**Thirteen-Year-Olds Hack Their Way Into Space**

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Noor Shenaq, Jordan Penchas, and Angela Glidewell examine an ArduLab. *Photo: Gwen Cario*

When Jordan Penchas started hacking some electronics hardware so he could play an absurdist surgery game with his Wii Nunchuk controller, he had no idea it would lead to a ride on the International Space Station.

Penchas is a 13-year-old eighth-grade student who lives in Houston, Texas. Late last year, a friend gave him an [Arduino Uno](http://arduino.cc/en/Main/arduinoBoardUno) — a $30 open-source computer motherboard that’s popular with the hardware hacking set — and at first, he used it as a kind of middleman between his Nunchuck and a game called [Surgeon Simulator](http://www.surgeonsimulator2013.com/).

Typically, you play the game with keyboard. If you master certain keystrokes, you can remove virtual organs from virtual patients, often to twisted comic effect. But Penchas thought this was awkward and clumsy, so he used the Arduino to plug the Nunchuk into the game instead, and things got much easier. He even impressed his older brother.

But the next step is far more impressive. In June, his latest Arduino hack will end up on the International Space Station. His school, Awty International School, was one of three selected to try out a new type of space science kit. It’s called [ArduLab](http://www.infinityaerospace.io/ardulab.html), and basically, it lets Penchas and his classmates build experiments to run on the space station.

Created by a Silicon Valley startup called Infinity Aerospace, the programmable lab-in-a-box shows just how much open-source software can shake things up — even in space. NASA has long used things called CubeSats to run experiments in space, but Arduino further democratizes this sort of thing. It’s far cheaper and easier to use, putting the power in hands of people as young as Jordan Penchas.

Down on earth, hackers like Penchas can pre-program sensors and test equipment so that the Space Station astronauts don’t have to manually turn dials up in space. They can even remotely connect with their experiments. That’s a big deal because it leads to self-managed experiments in space, says Laura Colville an Education Specialist with the Center for the Advancement of Science in Space, the nonprofit group that manages the International Space Station’s U.S. laboratory. “The one critical thing up there is crew time,” she says.

The openness of the Arduino platform simplifies things for the programmers, she says. “Anyone can buy it. Anyone can download that software for free and use it.”

The 9 cm tall ArduLab starts at $2,000, while conventional CubeSat kits can run five times that price. For [just $5,000](http://www.infinityaerospace.io/space-programs.html), Infinity Aerospace plans to give you the kit plus a four-minute ride on XCOR’s Lynx suborbital rocket.

“With our offerings, any school… can transform its lab into a fully equipped space lab with guaranteed launch slots,” said Manu Sharma, one of Infinity Aerospace’s founders, in an email interview.

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The ArduLab. *Photo: Infinity Aerospace*

There are already hundreds of sensors and devices that work with Arduino, and the open source code that runs on the hardware is freely available for anyone to play around with.

Penchas and his fellow students are designing an experiment that will test the effects of graphene as a radiation shield and they also want to study the growth of algae in zero gravity. They’re still working out the details of their experiments, but whatever path they take, it’s almost certainly going to be a little easier, thanks to open source.

“If there’s a certain thing that you want to do or a certain sensor that you want to use, somebody else has already written the stuff for it and you just have to go snag it,” says Penchas’s physics teacher, Angela Glidewell.

Penchas, like all little brothers, is pretty competitive with his older sibling. He still remembers the “look on his face of complete surprise” when his 17-year-old brother saw his Nunchuk hack.

He hopes to do even one better in space. “My one competitive up-move is that I’m a maker,” he says.