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OpenPhys: a Responsive Website Platform for Interactive Physics Education

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We have developed an open source web-based platform ('OpenMap') and website ('OpenPhys') to present interactive self-guided multi-level learning resources. Content is designed for viewing on any device (phone, tablet, laptop) using mobile web technologies.

OpenMap Format: The OpenMap format is crudely: 'a 2D interactive PowerPoint for the web'. Content is organized as a series of lessons (or 'learning objects'). Each lesson consists of a 2D concept map and a set of content pages. The clickable map shows the 2D arrangement of the content pages, which may contain any combination of text, images, animations etc. The learner can navigate between pages by arrow key or swipe, or may return to the map for overview. Pages are arranged left-to-right as a progression through lesson topics, and up/down to present topics at a gradation of difficulty levels. A key objective of this design is to allow learners to progress through lessons at their own level. This multipath approach is a key advantage of a digital medium, and is well suited to self-guided study. The 2D map grid encourages authors to convey the logical structure of the lesson by design of the map shape. The platform is adaptable to any type of material. All the development tools, packages and developed software are open source. The software uses standard web technologies (HTML5, CSS, Javascript, CreateJS) with no plug-ins or downloads required.

OpenPhys Radiation Physics Site: The first OpenMap site is 'OpenPhys'. This makes use of text, images, graphics, equations and interactive animations to present a series of radiation physics concepts. Web software and device graphic display capabilities have advanced sufficiently that quite complex simulations are feasible on the mobile web platform. In atomic and nuclear physics, many key physical processes, such as radioactivity and X-ray interactions, are invisible and physically hazardous, rendering hands-on experimental interaction difficult, and interactive simulations particularly useful. The OpenPhys website currently contains lessons such as: The electronic structure of the atom, Radioactivity; Compton X-ray Scattering, and the Photo-electric effect. The OpenPhys website is available at: https://openphys.med.ualberta.ca/ . Source code and documentation is at: https://github.com/OpenPhysProject/OpenPhys.

Authors: Ms DAI, Anni (University of Alberta); Dr SHARP, Jonathan (University of Alberta)

Co-authors: Mr ROBINSON, O'Jay (University of Alberta); Mr VON HAUFF, Patrick (University of Alberta)

Presenter: Dr SHARP, Jonathan (University of Alberta)

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