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Physics Students Help Highline Community with 3D-Printed Face Shields

Fall Quarter at Highline College Starts Sept. 28

DES MOINES, Wash. — Upon hearing news there was a personal protective equipment shortage from the worldwide COVID-19 pandemic, physics students at Highline College got to work.

With the guidance of physics instructor Aleya Dhanji, four students who are part of the local Highline College chapter of Society of Physics Students began producing face shields using 3D printers on campus.

To date, the physics club has produced more than 150 face shields. With a goal to get the printers working 24 hours, seven days a week, the team expects they'll soon be producing up to 100 per week. All face shields will be distributed to Highline College chemistry, biology and health care students, who need to be on campus or in hospitals for required clinical hours and practicums.

“I continue to be impressed by students at Highline,” Dhanji said. “Not only are they incredibly smart, but they’re very dedicated in helping the community, very creative. Highline’s biggest asset continues to be its students.”

Former Highline College transfer student Khang Bao, who will attend Central Washington University in the fall, and Sotheara Sen, who graduated from Highline College in June with an associate degree in engineering, both independently came up with the idea at the end of spring quarter.

Dhanji had asked the questions: How could physics provide real-world solutions? And, more importantly, how could they help their community?

But Sen, having owned his own 3D printer, had already found an open-source design from Prusa Research and printed a few face shields for the Highline College Bookstore when he worked there in March, before campus closed.

“I was looking at the news and they said the U.S. ... the death rate is rising in the medical field. There’s a lack of PPE, personal protective equipment,” said Sen, who plans to study mechanical engineering at the University of Washington this fall. “So, I just came up with this idea. I already own my own 3D printer so I might as well use it to help my community.”

Before Sen and the rest of the physics club could get started, they needed to figure out logistics. Dhanji reached out to Nicki Bly, the director of Highline’s Respiratory Care program, who is also leading the college’s COVID-19 response team. Bly indicated there was a need for more PPE, as Amazon orders were unreliable.

“Even if they got a few samples from Amazon, the quality was inconsistent,” Dhanji said. “We asked how many they needed, and they said 50 would be great. Then she came back and said it was probably more like 300.”

Looking ahead, Dhanji estimates the need is closer to 1,700.

Luckily, the government provided Highline College with about 800 face shields at the beginning of summer quarter, so the team had some time to figure out the best approach for fall.

Throughout July, Sen wrote code to adapt the face shield designs for three 3D printers, which included one public printer at Highline’s engineering lab, the printer Sen temporarily donated, and a newly purchased printer the college’s grant program invested \$450 in. Bao helped by fixing and fine-tuning the 3D printer with various mechanical parts.

Over the summer, the Pure and Applied Sciences department also hired Stephaney Puchalski as an instruction and classroom support technician who also oversees all the science labs. Puchalski then took the lead on getting the project started and keeping it organized.

Highline College’s Public Safety department paid for the raw materials for face shield production, which includes the spools of plastic that are fed into the printers and melted down before it is printed, layer by layer, into a headpiece design.

The club plans to continue producing face shields throughout fall quarter, which starts Sept. 28, and possibly into winter quarter. However, their hope is this project they’ve dedicated their summer to soon becomes obsolete, because then it means COVID-19 is finally over.

[Learn more about Highline College’s Science, Technology, Engineering & Mathematics degrees and certificates.](#)

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Attachment:

Photo 1: Highline College alum Sotheara Sen works with a 3D printer that is programmed to produce plastic head pieces for face shields.

Photo 2: Alexander Robins, Khang Bao, Sotheara Sen and Stephaney Puchalski inspect 3D-printed head pieces before they are assembled into face shields.

Links within this release:

- <https://www.spsnational.org/>
- <https://learn.adafruit.com/open-source-face-shield-designs?view=all>
- <https://highlinebookstore.com/>
- <https://www.highline.edu/what-we-offer/pathways/stem/>

Founded in 1961 as the first community college in King County, Highline College annually serves more than 11,000 students. With over 70 percent students of color, Highline is the most diverse higher education institution in the state. The college offers a wide range of academic transfer, professional-technical education, basic skills and applied bachelor's degree programs. Alumni include former Seattle Mayor Norm Rice, entrepreneur Junki Yoshida and former Washington state poet laureate Sam Green.