



7. PROJECT INDICATORS - SCIENCE AREAS AND AUDIENCES

STFC GRANT FUNDED SCIENCE AREA (S) OR RESEARCH FACILITIES Tick as many as are applicable

Particle Physics Nuclear Physics Astronomy Solar System and Space Science

Accelerator Science Central Laser Facility ISIS Diamond

Other (e.g. ILL, ESRF) Please state:

TARGET AUDIENCE(S) Tick as many as are applicable

5-10yrs 11-16yrs 17-18yrs Family General Public Teachers Other

If 'Other'; briefly identify this audience (e.g. music festival audiences; retired people; special educational needs groups; groups with disabilities etc.)

EXPECTED NUMBERS THAT WILL BE REACHED

1-200 201-500 501-1000 1001-5000 > 5001

8. AIMS

What are you trying to achieve? What will be the overall impact of your project?

Max. 300 words

[?? words]

9. OBJECTIVES

Please list as bulletpoints what your outcomes and deliverables from the project will be. This could include audience numbers and resources produced.

Max. 6 objectives.

Max. 300 words.

If funded this project will:

- Objective 1:
- Objective 2:
- Objective 3:

[?? words]

10. DESCRIPTION OF PROJECT

Please give a brief (bullet point) description of what you intend to do in the box below.

Max. 300 words.

Brief description of the project:

Inspired?

[?? words]

ATTACHMENTS:

You must provide a more detailed summary of your project in TWO (2) attachments that are described below:

- CASE FOR SUPPORT** - A maximum of FOUR (4) sides of A4 may be included for text, diagrams or photographs that help to explain what you are proposing to do.
- JUSTIFICATION OF RESOURCES** - A maximum of TWO (2) sides of A4 may be included, giving a detailed explanation of what the money will be spent on. You should also give details of any income (e.g. sales of resources or tickets to events), any "matched funding" (i.e. money or goods, services etc. from sources other than STFC).

Minimum font size Calibri 11pt.

Please refer to the guidance notes for things to include in these documents.

Note: These attachments should be added to the end of this application form, and the whole submitted as a single .pdf file.

BUDGET

13. OTHER INCOME SOURCES (if applicable)

If the total budget you need exceeds the amount requested, please list the other sources of funding and how much they are providing. This can include other grants, money from donors, sales of items etc. This can also include "in-kind contributions", such as staff time - please give an estimated cost per hour, e.g. typical rates would be undergraduate student volunteers £10/hr, university faculty volunteers at £50/hr.

14. BUDGET BREAKDOWN

This should be a full breakdown of income through grants, sales etc. and expenditure including things like office costs, equipment, staff salaries etc.

The details of these costs should be provided be in the **JUSTIFICATION OF RESOURCES** document (max. 2 pages), but here you must give an overall breakdown of the expenditure under the headings provided. You may add new headings if you wish, but please try and group expenditure under a relevant heading.

Income: List here any other sources of funding that you have access to, or will gain through e.g. selling things as part of this proposal.

Requested STFC grant funding total: £
(i.e. how much do you want from STFC - max. £15k)

Other funding sources (if applicable): £

Sales and other income (if applicable): £

Total (inc. VAT):

Expenditure:

Staff costs: £

(give basic details here)

Equipment costs: £

(give basic details here)

Travel and subsistence costs: £

(give basic details here)

Other costs: £

(give basic details here)

Total (inc. VAT):

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Max. 300 words.

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- Objective 2:
- Objective 3:

[?? words]

10. DESCRIPTION OF PROJECT

Please give a brief (bullet point) description of what you intend to do in the box below.

Max. 300 words.

Brief description of the project:

Creativity

- Video pitch
- Freedom to innovate in project idea

Minimum font size: 11pt. Please refer to the guidance notes for things to include in these documents.

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(give basic details here)

Equipment costs: £

(give basic details here)

Travel and subsistence costs: £

(give basic details here)

Other costs: £

(give basic details here)

Total (inc. VAT):

The Brief

Physics

Data-Intensive
Physics

Compound
Semiconductor Physics

Physics and astrophysics
outreach

EPSRC CDT in
Compound
Semiconductor
Manufacturing

Astrophysics

Data-Intensive
Astrophysics

Gravitational Wave
Physics

The brief: STFC Public Engagement Spark award

- **Engage the public with STFC-supported science, technology or facilities**
- Target audience:
 - 8- to 14-year-olds and their families
 - Socioeconomically deprived areas
 - Groups considered to have low science capital
- Budget: up to £15,000
- **Sneaky side-hustle (choose one)!**
 - Help PHYSX recruit more students from Wales
 - Help PHYSX recruit more students from outside the EU
 - Educate the public about Cardiff University science



The brief: STFC Public Engagement Spark award

Application form

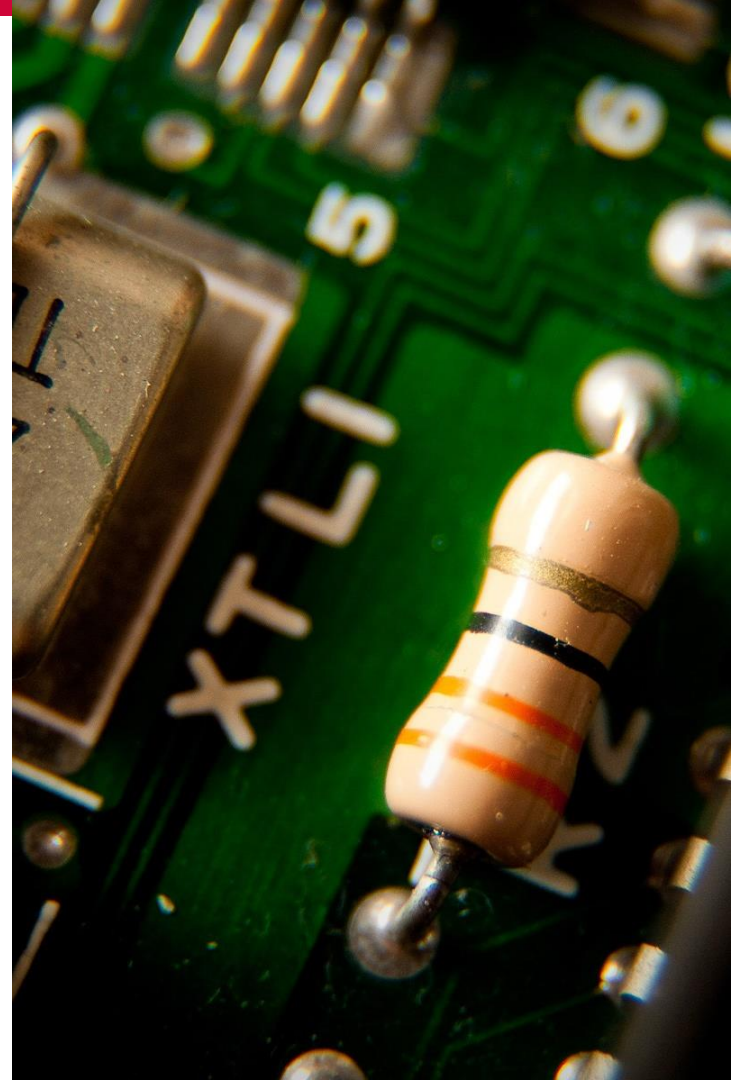
- Project summary
- Aims and objectives
- Budget breakdown
- Project personnel
- Case for support
- Justification of resources

Pitch

- 5 minute video to 'sell' the project
- 15 minute interview by the 'awarding panel'

Case study: LED diode kits

- 'Build your own LED circuit' kits for schools
- Kits to be sent to WIMD-indexed schools
- Circuit kits to be designed by CDT students
 - Advertised as a competition
 - Budget of £10
 - Cash prize for the best kit



Case study: LED diode kits

Beginners' electronics kits

Light emitting diode (LED)

Introduction



Today's tech means we can make semiconductor devices tiny!



One of the labs in Cardiff Uni, they're called cleanrooms because they can't have any contaminants in them that will affect our experiments.

About LASER

LASER is a small research group led by passionate physicists who all share the same vision; to spread awareness and appreciation for semiconductor physics. The aim is to make semiconductor physics accessible for KS3 students who wouldn't ordinarily study it unless they undergo a degree in physics. To us this seems ridiculous since semiconductors have shaped our everyday lives for over 70 years!

Why are Semiconductors Important?

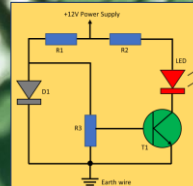
You might not know it, but semiconductors are all around you! From mobile phones to microwaves, semiconductors are everywhere, and their importance cannot be overstated. Think for a second about all the encounters you've had with electronic devices in the last 24 hours, we can guarantee that all of them have been made with semiconductor materials. Without semiconductors, none of the devices we take for granted would exist. How then would you heat up your food?

Semiconductor Research at Cardiff University

Here at Cardiff University, we are at the forefront of cutting-edge semiconductor research. Exciting new research is happening all the time looking at how we can make technology more accessible for the world. Current research is looking into new ways to understand how light interacts with stuff, this is called 'photonics'. As well as this, Cardiff has departments looking at nanotechnology which is basically technology the size of atoms!

Also, with funding from the Welsh government, Cardiff has founded the Institute of Compound Semiconductors which has brought hundreds of jobs to people in Wales making it the place to be for anything semiconductor related!

Instructions



This is the 'circuit diagram' for what we will be making in this project. Don't worry if it looks really complicated, you'll be able to put it together easily with this instruction manual.



This is an example of the modular aspect of the kit, notice how you can snap together individual parts of the circuit.

About our Kits

Our LED kits teach basic engineering, electronics, and circuitry concepts by using building components with a modular design to assemble electronic circuits on a simplified electronics breadboard (a construction base for designing electronic circuits). The resulting project functions like the printed circuit that you'd find in any electronic circuit. Each circuit component is easily recognizable by its colour and diagram on the front of the component as well as its description in this manual (see parts list below).

List of Parts

1 x power supply (12V battery) 3 x resistor 1 x red LED 14 x wire blocks
1 x transistor 1 x diode 1 x base 1 x willing parent/guardian to help you!

Resistor (R1, R2 & R3): a small part of a circuit that is designed to provide a specific amount of resistance in an electrical circuit. Resistance is an essential part of any circuit; you'll use resistors in just about any circuit you make!

LED: a semiconductor device that emits light when you pass current through it. Light is made when the particles that carry current (known as electrons and holes) combine in the semiconductor material. They can last ages and are more durable than normal bulbs.

Transistor (T1): a semiconductor device that can be used to control and/or change the flow of electrical signals in an electrical circuit.

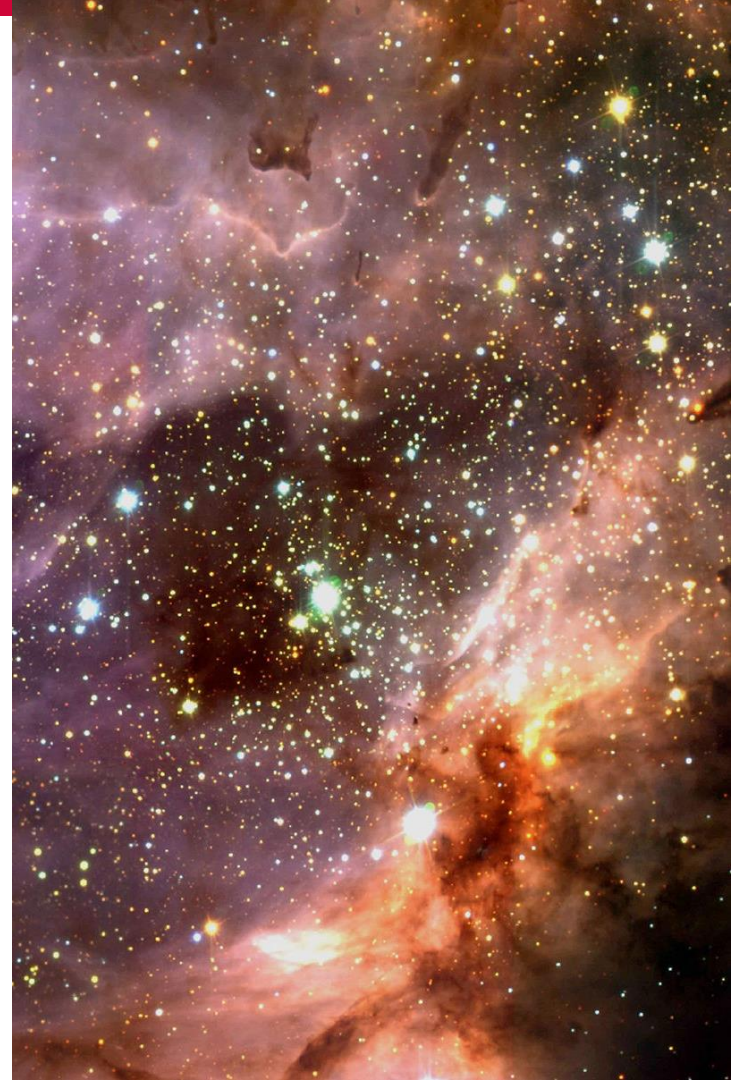
Diode (D1): another semiconductor device (they're everywhere!) that essentially acts as a one-way switch for electrical current. It allows current to flow in one direction in the circuit but not the other.

Don't worry if these ideas are new to you/you can't quite get them yet, we will be able to help you out in our Techniquiest workshop!

Case study: short-format videos

Tiktok – interstellar

- 14.8 million views
- 2.3 million ‘likes’
- 36,600 shares
- 122,600 saves
- Nearly 10,000 comments



Conclusion

Creative authentic learning assignment

→ Student ownership

→ Success!

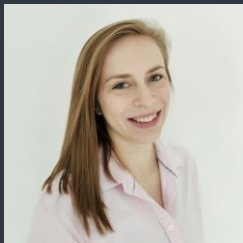
(→ Money...if actually submitted)

Students want to be creative...

How can we support that to enhance their learning?



Contact details (please feel free to get in touch!)



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