

Bottle, Can or Coffee Cup ?!



How Computer Vision and Machine Learning can be used to Recognise Different Materials to Make Recycling Easier



00 Setting up the Demonstration Hardware

This Materials Made Smarter Outreach Demonstration of How Computer Vision and Machine Learning can be used to Recognise Different Materials to Make Recycling Easier has been developed by Dr Robert Gibbs with Professor Cinzia Giannetti of Swansea University [\[↵\]](#) for Materials Made Smarter [\[↵\]](#), based upon the NVIDIA DLI "Getting Started with AI on Jetson Nano" course [\[↵\]](#).

This guide describes how to set up the equipment hardware ready to be switched on. Further information on the operation of this demonstration can be found at <https://discovermaterials.co.uk/resource/bottle-can-or-coffee-cup/>

This guide forms part of the section

01 Computing on the Edge

A playlist of walkthrough videos of the operation of the demonstration is at https://www.youtube.com/playlist?list=PLyl3ubsSP6pUkBdTephBtqL7UfIFfGQ_Z

Also available on the Discover Materials website are a **glossary** of the **highlighted technical terms**, an electronic version of the printed **booklet** and further information about the code, the equipment and progressively more detailed project documentation.



Y Gyfadran Gwyddoniaeth a Pheirianneg
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developed by Dr R. Gibbs and Prof. C. Giannetti for Materials Made Smarter,
based upon the NVIDIA DLI
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List of the equipment

A photographic inventory of the materials and equipment found in the project case.

In addition to this list are a printed A0 poster to promote the demonstrations and, at original time of creation, 500 printed copies of the A5 booklet. An electronic eBooklet version of the printed booklet can be found on the website and the high resolution resources to reprint the physical booklet can be found in the github repository for the project, linked to on the website.



Photograph of the final equipment setup for demonstration. Not included in this photograph, but included in the case, are the wireless keyboard and mouse to operate the system.

The MMSC Bottle, Can or Coffee Cup?! Project case



This case contains all the equipment for the demonstration except for the poster and the printed booklets which need to be carried separately.

The package weighs 4.6kg and has dimensions 470mm x 357mm x 176mm.

To fit everything in the case needs to be packed in a particular way, described later.

Photo-box



Top



Bottom



Open



Illuminated

The photo-box is collapsible and includes its own illumination, powered by the USB cable and the USB power supply. The brightness of the illumination can be adjusted with the control.

Logitech C270 webcam with Velcro attachment



The system code is designed only for the Logitech C270 webcam. It is important this camera remains with the project and is not substituted for a different model. The Velcro patches attach the camera to the top of the photo-box. The camera connects to the blue USB-3 port on reComputer1.

Seeed reComputer J1010 Jetson Nano 2GB platform pair



The two Seeed reComputer J1010 units, connected together with cable ties with a short ethernet cable between them.

The ports not needed are covered to avoid confusion.

Both computers have a USB-C power port, powered by two of the USB-C power supplies.

On the other side of both units, covered by stickers to avoid confusion are two other USB-C ports which are data ports, not power ports.

It is very important that the power supply is not plugged into the covered data ports. Damage will result.

On reComputer1 the blue USB3-A port is for the webcam to be attached. All other ports are covered.

On reComputer2 the two USB2-A ports are for the keyboard and mouse transmitter to be attached (and a USB stick to transfer data). The HDMI port is for the monitor cable to be attached. All other ports are covered.

Verbatim Portable HD monitor



Front



Back



Front



Back



Cover



Connections

The Portable HD Verbatim monitor allows the demonstration to be displayed as a stand alone application. It is powered by the third USB-C power supply and connected with the short HDMI cable. If the situation means that there is an alternative monitor/projector available then the longer HDMI cable can be used to facilitate connecting to that.

Mini Wireless Keyboard and Mouse



This wireless keyboard and mouse comes with a USB receiver unit that plugs into one of the USB2-A ports on reComputer2.

4-way gang plug with 3 USB-C power supplies and 1 USB-A power supply



The gang plug permits the demonstration to be run from a single 240v power outlet whilst the four separate power supplies ensure that each device has sufficient power to remain stable. The 3 USB-C power supplies power the reComputer units and the monitor. The USB-A power adapter supplies power to the photo-box illumination.

Short HDMI cable



Connects the reComputer2 unit to the portable monitor

Long HDMI cable



Connects the reComputer2 unit to an external monitor or projector if the situation requires it

Short USB-C to USB-A cable and Short USC-C to USB-C cable



Useful additional cables which came with the portable monitor for use outside of the demonstration requirements

2 project Bottles, 2 project Cans and 2 project Coffee Cups



The props used for identification in the project. The dataset of the project is specifically designed around these objects and so these should be preserved or replaced like-for-like if they become unusable.

Unpack/Pack the Case

Unpack and repack the case in the following order so everything fits



wireless receiver
may be attached
to reComputer2
already

Keyboard and Mouse



Bottles



Portable Monitor



4

Cans



5

Photo-box



6

Coffee Cups



7

Cables





8

Webcam



9

reComputers



10

Power Supplies



11

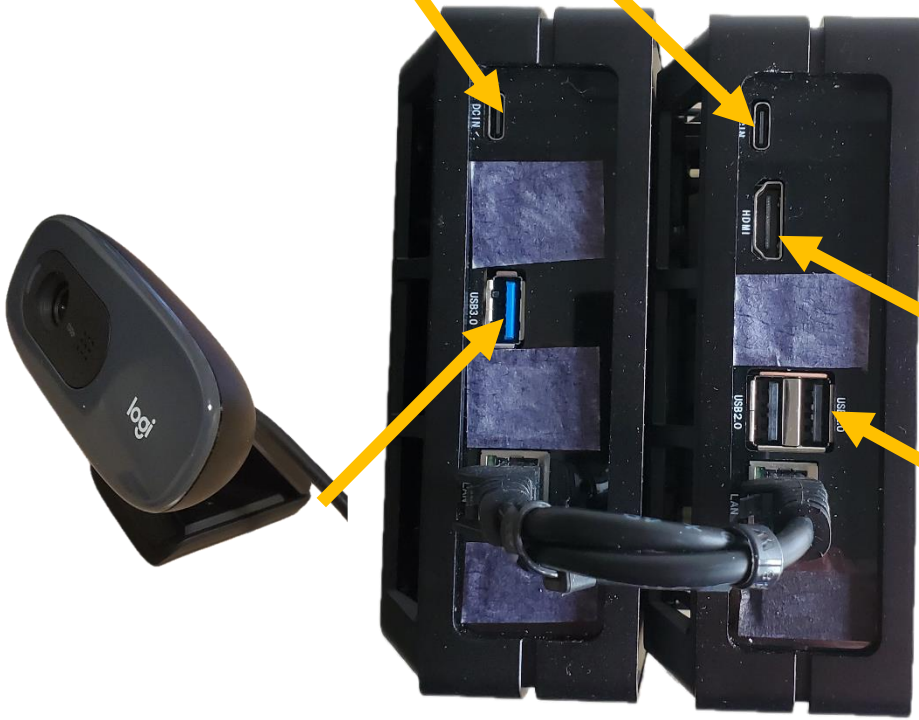
Cables



Expanding the Photo-box and attaching the Webcam



Electrical Connections

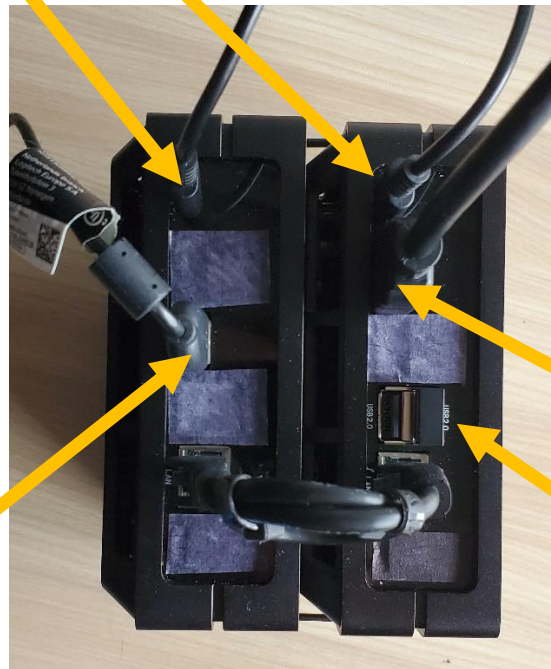


reComputer 1

reComputer 2



Electrical Connections



reComputer 1

reComputer 2



Electrical Connections



Electrical Connections

