

GENERATION BEYOND

FUELING THE NEXT GENERATION OF DEEP SPACE EXPLORERS

Today's middle school students are going to be future presidents, inventors and journalists. But they're also going to be the first generation to go to Mars.

WHAT IS *GENERATION BEYOND*?

Generation Beyond is Lockheed Martin's national education initiative that brings deep space exploration and STEM education to classrooms and homes across the country. *Generation Beyond* will inspire, educate and empower future innovation and technology leaders to reach their potential.

KEY COMPONENTS



Space Skills Academy

A deep space focused middle school curriculum with standards-based lesson plans, an educator guide, in-class activities, a digital exploration of Mars and take-home family activities to extend learning at home. The curriculum will be shared with thousands of middle schools across the country, reaching hundreds of thousands of students.

Mars Experience Bus

The Lockheed Martin Mars Experience Bus is the first immersive virtual reality vehicle using video game technology that replicates 200 square miles of Martian landscape. Riders see images derived from NASA Mars photos, rovers on the red planet and a mockup of what the first Mars community could look like.

Student Video Challenge

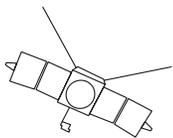
We're challenging students to develop a video and visual representation of the habitation module that will help carry the first humans to Mars. Students or teams can compete for \$10,000, \$5,000 or \$2,500 and the chance to win a Lockheed Martin space experience.

Virtual Field Trip

Experience a 50' x 50' asteroid wall, a full size mockup of a habitation model designed to house astronauts on trips to deep space, and meet with Lockheed Martin engineers, designers, test lab crews and mission support teams. Available on lockheedmartin.com/generationbeyond.

DEEP SPACE EXPLORATION

NASA is developing capabilities to send humans to Mars in the 2030s. This process has already begun:



NASA's Mars Atmosphere and Volatile Evolution (MAVEN) mission

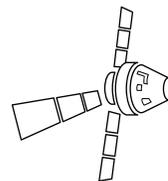
arrived at Mars in 2014, and has been exploring the planet's upper atmosphere, ionosphere and interactions with the sun and solar wind. MAVEN will give insight into Mars' climate, liquid water and habitability.

The Orion spacecraft will carry astronauts into deep space, farther

before, and return them home to Earth.

WHY LOCKHEED MARTIN?

We recognize our future success depends on the decisive action we take today. Lockheed Martin has long played a role in space exploration and STEM education. Over the past five years, Lockheed Martin has contributed \$70 million to STEM education programs. Annually, half of our corporate philanthropy is spent advancing STEM education. In support of NASA, Lockheed Martin has been involved in every U.S. mission to Mars, and in many U.S. space missions.



WANTED: STEM STUDENTS

Economists project there could be 2.4 million unfilled STEM jobs by 2018. For the U.S. to continue to be a science and innovation leader, we must have the skilled workforce to get the job done. We must inspire students to love science, technology, engineering and math. Space has the power to inspire a new generation of innovators, and the time to start is now.



TO LEARN MORE

LOCKHEEDMARTIN.COM/GENERATIONBEYOND

ANATOMY OF A MARS BUS



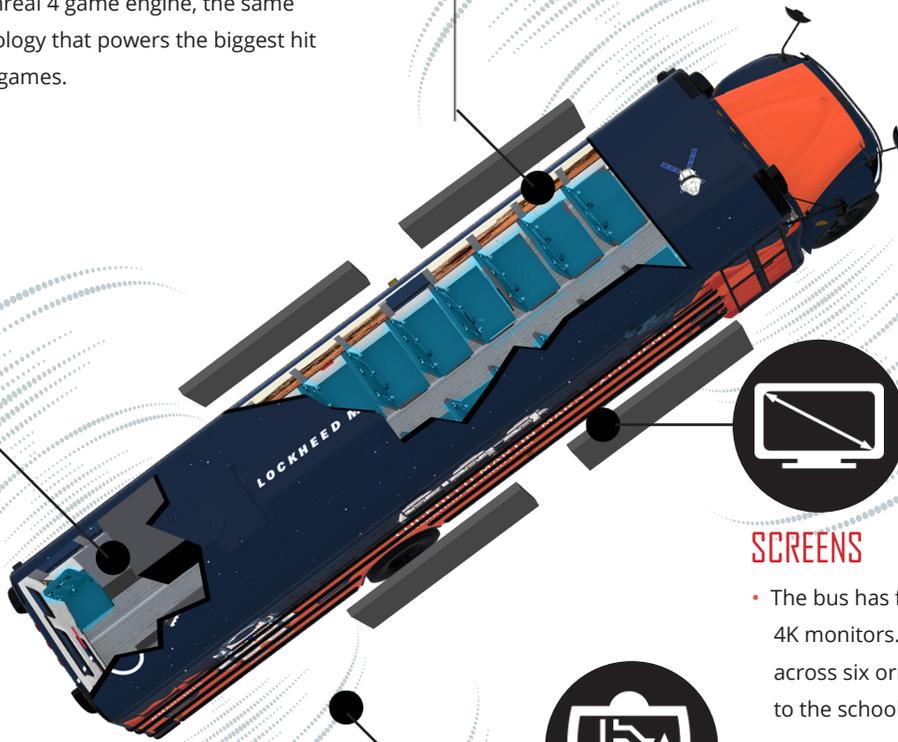
LOOKING AT MARS

- While not mapped to specific features of Mars, the images bus riders see are based on raw NASA image files from the planet.
- The animation includes a few manmade objects on Mars today, such as the Curiosity Rover, and passes through what we think the first base camp on Mars might look like.
- The team mapped more than 200 square miles of Mars for riders to travel through.



VIRTUAL REALITY

- The Mars Bus film and animation run on the Unreal 4 game engine, the same technology that powers the biggest hit video games.



SCREENS

- The bus has four 85-inch high-definition 4K monitors. Each monitor stretches across six original window panes adding to the school bus appearance.



AUGMENTED REALITY

- The dynamic virtual reality experience is made more real with the Polytec Accelerometer laser. This laser tracks speed, distance traveled and direction of travel. This allows the screen content to mimic the outside world. If the bus turns right while driving in a city at a certain speed, the screens mimic the experience in Mars.
- An Arduino GPS feeds exact GPS coordinates into the bus to ensure our starting location on Earth matches our starting location on Mars.
- The team installed audio equipment so if you see something on Mars, such as a sandstorm, you hear it all around you on the bus.

QUICK FACTS

- The bus can hold up to 30 people.
- The bus took about five months to create.
- More than 100 people worked together to create the Mars Experience Bus.
- The bus generates enough energy to power someone's home.
- The bus is powered by five separate gaming PCs.

DID YOU KNOW?

The same team that worked on the movie "The Martian" helped with the special effects on the Lockheed Martin Mars Experience Bus.