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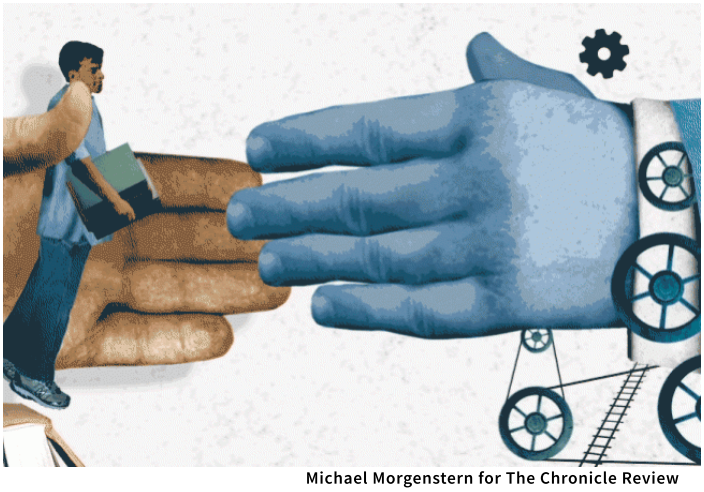
Hyperserfs

How Silicon Valley exploits students and their universities



Michael Morgenstern for The Chronicle Review

By Avery J. Wiscomb | MARCH 12, 2017

✔ PREMIUM

Since October of 2015, an estimated 318 teams of students from 162 universities and 16 countries have worked to make a billionaire's dream come true. Thousands of students (and hundreds of their faculty advisers) have been designing prototype versions of high-speed, Hyperloop train pods, including braking systems and other transportation technologies, at the behest of Elon Musk — for free. With their sheer number, it's as if Musk owns his own Hyperloop research university, paid for by other universities and their students.

Musk's Hyperloop Pod Competition, run by his company SpaceX, is just the latest, trendiest example of Silicon Valley's increased efforts to unite the student workers of the world together into a labor force it does not need to pay. Open source, crowdsourcing, and work-for-credit schemes like Hyperloop are now thriving on the campuses of today's top research universities. Hacking for Defense pairs corporate sponsors with student teams to solve problems for the U.S. Intelligence Community, for college credit. And tech giants like Qualcomm, Google, and Microsoft incentivize students to "Hack the Brain," for the chance to win free tuition.

It's no wonder that universities are eager to enter into such arrangements, which help cultivate ties with research sponsors, align the curriculum to marketable skills, and, ideally, help graduates find work. But these deals benefit private industry much more than they do universities and their students. They are not just exploitative but superexploitative, because students don't simply labor for free, they pay tuition or accrue student-loan debt for the privilege.

Musk first proposed his Hyperloop in a 54-page manifesto, or "alpha paper" (his term), in 2013. Framed as a less-expensive, faster alternative to the California High Speed Rail project ($64 billion), Hyperloop would propel aerodynamic aluminum capsules — filled with people, automobiles, or cargo — through a nearly airless network of tubes between cities at close to the speed of sound. The basic idea for Hyperloop is not new; it was imagined by the rocket inventor Robert Goddard as early as 1945.

Musk declined to build Hyperloop himself, but he encouraged others to build it. Tech elites like Musk now double down on their investments by "inventing," then "giving away" products they can later manufacture parts for, build outright, or deploy for their own ends after they are researched and developed, in part, by college students.

Two start-ups, founded by friends of Musk's, also capitalized on the hype: Hyperloop Transportation Technologies, also known as HTT, and Hyperloop Technologies Inc., now called Hyperloop One. Although these companies are uniquely positioned with Musk to profit from student work, universities by their design will surely fail to profit to the same degree. Hyperloop would run on technologies (solar, battery, and electric) that Musk is already heavily invested in, and that have nothing to do with university business. Hyperloop technology could also move cargo to resupply Musk's for-profit Mars colony from Earth multiple times daily.

Musk has capitalized on his fame to exploit the research university, using it to develop and create demand for technologies he can profit from at others' expense.

he costs of prototyping and testing pods for Hyperloop were to be offset by work from two kinds of crowds: casual and student — a practice called "crowdstorming" by HTT's chief executive, Dirk Ahlborn. The first crowd consisted of part-time, contingent STEM workers such as those at HTT — many of them recent college grads, or interns.

According to Ahlborn, most of the company's employees work on proprietary Hyperloop technology "in their spare time" — that is, free, with no benefits, in exchange for future shares in HTT should it go public. This is not a particularly remarkable practice (although Ahlborn was somewhat unique in bragging about it). While it could be argued that companies like HTT and Hyperloop One might succeed, and ultimately create paying jobs, more than nine in 10 start-ups fail, meaning that employees will probably never receive reimbursement for their unpaid labor.

For the second crowd, Musk inspired student teams from around the world to design, and ultimately to build, Hyperloop pods, seeking to capitalize on higher education's much-touted embrace of innovation. Announced in June 2015, SpaceX's Hyperloop Pod Competition for student and independent teams offered cash prizes of $150,000. Teams assumed responsibility for funding their prototypes, and were required to give away their designs to company sponsors if they wanted to compete. In a move that made the contest appear more like a protracted job interview, SpaceX also promised some winning team members "a chance to work with real Hyperloop engineers," as if students were not already being asked by SpaceX to work like real Hyperloop engineers.

More than 1,000 student teams, Space X reports, filled out the preliminary application materials to compete; more than 300 began to design a pod; of those 124 would qualify for Phase 1 of the contest. The total amount of money and time spent on the Hyperloop Pod Competition is unknown because SpaceX did not ask students to keep track. However, we can make some rough estimates. MIT's team reported that its pod design cost about $150,000, and that each of its 25 student team members spent about 20 hours a week on the project, for six months. That comes to about 12,000 hours of work. If, like MIT, the average-size team numbered 25 students (Delft's has 30 and Open Loop's has 60), the average output of teams would be about $18.6 million on pod materials, and 1,488,000 hours of work. That translates to the equivalent of $16,222 per student (based on the average first-year salary of $64,891 for an engineer with a bachelor's degree in the United States) or about $50,288,200 in total labor costs across teams, or $68 million for Phase 1 of the Hyperloop contest. In many cases, the students are earning course credit for their work, but they are already paying the university for that credit.

These figures still do not reflect the added value of faculty mentors (many at the top of their field), graduate students (who have more valuable skill sets than undergraduates), work from those not officially on the team (including other faculty and university administrators), or the advancement of 30 student-team finalists to the second phase of the contest, which took place in January. Additionally, a second Hyperloop challenge (Hyperloop Pod Challenge II) is scheduled to happen this summer.

The mass extraction of labor from universities and students by the technoscientific class is not new. What has changed is the size, scope, and pervasiveness of these projects. The labor is extracted not just in material terms of hours but also in affective terms. The R&D work that STEM students perform for tech companies shapes the kind of education students receive, designing it specifically to benefit companies like Musk's. With explicit university and federal support, the tech industry structures the preconditions for future employment at billion-dollar companies like SpaceX into coursework and daily student life.

The idea that industry dictates what learning can be in STEM fields is a strong assertion. But as programs at Cornell Tech, Purdue, Texas A&M and other universities demonstrate, courses are being designed in collaboration with the tech and venture-capital sectors that enable them to appropriate the free labor of STEM students. Cornell Tech is even housed in New York's Google building while the school's campus is being built.

Many engineering schools — and even whole university systems — have become heavily invested in Musk's concept. Some sent multiple teams of students to the Hyperloop contest. The University of California at Berkeley and the Rochester Institute of Technology each had three teams competing. The University of California system had nine teams in total. Texas A&M (the host university for Phase 1 of the Hyperloop contest) sent seven teams. Not surprisingly, most competitive teams were from well-funded engineering schools, which have engineering and lab infrastructure for student teams to leverage for Musk's benefit.

The effects carry beyond the faculty and students who are directly involved. Cash, raw materials, lab resources, and even server space that could have gone to other programs or departments were allocated for Hyperloop (for instance, each school affiliated with the Open Loop team, itself composed of six schools, initially contributed at least $10,000). Students also pursued and/or brokered corporate sponsorships (Open Loop is sponsored by Ford, Hyperloop One, GM, GE Transportation, and others), and petitioned their student governments for access to undergraduate and graduate student activity fees.

Student teams built public-facing websites, asked manufacturers to donate materials, and asked family, faculty members, and friends to donate cash through crowdfunding web apps like Kickstarter, Indiegogo, or GoFundMe. MIT's Hyperloop team created its own business-development units to organize funding for its Hyperloop pod (two of its six team leaders are in business management), while the public research university Virginia Tech recently announced its plan to build a Hyperloop test track, signaling long-term investment in Hyperloop for its students.

The capture of student work on Hyperloop technologies extends beyond the contest itself and into the spirit of other programs, too. For example, Dirk Ahlborn of HTT has snatched up ideas from UCLA's Suprastudio architecture program, challenging a class to create solutions for the "Hyperloop user experience."

It is difficult to blame students eager to work on projects like Hyperloop, framed by SpaceX as a technology that will change the world. They hope for fame and fortune, recognition from Musk, and, of course, job opportunities. But, in effect, many students are already paying to work for his companies. Students from top colleges will probably get jobs after graduation, but not necessarily the jobs they expect. The push to produce STEM students has created a new cheap labor force; at the same time, STEM wages are already being driven down. More consequently, students will not have learned to imagine alternative career paths, nor be taught to what degree industry will eventually benefit by appropriating their work.

Students themselves even work to facilitate the conditions of their indenture. The leaders of many top-performing student Hyperloop teams — for example, two at the University of Illinois at Urbana-Champaign — had pre-existing relationships with Musk's companies, having done internships at Musk's SpaceX. Through these internships, Silicon Valley companies are rearing a generation to think on, talk about, and feel for these kinds of technologies. The goal for companies extracting this R&D resource from students is not just a real, useable product. The goal seems to be for students to connect to their technologies in deeply personal, cognitive, and emotional ways, and to engage with and collaborate with each other inside the university and globally. In effect, students become serfs, paying to develop ideas of the future that will probably benefit only the superrich.

If anything, universities need to help students consider how their skills can be engaged for noncommercial purposes and embolden them to take on R&D projects that actually benefit the wider public. Projects like Hyperloop narrow what STEM students see as the practical purpose of their skills, at the same time that they co-opt the ideals of open source. Universities ought to better protect their students' time, labor, and futures.

As for the assumption that universities profit from cultivating ties to research sponsors and businesses, Christopher Newfield has shown that these practices actually cost more than they yield, while vacuuming up resources from profitable departments, or from noncommercial, public-benefit research.

When universities enter into agreements with corporations to sponsor research, the extent of their claim on the intellectual property is spelled out. But when it comes to curricular or resource-based arrangements like the Hyperloop contest, what the university stands to really gain is not so clear. And yet, strapped for funding and competing to stay relevant, many universities still eagerly support such high-profile projects in hopes of accruing cultural capital, raising their profile among peer institutions and prospective students, or striking it rich. As a result, universities have commodified not only student knowledge but learning and student life for profit.

In so doing, they are betraying their public promise, which is to advance science and technology for the benefit of everyone. We can appreciate the results of science or the technological breakthroughs brought about in the postwar university, and learning by doing is an essential pedagogical technique. University and student-powered research led to innovations such as oral contraceptives, the polio vaccine, the computer, and the internet — in a climate that fostered the pursuit of human knowledge, for the sake of all humans.

This climate has given way to one where, as Jacob Rooksby has argued, companies are in the classroom at the same time universities increasingly act as companies — in a climate that fosters the pursuit of intellectual property, patents, copyright, and branding.

In today's environment, universities must do more to ensure that the public and social investment in STEM benefits the common good, rather than serves primarily private interests. We need more research-based, public service in STEM fields, and it needs to be free not only of student debt but also of political and commercial restraints.

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