May 2022

SONOMA STATE UNIVERSITY

Learning by Making Newsletter

Introducing the LbyM Web App

The Learning by Making curriculum requires technology that allows students to interact with computer software, computer hardware, and experimental lab setups. The first six years of curriculum development have required customized student laptops. Beginning in 2020, the EdEon team at Sonoma State University has moved this technology to a Web App, making it possible for students to use their own computers while in the LbyM course.

The idea for a version of the Learning by Making software that does not require privately owned computers for each school has been around since the program's inception. However, until March of 2021, the Web App was not even possible. With the release of the Web Serial API, the Web App became a reality. Casey Lewiston is EdEon's main software developer, and he designed and implemented the Web App. The Web Serial API is a feature of the Chrome and Edge browsers that allows LbyM's software to use a USB serial line to communicate with Arduino processors directly from the browser. The new technology enabled the EdEon team to create this much more scalable system.

While the LbyM team developed the Web App software, it is incredibly important to recognize the entire team for the feedback they provided. Greg Martin from Ukiah proactively took a very early version into his classroom so that he could offer feedback to the team based on real student experience. Greg's feedback was an immense help, and ensured that the version of the Web App used in each and every classroom utilizing the LbyM curriculum is professional and intuitive.

How different is the Web App?

The Web App is very different. Before the Web App, students used custom computers provided by EdEon at SSU and purchased with the Department of Education grant funding. With the Web App, however, almost any computer will work with the new curriculum. The Web App features an entirely new modern interface, including a popular cloud saving feature. With the implementation of the Web App came a completely redesigned Unit 1, which presented the students with the opportunity to create computer scientific simulations.

What were some challenges the team faced in the design & implementation of the app?

While everything was a challenge on its own, one of the most challenging obstacles, according to LbyM Project Manager Laura Peticolas, was figuring out what to keep from the previous Arduino-based version and how to implement the coding language and technology. Essentially, the information needed to be both translated and moved. While starting from scratch was an option, it was far less desirable than digging through the code previously used and bringing as much of it as possible into the revamped project. "The technology has gone through so many development phases that it can be hard to figure out what was brilliant, still relevant, and what could be left out," Laura mentioned, on the difficulty of deciding what to keep and what to devote the time to translating and moving.

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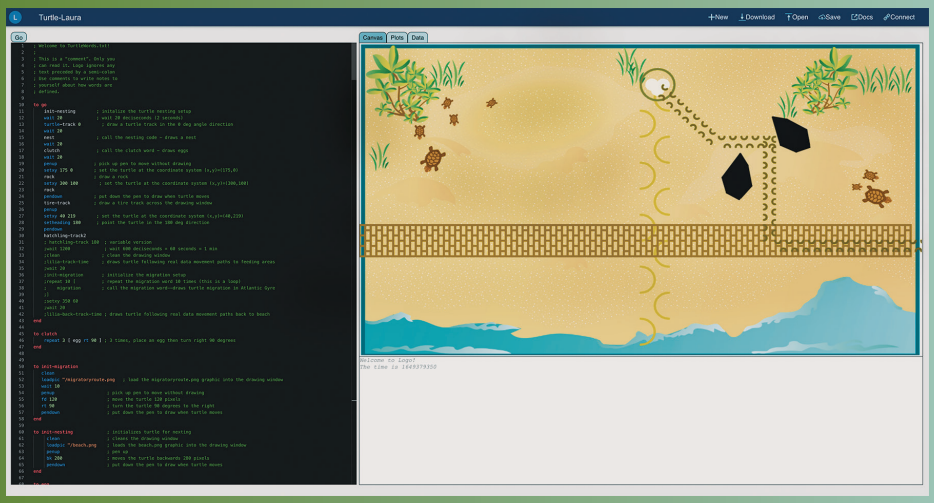
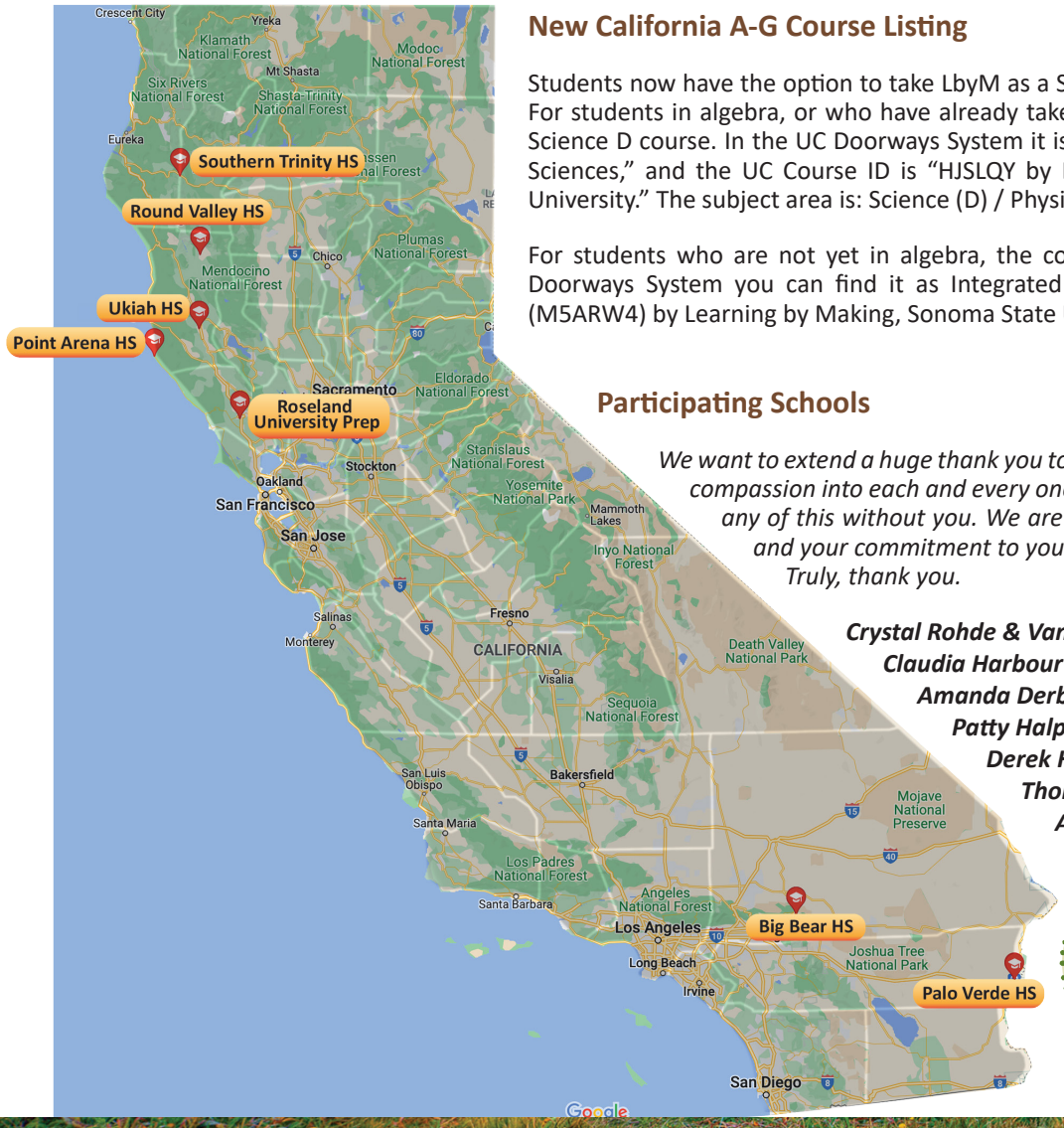
Casey began building the Web App before the release of the Web Serial API, so his first challenge was to adjust his work to utilize the Web Serial API–which he helped test and develop. A new infrastructure was created that supported fast development, testing, and deployment using cloud services. "Every feature has been a challenge," Casey said, "and there has been a lot to learn. Even though parts of it look similar, the interface was built from scratch for this version, and being able to respond quickly when we find issues or realize what features are missing has been important." Casey went on to add that these changes happened in the middle of the COVID-19 pandemic, when schools were transitioning to remote education. The transition meant a complete redesign of the legacy system used previously by LbyM to support the schools and educators, along with the entire logistics process.

"The world does not reward you for what you know but instead it rewards you for what you can do with what you know"

Andreas Schleicher, Director (Organisation for Economic Co-operation and Development)



This image shows the result of a simulation of the life of a female sea turtle. The simulation was written using the Turtle Logo language as part of the Learning by Making (LbyM) integrated CSTEM curriculum developed by Sonoma State University. The LbyM Web App can also send and receive signals from experimental sensors wired to the LbyM Basic Board. Using the sensors together with code written in the Logo language, 9th-grade rural students in California are conducting a variety of different scientific experiments with themes including Water & Soil, and Light & Energy.



New California A-G Course Listing

Students now have the option to take LbyM as a Science D or as an Elective G course. For students in algebra, or who have already taken algebra, the course to select is a Science D course. In the UC Doorways System it is called: "Integrated CSTEM Physical Sciences," and the UC Course ID is "HJSLQY by Learning by Making, Sonoma State University." The subject area is: Science (D) / Physics/Earth & Space Sciences.

For students who are not yet in algebra, the course is a G course. Within the UC Doorways System you can find it as Integrated CSTEM Physical Sciences, Elective (M5ARW4) by Learning by Making, Sonoma State University.

Participating Schools

We want to extend a huge thank you to our teachers in California. You bring compassion into each and every one of our schools and we could not do any of this without you. We are so thankful for your thoughtfulness and your commitment to your students.
Truly, thank you.

Crystal Rohde & Vanessa Cannon - Roseland Univ. Prep
Claudia Harbour - Southern Trinity HS
Amanda Derby - Round Valley HS
Patty Halpin & Greg Martin - Ukiah HS
Derek Hoak - Big Bear HS
Thomas Cee - Point Arena HS
Arnold Pelicano - Palo Verde HS

We extend a warm welcome to our newest school to join the LbyM curriculum starting in the Fall of 2022: Roseland Collegiate Prep (part of the Roseland Charter School District)

Learning by Making: STEM Success for Mendocino County, an "Investing In Innovation" (i3) program, was funded from 2013-2018 by the U.S. Department of Education. Our current grant *Developing a Student-Driven STEM and Computer Science Curriculum for Rural Students* is funded by ED's Education Innovation and Research (EIR) program (2018-2023).

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To join our LbyM group page, send email to
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