analysis. Created at no charge, those icons are now available to all BioRender users. "You're welcome," he quips.

All lined up

Fleshing out BioRender's toolbar are drawing tools specific to life-science research. There are pre-made lines and arrow styles for biochemical pathways, for instance; an arc tool for plasmid maps (graphical representations of small circular pieces of DNA commonly used in molecular biology research); and a new series of brushes for drawing plasmid membranes, vasculature and nucleic acids as if they were lines.

Andrew Deans, a protein chemist at St Vincent's Institute in Melbourne, Australia, published a paper (J. O'Rourke *et al. Nucleus* **10**, 221–230; 2019) in October that features four graphics created in BioRender. Deans is comfortable using Illustrator, but notes that it can be difficult to train new people to use it. As a result, he says, his students 'love' BioRender. But they still create data figures with Illustrator and Adobe Photoshop, he notes. And one member of his team, who is comfortable drawing freehand, creates illustrations using the Tayasui Sketches iPad app and an Apple Pencil.

And there are other options, although none is as bio-focused as BioRender. Kenkel, who also blogs for the reagent distribution service Addgene, says that she illustrates her posts mostly using Vectr, a general-purpose vector-graphics tool, and Canva, an online tool for creating social-media images. Both tools are free, web-based and easy to use, she says, and "basically tick all the boxes for me".

Ken Hughes, an oceanography postdoc at Oregon State University in Corvallis, uses Inkscape, an open-source Illustrator analogue whose version 1.0 release came out on 1 May. And Zen Faulkes, who studies crustacean biology at the University of Texas Rio Grande Valley in Edinburg, favours CorelDRAW, a commercial tool that he supplements with images from the Noun Project, a collection of more than 2 million freely available icons. (Another option is the Servier Medical Art collection from the pharmaceutical company Servier in Suresnes, France; this includes some 3,000 free-to-use images.)

According to Aoki, BioRender now has some 200,000 users. It's free to use, but the resulting images are watermarked, and output-file resolution and format are limited. Figure publication requires a licence (US$35 per month, or $99 per month for 5 users). Users can start working from a blank canvas, but the company also provides hundreds of predesigned templates, including several related to SARS-CoV-2. One of these, detailing the coronavirus replication cycle, is currently the most-used template on the site, Aoki says.

Jeffrey M. Perkel is *Nature*'s technology editor.

AFRICAN SCIENTISTS LEVERAGE OPEN HARDWARE

A growing emphasis on do-it-yourself science is helping researchers to equip labs in resource-limited areas. **By Abdullahi Tsanni**

A 2018 article in the journal *HardwareX* details "an open source hardware setup to measure locomotor activity in rodents". It has a simple design. But for developer Victor Kumbol, then a neuroscience master's student at the Kwame Nkrumah University of Science and Technology in Kumasi, Ghana, that device, called Actifield, has had an outsized impact.

Actifield is an actimeter, a device that quantifies animal activity (V. Wumbor-Apin Kumbol *et al*. *HardwareX* http://doi.org/ggb8hw; 2018). "I needed the actimeter to test for potential drug compounds that could modify behaviour in mice. But my department had only one actimeter available, and it was outdated," Kumbol says. "So I decided to build one for myself."

With colleagues Elikplim Ampofo and Mary Twumasi, Kumbol travelled to Cape Town, South Africa, to attend a two-week workshop run by the non-profit organization Teaching and Research in Natural Sciences for Development (TReND) in Africa, which promotes research and education on the African continent.

Founded in 2011 by Lucia Prieto-Godino, now at the Francis Crick Institute in London, Sadiq Yusuf at the Uganda Technology and Management University in Kampala and Tom Baden at the University of Sussex in Brighton, UK, TReND in Africa encourages do-it-yourself research with a focus on low-cost, open-source science. Courses cover such topics as fly genetics, neuroscience and hardware development.

In one example, TReND in Africa instructor and University of Sussex bioengineer André Maia Chagas joined a team including Prieto-Godino and Baden in 2017 to design a microscope. It was built using off-the-shelf and 3D-printed components, and dubbed the €100 lab (A. Maia Chagas *et al*. *PLoS Biol*. **15**, e2002702; 2017).

"Open-science hardware is not only important in Africa but all over the world," Chagas says. "If you have the blueprint for a piece of equipment, you can understand how it works. You can repair your equipment if it breaks down, and, even more importantly, adapt it to your local needs."

Kumbol's Actifield device is an array of infrared light emitters and detectors inside a box, run using a microcontroller made by the open-source developer Arduino. As rodents move around in the box, they disrupt the beams and the actimeter counts those events.

At US$122.91, the device is a fraction of the cost of commercial systems, which can amount to $6,000 or more. The resulting paper in *HardwareX* helped Kumbol to secure funding from the Mozilla Foundation to organize a follow-up workshop last July at the University of Health and Allied Sciences in Ho, Ghana. He has demonstrated Actifield at the Kwame Nkrumah University of Science and Technology, and has built actimeters for the science department there.

Now a PhD student at the Einstein Center for Neurosciences in Berlin, Kumbol has joined the editorial board of *HardwareX*. In February, he was invited to speak about using open-science tools to tackle equipment challenges in Africa at a VIB Core Management Workshop in Leuven, Belgium.

"It was a great experience for me," Kumbol says. "I received a lot of positive feedback on the potential for open hardware, which has really motivated me to start working on the next steps."

Says Chagas, "This is what we want: a new generation of African scientists that will train others on the continent."

Abdullahi Tsanni is a science writer based in Abuja, Nigeria.