Career EXPLORATION lab

Career Exploration: Science, Technology, Engineering, and Math (STEM)

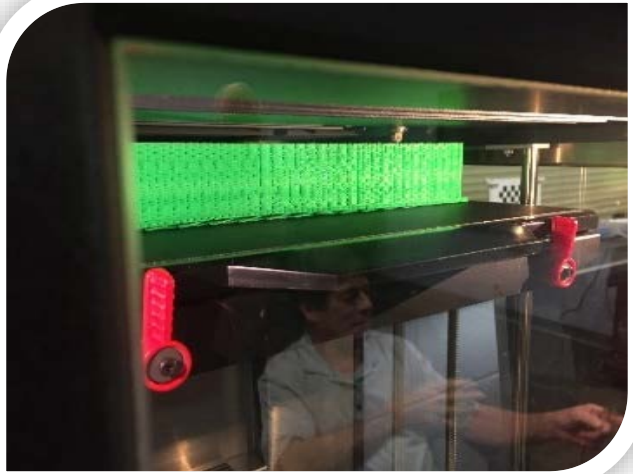
The South Carolina Commission for the Blind

The South Carolina Commission for the Blind

Career EXPLORATION lab

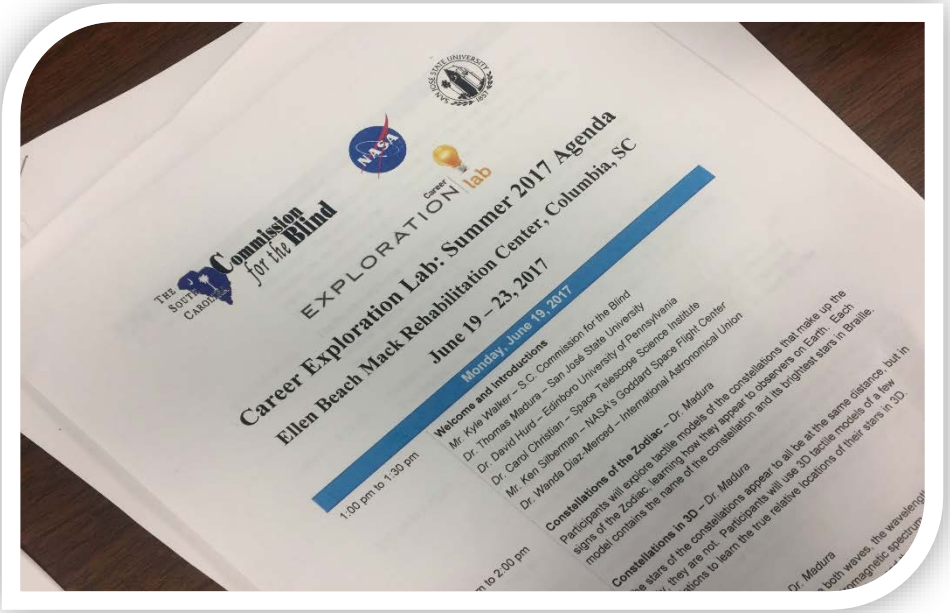
What is the Career Exploration Lab?

- Six (6) 3D Printers
- Large wall mounted touchscreen monitor
- Accessible design software
- Located in the ***Ellen Beach Mack Rehabilitation Center for Employment***, Columbia SC



STEM Career Exploration Week:

June 19th through 23rd 2017



Purpose:

Use 3D printer technology to help blind and visually impaired students age 15 to 18 explore STEM careers using tactile models and sonification techniques, and to introduce students to blind professional role models with successful STEM careers.

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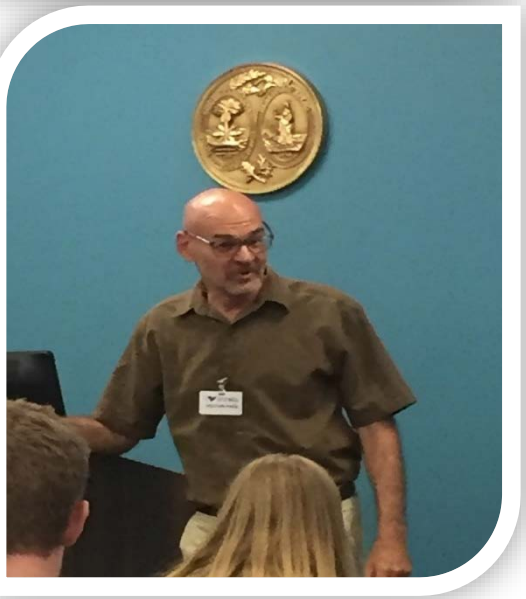


Our Team of Scientists:

- Dr. Thomas Madura

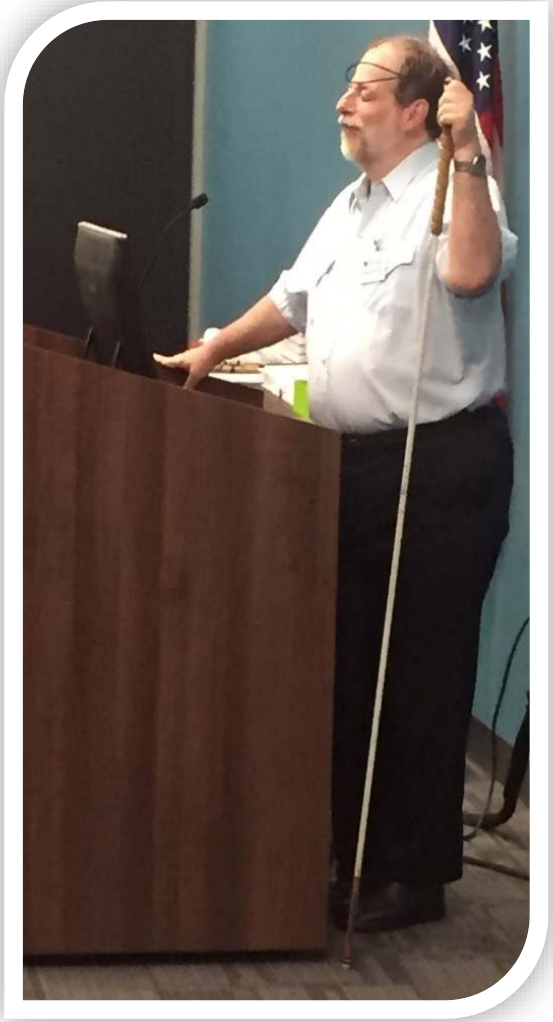
  Assistant Professor,
  Dept. of Physics & Astronomy,
  San José State University

- Mr. Kenneth Silberman

  Engineer & Patent Attorney,
  NASA Goddard Space Flight Center

- Dr. David Hurd

  Professor of Geosciences,
  Edinboro University of Pennsylvania



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Our Team of Scientists:

- Dr. Carol Christian

  Astronomer,
  HST EPO Project Scientist,
  Space Telescope
  Science Institute

Space Telescope Science Institute
Operated for NASA by AURA

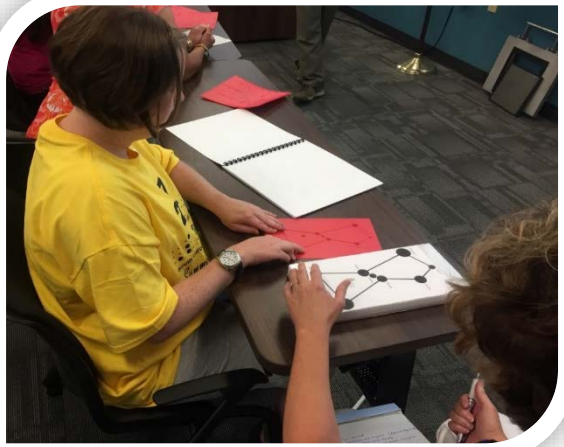
- Dr. Wanda Diaz-Merced

  Astronomer,
  International Astronomical
  Union

IAU
International
Astronomical
Union

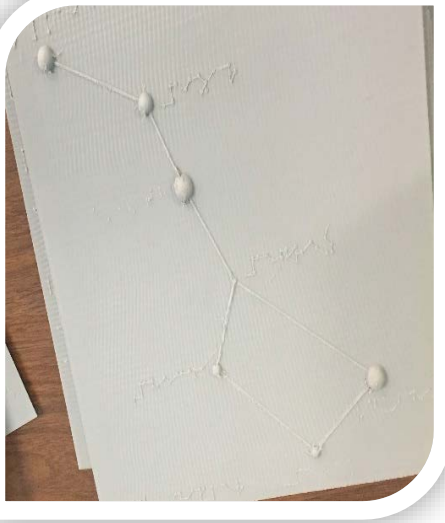
Our Students:

- Nine (9) students who are blind or visually impaired
- Ages fifteen (15) to eighteen (18)
- Representing all areas of the state of South Carolina
- Students were identified by their Transition VR Counselor as having aptitudes and interest in science careers
- Students stayed in the SCCB dormitory and participated in classroom, Career Lab, and planned evening social and recreational activities.
- Pre- and post-evaluation data gathered to measure effectiveness of program.



Tactile Constellations of the Zodiac and Constellation Orion in 3D

Students explored 3D printed tactile models of the constellations of the Zodiac, learning how they appear to observers on Earth and about apparent stellar magnitude. Students also constructed a 3D model of the constellation Orion and learned about absolute stellar magnitudes, the distances of the stars from Earth, and that apparent stellar brightness depends on both absolute stellar brightness and distance.



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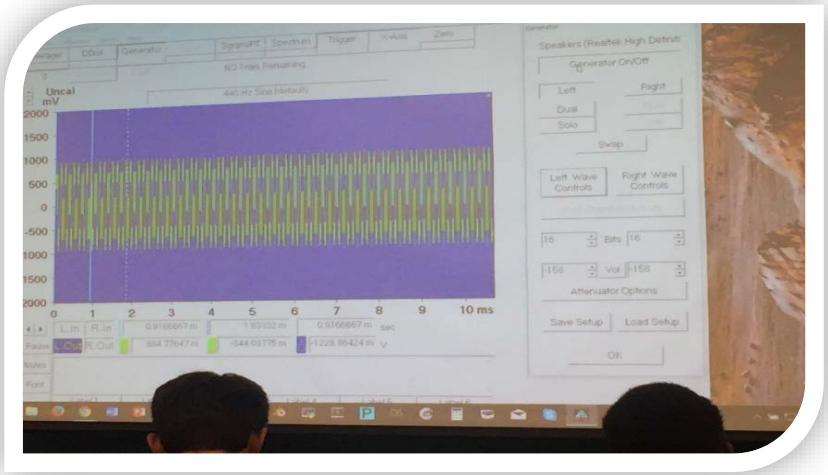
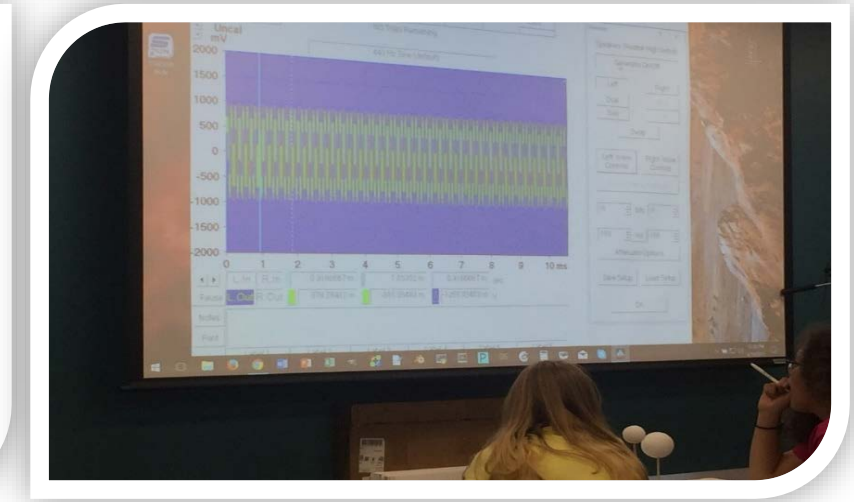
Light and Energy

Light and sound are both waves, the wavelength spectrum of sound can be used to explore the electromagnetic spectrum of light. Students “listened” to colors and learned about line spectra and the Doppler Effect.





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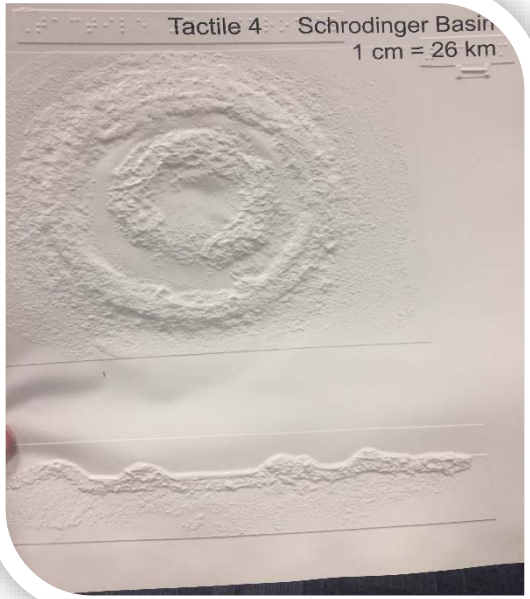
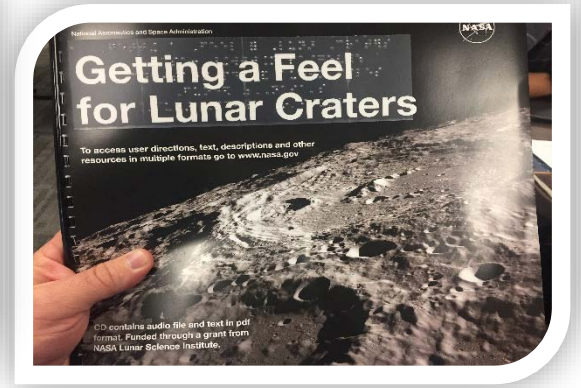


Tactile Gravity, Tactile Atmospheres, and Lunar Craters

Students learned about the relationship between weight and a planet's mass. Students explored simulated atmospheres of four celestial objects and learned how to identify the celestial object by the properties of it's atmosphere. Students then used tactile maps to explore the Moon, learn about crater properties, and estimate crater diameters.



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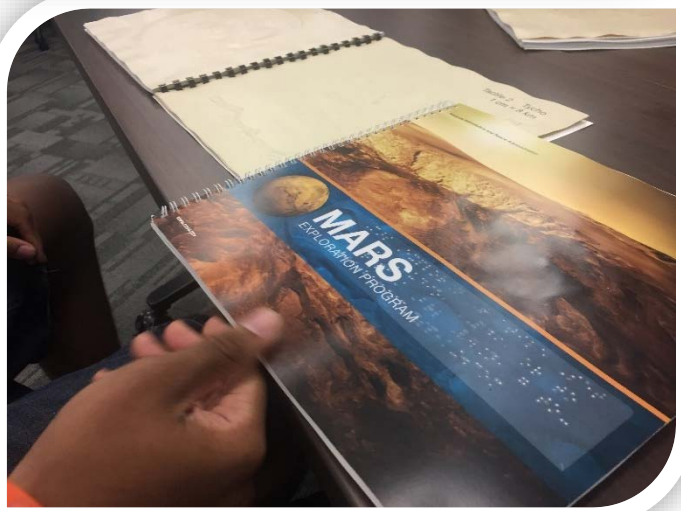
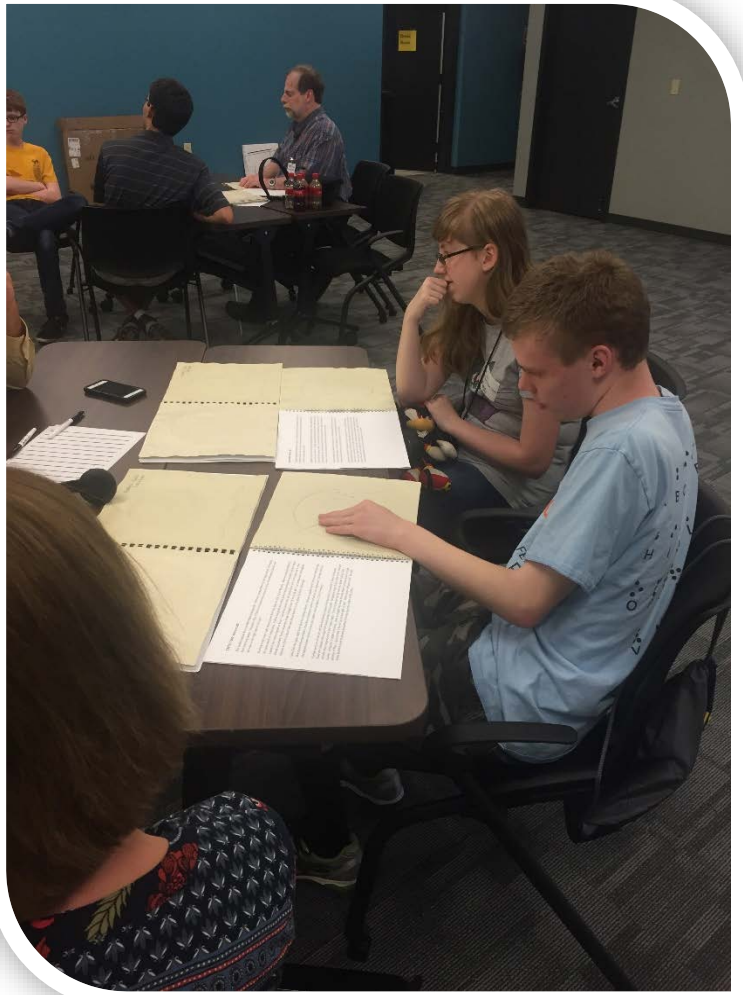


Mars Exploration

Using NASA's Mars Exploration Braille Book, students explored Gale Crater, learned about the Curiosity Rover, and explored evidence of Mars's watery past.



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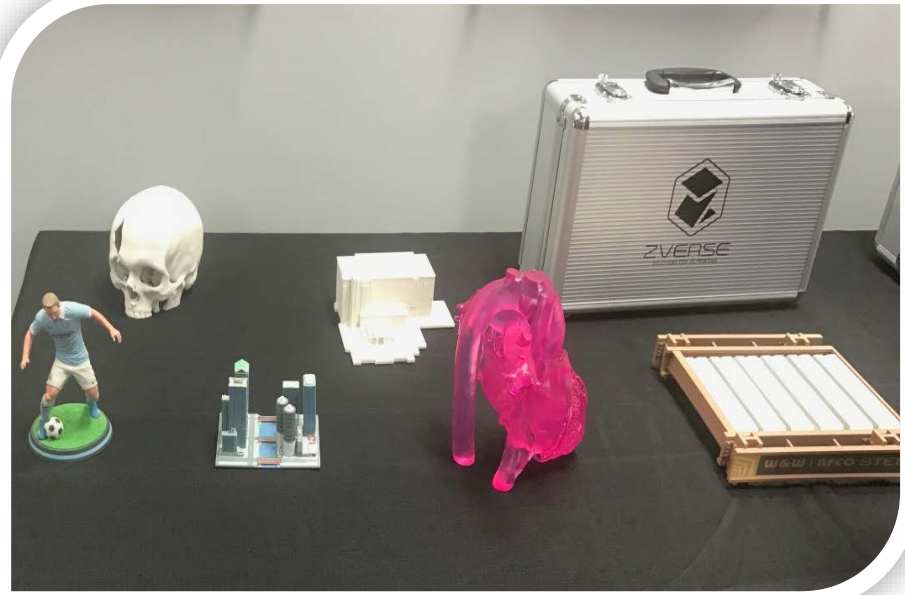
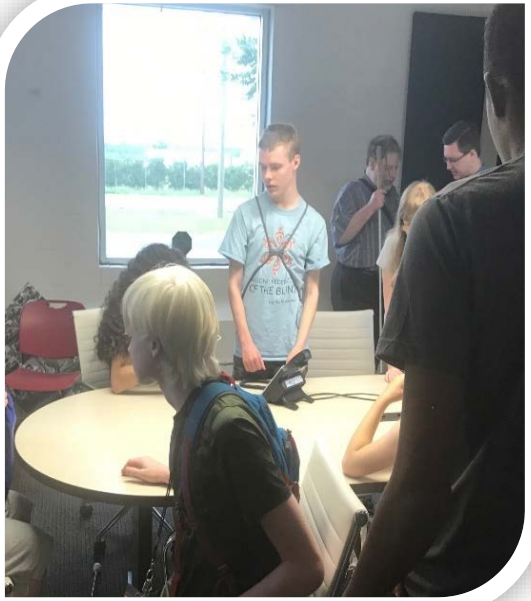
Employer Field Trip!

Students toured local employer Zverse, who specializes in 3D Printing. Students met with Zverse employees and learned about jobs in 3D printing.

zverse® INSPIRED 3D PRINTING





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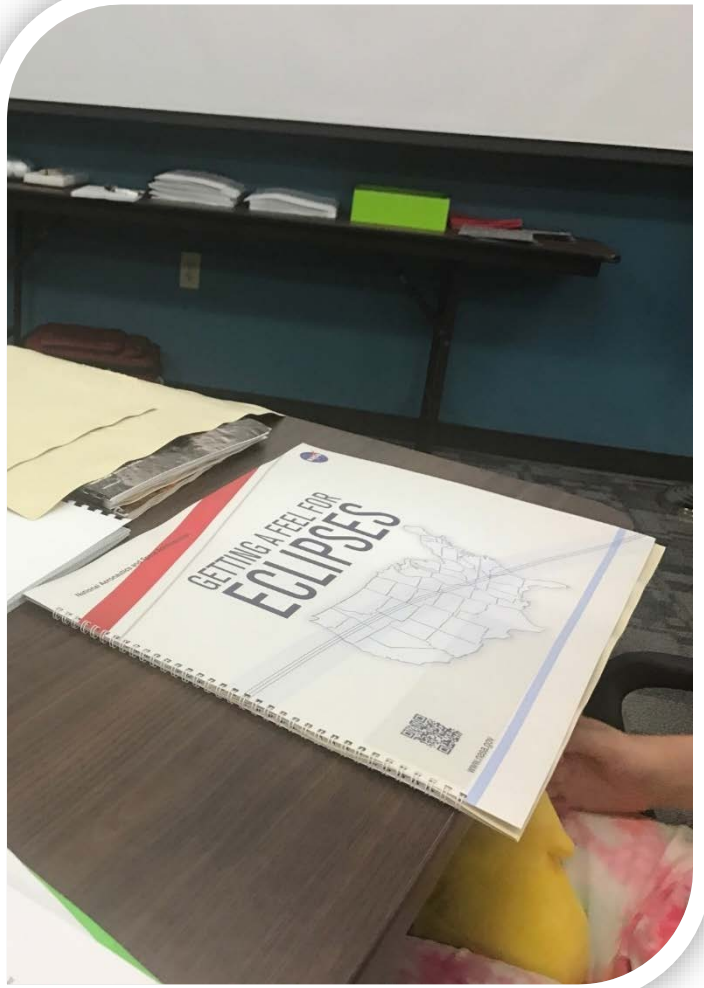
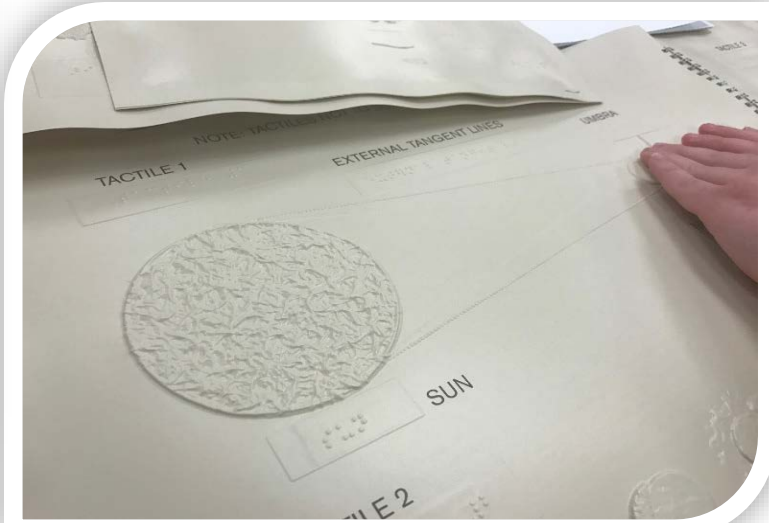
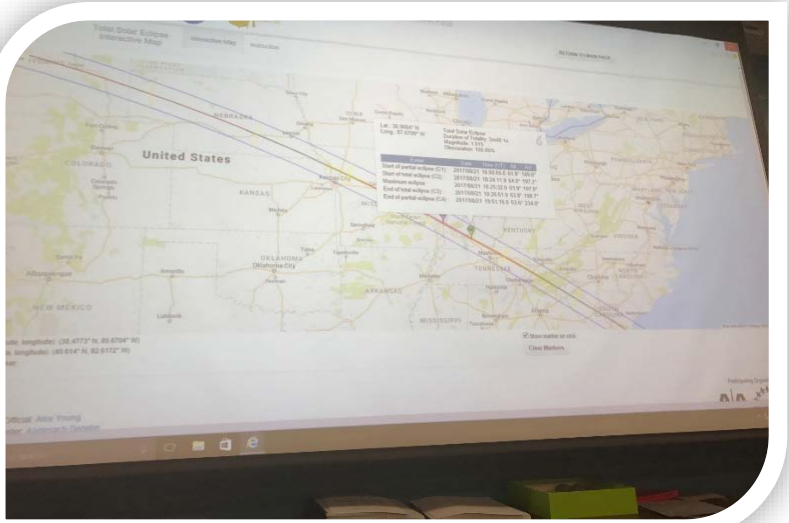


Total Eclipse August 21st 2017

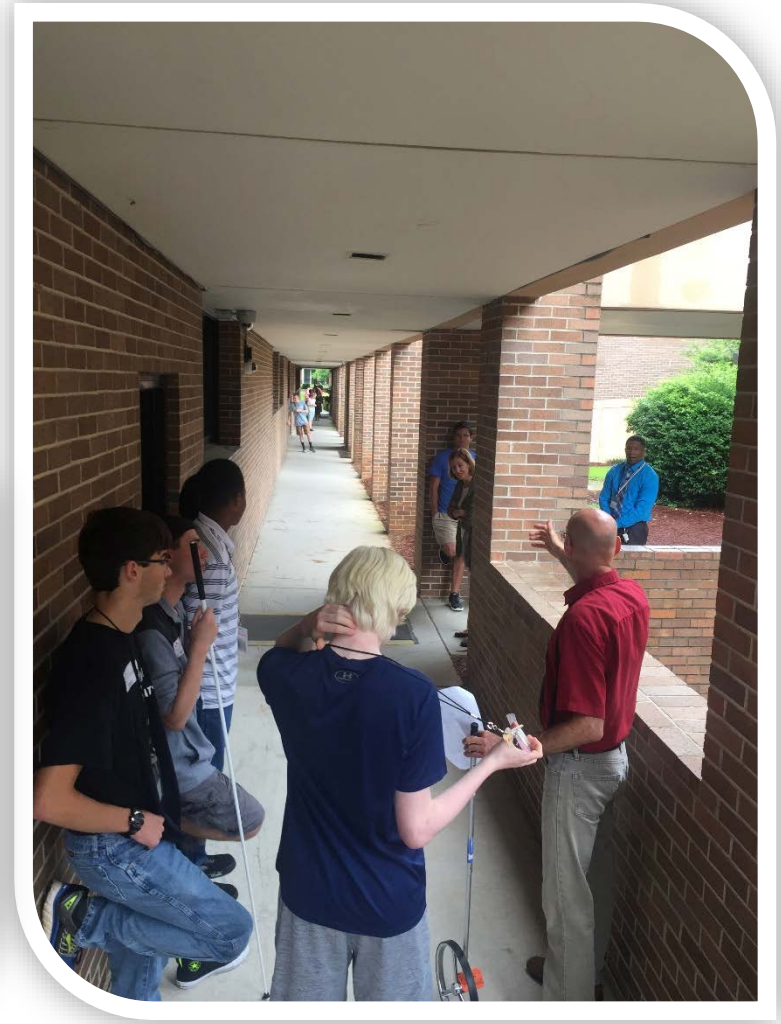
Using NASA's "Getting a Feel for Eclipses" Braille Book, students explored the path of the upcoming total eclipse of 2017, learned about the eclipse umbra and path of totality, and explored how to experience this rare event from South Carolina.





Audible Scale Model of the Solar System

With the help of sound and by shrinking our Solar System to a smaller scale, students learned about the vast size of the Solar System, relative distances from planet to planet, and discussed the time it would take humans to travel from one planet to another.



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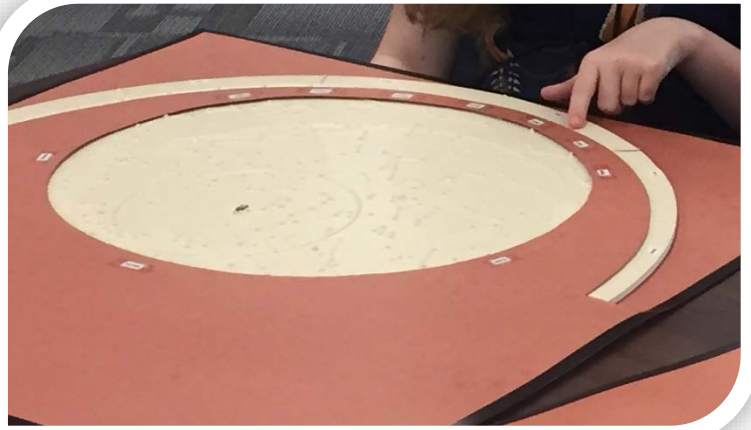

Planispheres

Tactile Braille Charts allow students to explore the night sky above South Carolina. Emphasis was placed on the three or four major Summer constellations visible in June.

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The Sun

Using 3D-printed models, students learned about the key features of the Sun's surface and interior. Students listened to sounds generated from acoustical waves on the Sun and learned about auditory methods used to study the interior of the Sun.

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3D Printing

Students were introduced to 3D printing and were able to explore the parts and functions of 3D printers. Each student was able to perform a simple 3D print.

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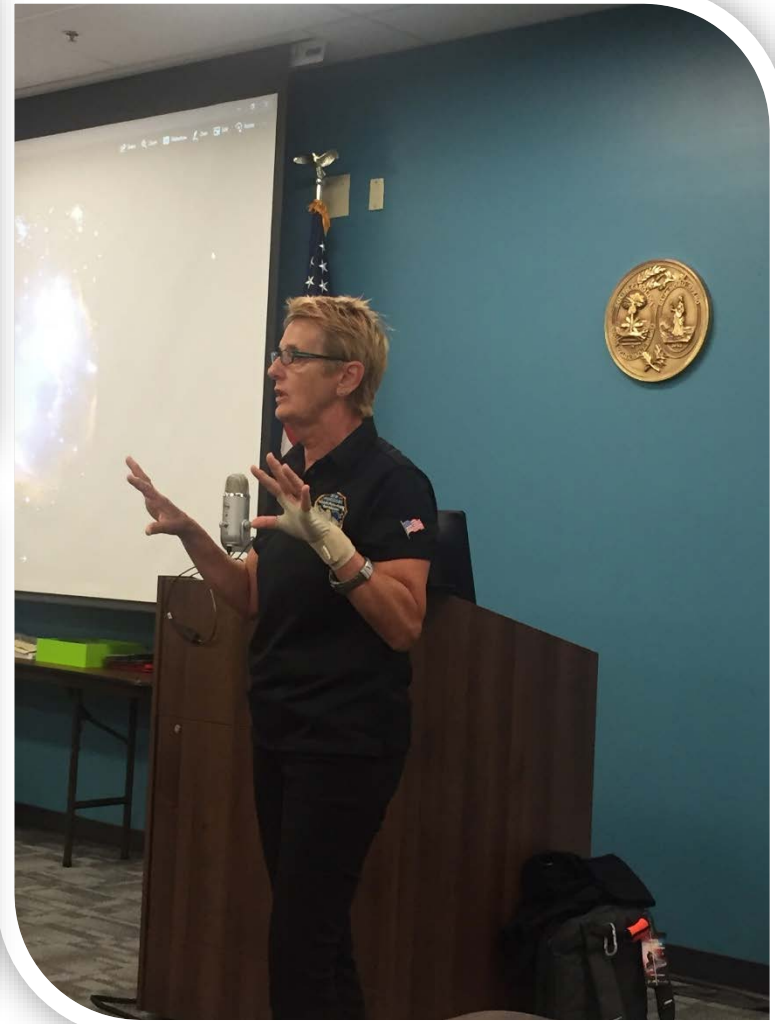
Star Clusters

Students used 3D prints to explore the celestial star-forming region and stellar cluster NGC 602, learning about stars, gas, dust, and how they relate to each other.



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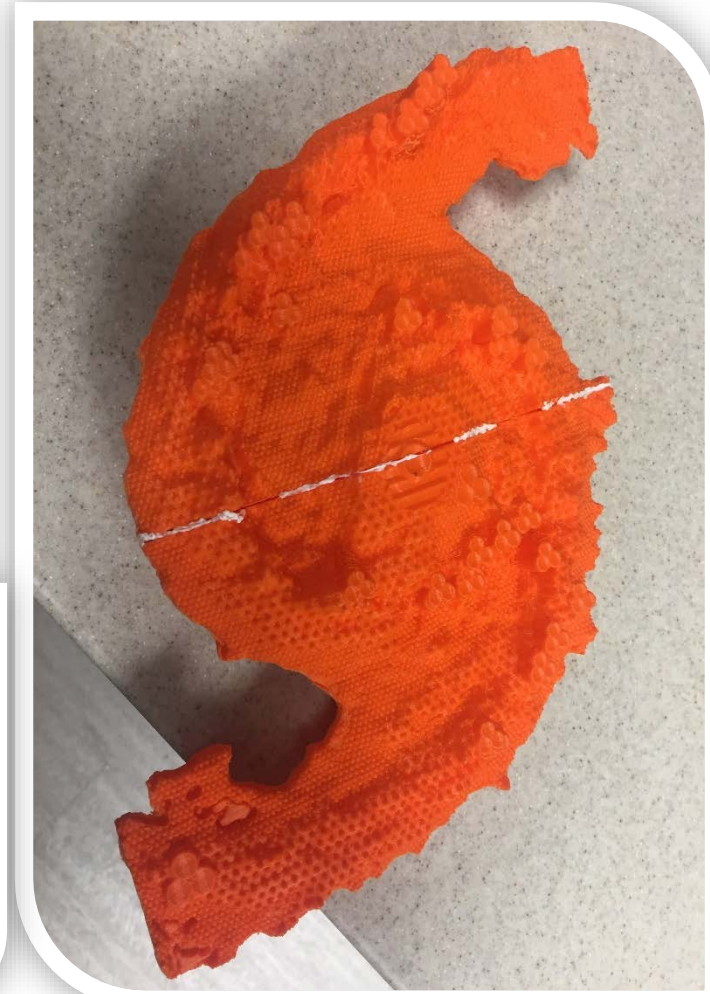
Galaxies

Students used 3D prints to explore the shape and structure of spiral galaxies. The students learned that the Milky Way in which we live is a spiral galaxy. Tactile textures relay information about the distribution and locations of stars, gas, and dust within the galaxy.



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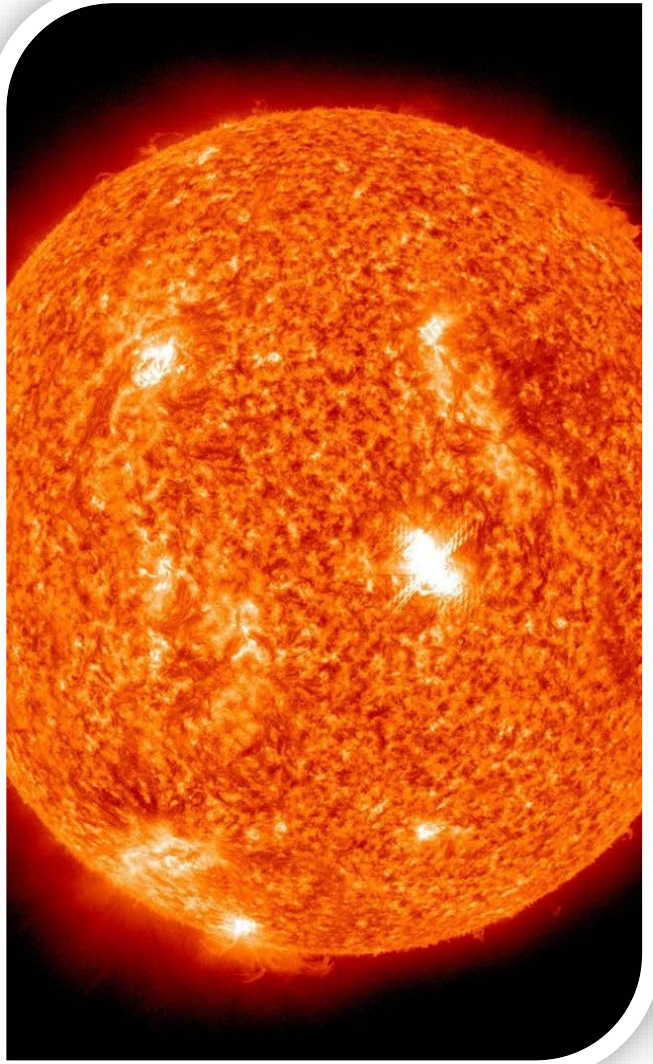
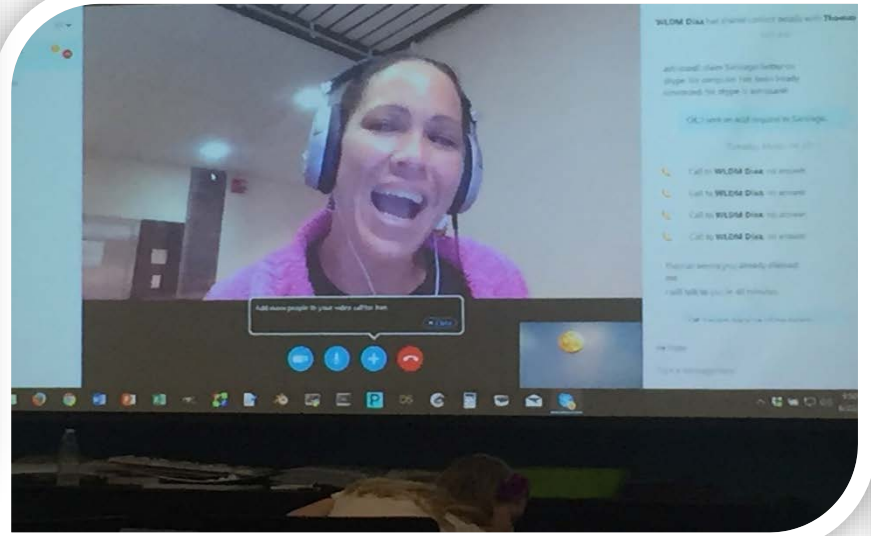


Astronomy and Data Sonification

Dr. Wanda Diaz-Merced is an astronomer and computer scientist who lost her vision while studying physics at the University of Puerto Rico. Dr. Diaz-Merced joined us via Skype to share her personal and professional experiences pursuing astronomy and her work in data sonification. She played several sonification recordings including the sounds of the Sun and a White Dwarf orbiting a Red Giant.



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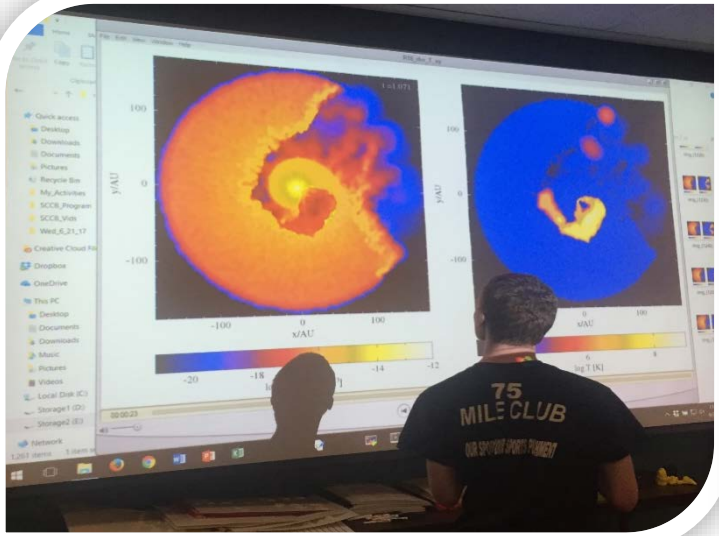
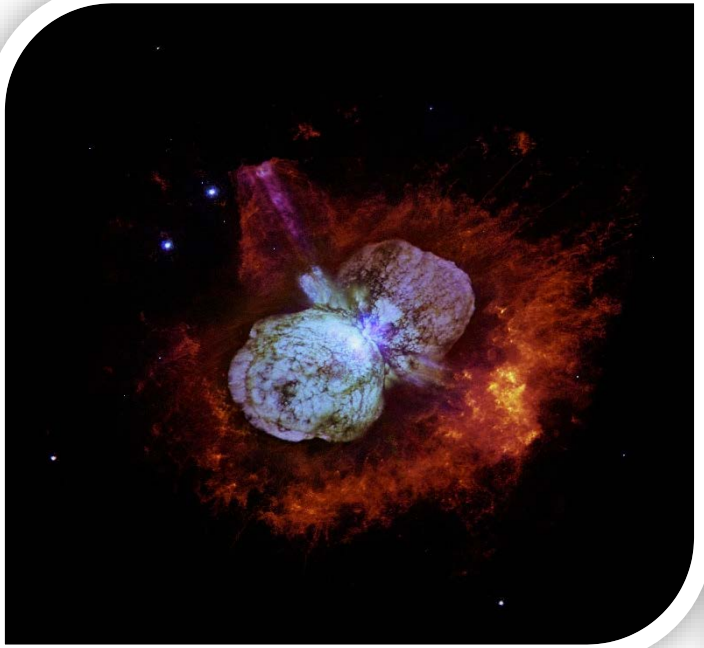
Eta Carinae's Binary Stars & Colliding Stellar Winds

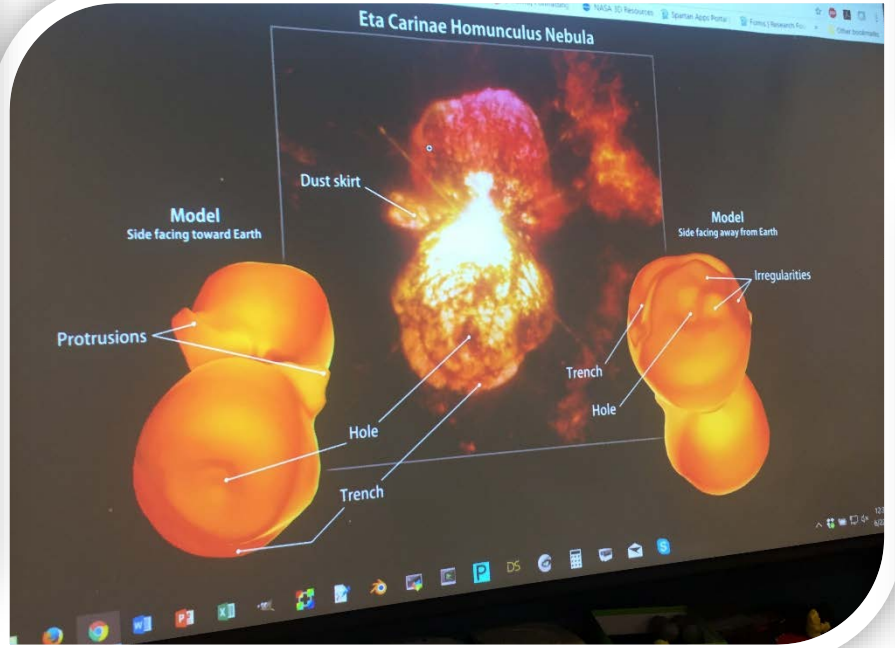
Students learned that Eta Carinae is composed of two massive stars that orbit each other. These stars are millions of times brighter than our Sun, which causes them to spew huge amounts of material into space at millions of miles per hour, called stellar winds. Using 3D tactile models, students explored the binary star system and it's colliding stellar winds.



Eta Carinae's Homunculus Nebula

Students explored the shape and features of the bipolar Homunculus Nebula using 3D printed models. Students learned how this nebula was created by an explosion from one of the massive stars in Eta Carinae.





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Student 3D Print Projects

Students were able to create a 3D printed project. Several students chose to print pin hole projectors to view the August 2017 total solar eclipse. Others 3D laser scanned and 3D printed samples of meteorites.

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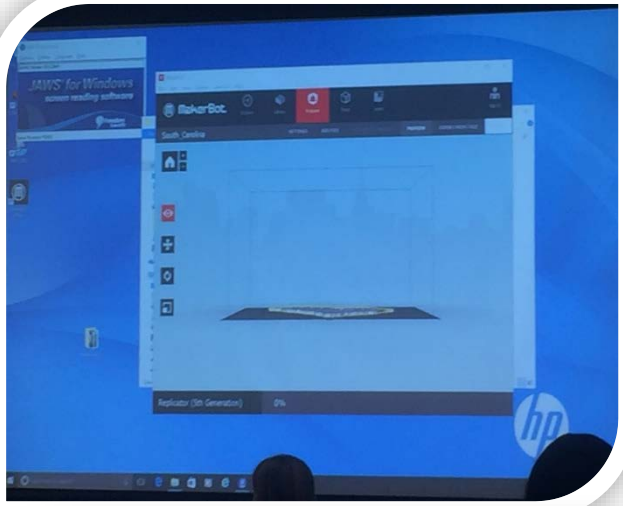

3D printers and JAWS adaptive software

The SCCB's Dr. Derrick Strick taught students about how he uses JAWS to interface with MakerBot Software to make 3D prints. He showed them where the interface works well, and where troubleshooting and adapting are necessary.

STEM Careers

Students were introduced to blind role models with successful STEM careers.

Students were introduced to STEM careers including:

- Astronomy
- Physics
- Engineering
- Geoscience
- Computer Science
- Science Education
- 3D Printing

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FUTURE: Career Exploration Lab Programs

- Aerospace Week (Boeing, NASA)
- Art, Architecture, & Design Week (University of South Carolina)
- Prototyping, Marketing, and Business Plan Development Week (Self-Employment, SBDC)
- Computer Technology Week
- Engineering Week (USC, Clemson)

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