



The 2020 GOLC International Online Laboratory Award

Presented by the Global Online Laboratory Consortium, www.golc-online.net, info@golc-online.net

Entry Form

The GOLC invites you to submit your successful Online Laboratory course, site, and product or success story, from a university or other institution or school. Please complete this form and submit it via www.conftool.com/rev-conference/.

Submission Deadline

27 November 2019

Entry Information

Product Name: Easy JavaScript Simulations

Entry Category:

(mark only one)

☐ Visualized experiment

☒ Simulation

☐ Remote controlled lab

Laboratory Language(s) (English, Spanish, etc.): English

Organization Information

Entering Organization(s): University of Murcia (Spain) and Ministry of Education Singapore

Organization Web Site: <https://www.um.es/en/web/iwp/> and <https://www.moe.gov.sg/>

Contact Information

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Entry Details

Description (100-300 words):

Easy Javascript Simulations (EjsS), is a free authoring tool¹ written in Java that helps non-programmers create interactive simulations in Javascript, mainly for teaching or learning purposes. EjsS has been created by Francisco Esquembre and Félix Jesús García Clemente and is part of the Open Source Physics project.

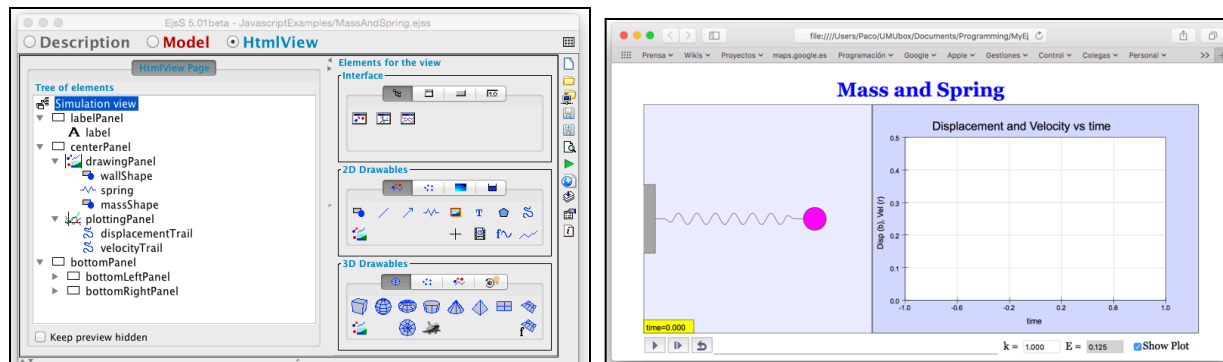


Figure 1: Tree and palette of view elements (left) and final HTML user interface (right) for the mass and spring system.

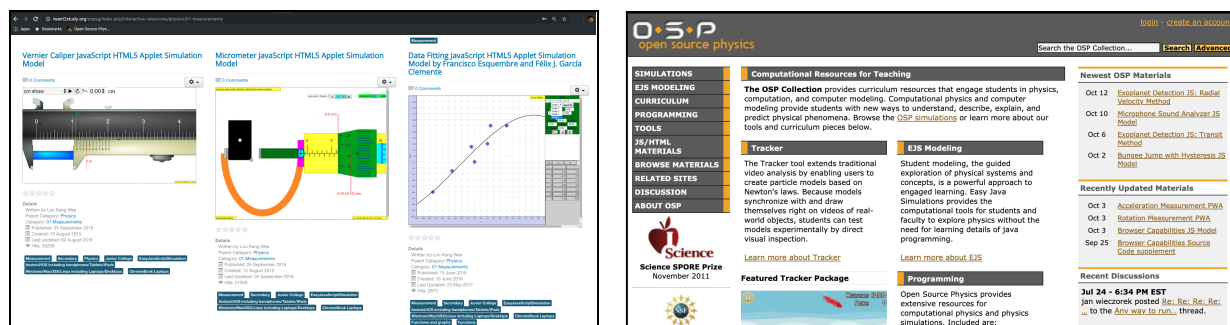


Figure 2: Open Source Physics Singapore (left) and Open Source Physics (USA) digital libraries

There are open sourced digital libraries^{2 3} complete with online virtual laboratories, downloadable model_zip for anyone who wishes to run them locally on their computer without internet and source_zip files for students and educators with interests to edit and modify and repurpose these simulations. There is currently 1000+ JavaScript virtual laboratory, freely distributed licensed CC-BY-NC-SA⁴ on these two digital libraries. This is significant because our online laboratories/simulations generated from our toolkit runs on almost all platforms (Android , iOS and computers via an internet browser like Google

¹ <https://gitlab.com/ejsS/tool/tree/master/Release>

² <https://www.compadre.org/osp/>

³ <https://iwant2study.org/ospsg/>

⁴ https://creativecommons.org/licenses/by-nc-sa/2.0/?utm_source=www.domtail.com

Chrome), it is also possible to package as Android⁵ and iOS⁶ apps and is capable of tracking and recording user interaction data analytics when uploaded to a Moodle Learning Management System via our moodle-plugin⁷.

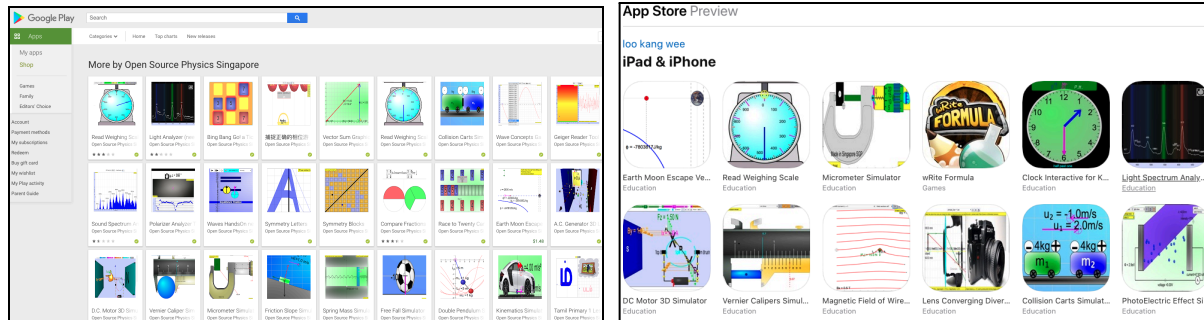


Figure 3: Android (left) and iOS (right) Apps serving as virtual laboratories generated using EJS and ionic framework

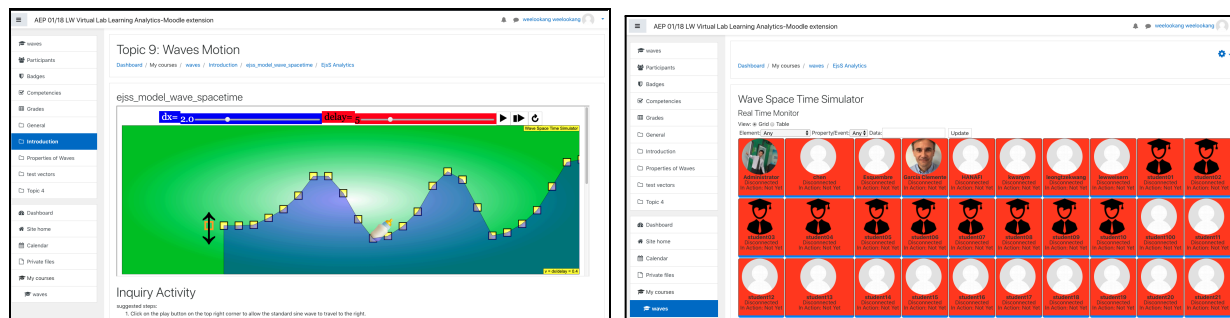


Figure 4: Moodle course with EJS virtual laboratory and the instructor dashboard with data analytics on interactions conducted by students

In order to show the capability of EjsS to create valuable simulations, we present 3 examples running on mobile phones. First, we have developed handphone sensor aware online laboratories reading the phone's accelerometer⁸ to support hands-on experiments tilting the handphone to investigate the relationship between friction and angle of slope for example to argument real experimental setup.

⁵ https://play.google.com/store/apps/dev?id=7915608832562607433&hl=en_US

⁶ <https://apps.apple.com/us/developer/loo-kang-wee/id1231378973>

⁷ <https://gitlab.com/ejsS/moodle-plugin>

⁸ <https://iwant2study.org/ospsg/index.php/423>

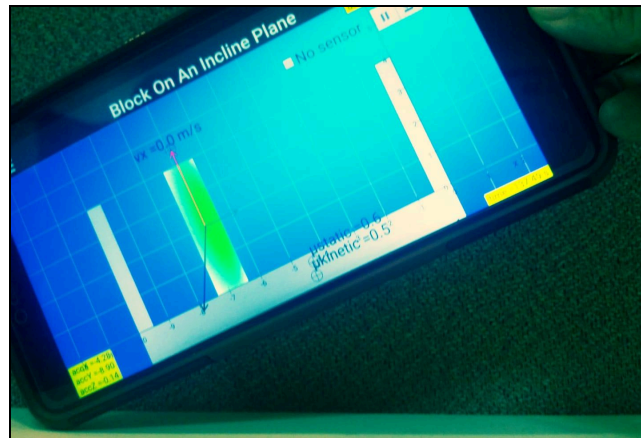


Figure 5: handphone with the web page that detects the accelerometer X, Y and Z direction influencing the acceleration of the mass on a rough slope in the simulation

Another example is to use the phone's camera⁹ with diffraction grating with 3D printed holder that can be used to conduct light spectrometer experiments.

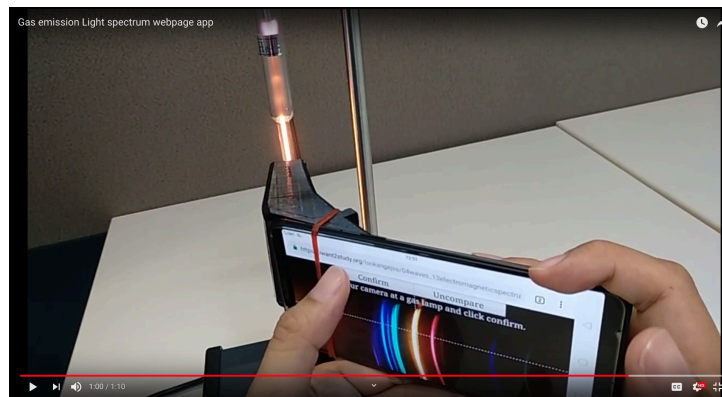


Figure 6: YouTube¹⁰ of phone camera used together with the 3D printed diffraction grating holder to identify gas types such as hydrogen discharge lamp with comparison data from National Institute of Standards and Technology (NIST)

And the last one uses the phone's microphone¹¹ and simple straws or pipes, can explore and predict the length of the open-close pipe system and the fundamental frequency of the sound produced while blowing across the pipe.

⁹ <https://iwant2study.org/ospsg/index.php/643>

¹⁰ <https://www.youtube.com/watch?v=XQiUvY94uMc>

¹¹ <https://iwant2study.org/ospsg/index.php/820>

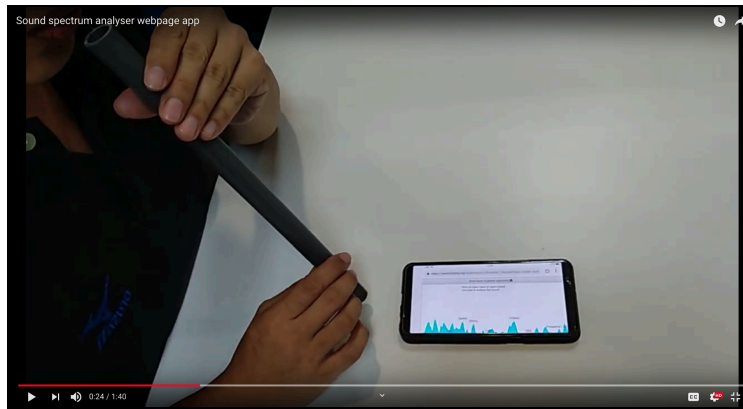


Figure 7: YouTube¹² on the webapp detecting the microphone data used with pipe blowing to create sound waves of frequencies that are based on real world physics

Our future plans include making EJS run on TAO for school and national examination explorations and creating Learning Tools Interoperability (LTI) compliance EJS by turning our Singapore server into an LTI provider for communications with other LTI learning management system for a more seamless online virtual laboratories experiments all over the world.

Audience:

Singapore teachers and students.

Global community serving everyone that is interested in online virtual laboratories

Goals:

To support online virtual laboratory and computational physics and mathematics education through creating, remixing and disseminating simulations to support experiential learning augmenting real experiments to give hope for a better educational experience 'to empower people with the knowledge, skills and values to live in dignity, build their lives and contribute to their societies'. -UNESCO 2030

Additional Information (if any):

Entry Access for Our Judges

Link to the Entry or Web portion of the Entry: see footnote URLs

ID and Password (if needed):

Special Instructions (if any):

Optional Additional Links

¹² https://www.youtube.com/watch?v=2u_djWwm0u8&t=6s



You may provide us with additional relevant links, such as a narrated video or flash movie in which you show and describe your product. These may be in addition to, or in place of, the link to the lab itself. However, if a link to the lab is possible, it will likely strengthen your application.

Optional Additional Links:

**Permissions**

The entrant grants permission to the Global Online Laboratory Consortium to publish reviews and reports about this entry, including the entrant's video recording and the entrant's description of the entry. The entrant also grants permission to the Global Online Laboratory Consortium to show the video recording of the entry in meetings, conferences, and webinars.

The entrant warrants that he, she, or the submitting company, is the proprietor of the entry; that they have the power to make this agreement; that it does not infringe on any copyright, trademark, patent or rights in the work.

Signed by:

Name: Félix J. García Clemente

Title: Professor

Place and Date: Murcia, Spain, 15 Nov 2019



Submission Process

Please submit this form to us at via the REV submission system:

<https://www.conftool.com/rev-conference/>

Timeline

Submissions Due: 27 November 2019

Awards Announced: Awards will be announced at our Awards Ceremony in Athens, Georgia, USA, at the REV2020 Conference in February 2020 (<http://www.rev-conference.org/current/>). Winners are not required to attend in person, but are of course invited to do so.

Questions?

Please contact us via e-mail to info@golc-online.net.