**FINAL STRETCH**

SkillsUSA, the Regional Science and Engineering Fair, the second annual LCPS Student Maker Showcase, and so many snow days made third quarter go by in the blink of an eye! Students across all Academies were actively engaged in projects - from mathematically modeling the final altitude a model rocket, to mapping the opioid crisis, to inventing Rube Goldberg machines and prosthetic limbs.

Even your librarian was actively involved in her own research - what resources and services do you use/value in your research library? Studies show that libraries are huge supporters of innovation, but with an abundance of data and Internet accessibility making resources available everywhere - what are students coming to the library for? This action research project has lead Mrs. Hiltner to a variety of new productivity tools, platforms, and resources that she is excited to implement at the Academies. Look for a more student lead library page (coming soon!)

**WHAT WE'RE READING**

Instantly a New York times best seller, the *Gilded Wolves* has it all - history, fantasy, mystery, and magic. It’s 1889 an the Exposition Universelle is caught in a political scandal - old houses and current powers are at odds. An all-powerful society called the Order of Babel (think Free Masons), calls upon Séverin Montagnet-Alarie, disgraced son of a fallen house, to find a lost artifact. With his misfit band of friends, his quest is to find the artifact and regain his family’s place of power.


The number of women working in the tech sector in the United States is dismal, which is one of the reasons why attorney and activist Reshma Saujani started Girls Who Code seven years ago with the hope of closing the gender gap. To date, the organization has served over 185,000 girls from 3rd graders up to college-aged, many of whom are from historically underrepresented groups. In her latest book, Saujani states why she thinks this is: From a young age, boys are lauded when they take risks. Girls, on the other hand, are told to be perfect but also to steer clear of taking chances, which puts them at a disadvantage when it comes to coding, and jobs in tech in general. They are are all about taking risks. Saujani shares her own inspiring story of learning to be brave, and how it is bravery which gives us the power to claim our voice, to leave behind what makes us unhappy and go for what sparks in our souls.

Check out her famous TED Talk [here](#).
Where Exactly is the Cloud?  
by Frances Roberts

“People think that data is in the cloud, but it’s not,” said Jayne Stowell, who oversees construction of Google’s undersea cable projects. “It’s in the ocean.”

It kind of boggles the mind when you really think about the Internet. Do you even know what it is? While most of us experience the Internet through Wi-Fi and phone data plans, those systems eventually link up with physical cables that swiftly carry information across continents and even oceans.

The Internet is made up of tiny bits of code – called data - that move around the world, traveling along wires that are as thick as a strand of hair and long enough to stretch across the ocean floor. And, these bits of code move amazingly fast. The data is somehow able to zip from New York to Sydney or from Hong Kong to London in less time than it took you to read this paragraph.

A lot of cable has already been laid to connect the continents and support our insatiable demand for information, communication and entertainment. In fact, 750,000 miles of it. In the modern era, it was the telecommunications companies that first took on the task of laying out most of the cable, but in the last ten years, American technology giants have started taking over. In the beginning, they created a consortium to pool their resources and build - and then own - the subsea cables. Think of it as building a freeway for them all to use. Google has backed at least 14 cables globally, and Amazon, Facebook and Microsoft have invested in others. These content providers now own or lease more than half of the subsea bandwidth.

A more recent option is for a company to take on an subsea cable project alone, and Google recently announced its newest one that will connect the United States to Chile, which is where the company’s largest data center is located. Google has invested $290 million in its Chilean data center to help develop its capacity in artificial intelligence and machine learning, as well as to deliver cloud applications like Gmail, Google Maps, YouTube, and Waze.

This subsea cable project will be no easy task. Although a 456-foot ship named Durable is set to deliver the cable to sea, the cable will first need to be assembled inside a large factory in Newington, New Hampshire. The factory is owned by SubCom and is filled with specialized machinery that is used to maintain tension in the wire and encase it in protective skin. The cable will have plastic, steel and tar added to help it withstand unpredictable ocean environments, and when finished, it’ll end up the size of a thick garden hose. It takes a year of planning to chart the cable route so as to avoid underwater hazards, but the cables themselves will still have to withstand heavy currents, rock slides, earthquakes and interference from fishing trawlers. Google estimates the cable will last up to 25 years.
When the cable is ready to be installed, it will take about a month to carefully load it onto the Durable before the ship hits the open sea. Building and laying the infrastructure of our digital world is a labor-intensive job. The Durable will have to carry enough supplies to last at least 60 days at sea at a time with the 80 crew members switching off 12-hour shifts. The work is slow and plodding with the ship moving about six miles per hour, as the cables are pulled from the giant basins out through openings at the back of the ship. In areas closer to shore where there would be a higher risk of damage, an underwater plow is used to bury the cable in the sea floor.

After the Latin American project is completed, Google then plans to start on another subsea cable project called Durant, named after the first Nobel Peace Prize winner and Red Cross founder Henry Durant. The cable will stretch from Virginia Beach in the U.S. to the French Atlantic coast and will enable major expansions in their global cloud infrastructure. This cable is needed to help assure connectivity between its many other data centers around the world, including the Netherlands, Montreal, Finland and Los Angeles. Google currently has 13 data centers around the world and 8 more under construction. By building the massive subsea cable themselves, Google will then own the connectivity between its data centers and won’t have to share the bandwidth for the life of the nearly 4000-mile cable.

Durant will be expensive, to say the least. These subsea cable projects can cost hundreds of millions of dollars to pay for not only the cost of the cable itself but also for the specialized surface facilities needed at both ends of the cable. Google has hired TE SubCom, an industry pioneer in subsea communications technology, to design, manufacture and lay the cable for Durant. This project will add network capacity across the Atlantic, supporting one of the busiest routes on the Internet, as well as the growth of Google Cloud. The Durant cable is expected to be completed in late 2020.

The demand for subsea cables will only increase as more businesses rely on cloud computing services. Also, new technologies, such as powerful artificial intelligence and driverless cars, will also require such fast data speeds. New areas around the globe are gaining access to the Internet, and the United Nations has now reported for the first time that more than half the global population is online. All that growth and its accompanying data will require more and more subsea cables to be built. It’s truly a modern day phenomenon to imagine these many freeways under the sea.

**SOURCES**


**THUNDER HEAD**

Internet of Things (IoT) and data everywhere got you feeling paranoid?

Want to feel prepared when "the cloud" finally does take over?

Check out Neal Shusterman’s Arc of the Scythe trilogy.

(The final installment, *Toll*, is due out this September).
Read on the Go

With the warmer weather and longer days, we know you're on the go. Use the follow apps to take your media with you, wherever you are.

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Or you can download the MackinVIA app and link directly to your school account. MackinVIA keeps track of your school e- and audiobooks.

AVAILABLE THROUGH THE LOUDOUN PUBLIC LIBRARY
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MRS HILTNER CURRENTLY HAS CHECKED OUT:

Cinematic adaptation of Ruta Septys Between Shades of Gray available through Hoopla

e-book available through Libby. Published around the same time as Beth Macy's Dopesick.