

The GMN Outreach Project

Let students explore STEM through the installation and operation of a Meteor Camera.

This project is aimed at high school students, but it is not limited to high schools. It can be carried out also in astronomical clubs working with youths. It needs a teacher or a leader (recommended focus is natural sciences, technical, informatics, etc. with some basic computer and assembly skills) who will be actively working with students on the assembly, installation and operation of a meteor camera. A teacher or leader is supported by a GMN member of the outreach project. Students are encouraged to document their journey, discoveries and problems, and record them so they can use them in a presentation during the final student conference.

What is the GMN?

GMN stands for Global Meteor Network, which is a citizen science group of volunteers around the world. They operate more than 800 cameras, 200 of them alone in the UK and their ultimate goal is to record all meteors in the sky, calculate their trajectories, support meteor and solar system science, and develop new tools and techniques in meteor science. It provides open data in near real-time for everyone and significant scientific output. It is led by Dr Denis Vida, Meteor Physics Postdoctoral Associate at Western University, Canada.

What is a meteor camera?



A meteor camera is a camera module with a lens encapsulated in a camera housing and connected to a Raspberry Pi. It starts its recording at dusk, records images in intervals, identifies meteors, creates archives, and uploads data to the GMN server for further processing in the morning. Its functioning is fully automated and raw data are available for the operator as well as the archive data.

What can a meteor camera record?



Although a meteor camera is intended for meteor observation and recording, it can record much more. It records planes, satellites (you will see how the sky is polluted by them), migrating geese, owls, insects, bats and even auroras (if auroras are visible from the camera location). It also records the movement of stars, planets and bright comets. Much more can be found in the recordings and it can be a lot of fun for students.

What will a student group get?



A student group will receive (free of charge) components needed for the camera assembly, a Raspberry Pi 4, a complete crimping set to connect the network and the necessary cables. There will also be materials written by the GMN outreach project members, which include 3 modules – Astronomy, RMS/GMN (about the system powering the cameras and a lot of useful utilities including the GMN itself) and Computer science. The module documents are accompanied by tasks, games and competitions.

What is needed from a school/astronomy club?

A place to install the camera outside (roof, facade) with a free view of the sky, and a place to keep the Raspberry Pi and PoE injector inside. The Raspberry Pi will need Wi-Fi access to the internet. A camera is connected to the Raspberry Pi by one Ethernet cable (maximum length is 100m). There will need to be two 13-amp plugs inside – one for the power supply of the Raspberry Pi and one for the PoE injector. Power consumption is 15-20W at peak.

What will a student group do?

Students will assemble, install and operate the camera. In addition, they will learn from the modules, carry out tasks, play fun games and compete. It is recommended you follow the content of modules, but it is not obligatory – the teacher or leader will choose what fits the student group best. Students can collect material for their final presentation and share work, experience and challenges with other student groups across the world.

Are there other student groups?

There will be student groups across the globe – Washington State, USA, Wales, Scotland, other parts of the UK, Germany, Austria and South Africa. Students will be encouraged to interact and share their progress via an online tool.

Is there something more?

We are going to connect students to real scientists and experts. We have a variety of speakers prepared for students – scientists, engineers and professors.

What is expected from a student group?

Students are expected to successfully install a camera, learn some new STEM skills, explore, have fun and prepare a presentation of their journey.

How long does the project take?

The project is designed to start on 09/2023 and end on 06/2024. We are planning an extension to the project to keep students already involved interested and it will also be possible to involve new students. A teacher/school/astronomy club can even continue on their own. A camera remains the property of the school/astronomy club.

Is there any support?

Primary support is from the student group coordinator from the GMN, who stays in contact with the teacher/leader and helps to bring the project to a successful closure. For Germany and Austria, it is Radim Stano (radim.stano@outlook.com), who is available online and a member of the Meteor group of the Astronomical Society of Edinburgh (ASE) is available in Edinburgh and the vicinity.

Additional resources

Denis Vida's talk about GMN for the ASE:

<https://youtu.be/f0LdU1JRpf8?t=393>

More information can be found here:

<https://globalmeteornetwork.org/>

<https://www.meteornews.net/2023/02/28/march-issue-of-emeteornews-online-2/>

A camera recording from all over the world can be found here (select a country and then a camera to get daily records):

<https://globalmeteornetwork.org/weblog/>

All the cameras on the map with detected meteors can be found here:

<https://tammojan.github.io/meteormap/>

An all-night video can be found here:

https://radim.mediatop.sk/SK0002_20211110_002843_363275.mp4

Recording of a fireball can be found here:

<https://radim.mediatop.sk/animation.gif>

https://radim.mediatop.sk/animation_meteor_24_03_2022.gif