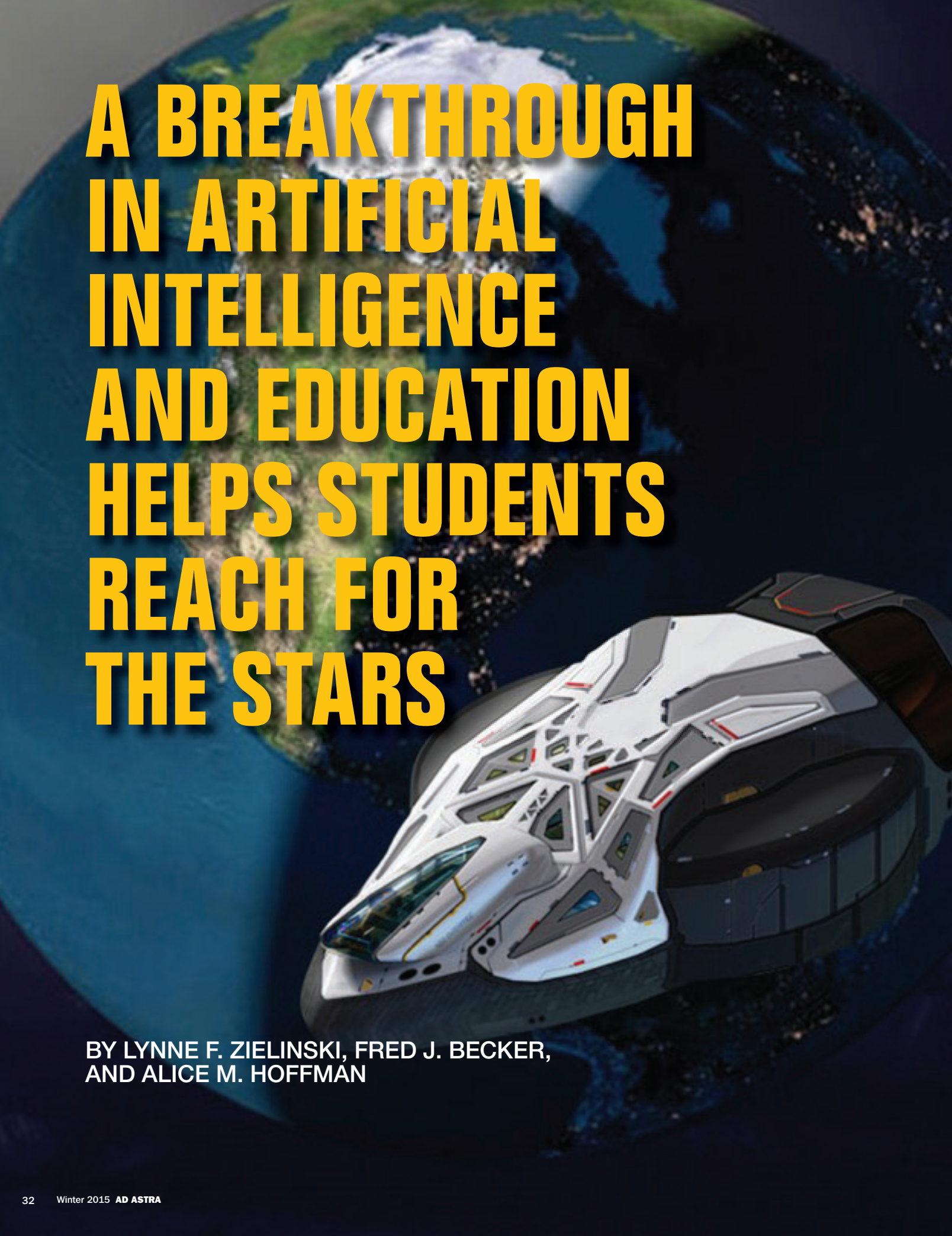
A BREAKTHROUGH IN ARTIFICIAL INTELLIGENCE AND EDUCATION HELPS STUDENTS REACH FOR THE STARS



BY LYNNE F. ZIELINSKI, FRED J. BECKER, AND ALICE M. HOFFMAN

Imagine a future where children everywhere have a personal tutor in the palm of their hands—allowing them to reach for the stars. Imagine students using the internet to interact with their experiments onboard an Earth-orbiting spacecraft. Science fiction? Or science fact? It could become a reality. Now, to set in motion a tangible paradigm shift that supports these educational visions, comes the next bold project of the National Space Society: an exciting initiative known as Enterprise In Space™ (EIS).

EIS, founded by Shawn Case, aims to bring the excitement of space exploration to everyone, with the goal to design, engineer, build, launch, orbit, recover, tour, and exhibit a spacecraft named NSS Enterprise. With education as its primary focus, the spacecraft will carry more than 100 subsidized student experiments. Through the NSS Enterprise orbiter, EIS pays homage to NewSpace enterprises and entrepreneurs, space and science fiction visionaries, and all the pioneering ships, both real and imagined, bearing the name Enterprise, as it engages and inspires the next generation of explorers.

An important mission of the NSS Enterprise is to motivate students everywhere to reach for the stars and to give them the tools they need to get there. To accomplish this, a demonstration of a breakthrough cognitive computing technology, an artificial intelligence program (AI) with a synthetic personality called 'Ali,' will inspire tens of thousands of students to learn independently and at their own pace. Ali is being developed by EIS partner Value Spring Technology, and will run on cloud services atop the IBM Watson stack. Ali will converse with students and teachers in natural language, encourage individualized learning, and help identify learning barriers. The EIS mission will serve as a highly visible demonstration of this breakthrough educational technology. This innovative learning tool provides the first step toward making Ali available to every student around the world, thus turning the science fiction future seen in Star Trek™ into a reality. With the help of its members' support of this project, NSS is leading the way to a better future.

The Need: Why an AI Tutor?

Students learn at different rates and have different learning styles. An artificial intelligence program like Ali can help teachers recognize these differences. This is important because the availability of quality teachers and schooling varies widely in the United States and around the world. Some students have access to the very best schools, teachers, and materials. This allows them to be highly successful, envision their goals, see a path to achieve their goals, and fulfill their potential.

At the opposite end of the spectrum are the disadvantaged, remote, orphaned, working children, or children living in poverty that have few educational opportunities. Still others live in areas that are so war torn (gangs or actual political turmoil) or far from civilization that it is difficult for children to imagine a way forward, much less a way to succeed academically. Some live in areas where religious or moral beliefs do not allow children (especially girls) to attend school. In the middle are children who receive an adequate but limited education; they are often seeking more knowledge than local resources provide.

Each student can use Ali to learn at their won pace, any place, in their own style, exploring knowledge at will!

Reaching the World

All children can benefit from an exciting vision of humanity's future in space and a personal tutor who knows them and how they learn best. A technology like Ali can be the future of education for all, blending classroom and individual learning with an AI tutor in the most exciting frontier known to humanity: space. Space is a proven igniter for the imaginations of students. Ali will mentor each student, providing individualized teaching, learning their strengths, assessing their mastery, and answering their questions. Ali can benefit teachers as well, working in tandem with them during the project, reporting their student's progress toward concept mastery, and identifying the student's strengths and weaknesses. The teachers can then take the necessary measures to redirect their students toward success. EIS wants to use space as the catalyst to place the highest quality education into the hands of all students, accelerating their learning, and enriching their world.

EIS and Ali can provide some of the educational tools needed now and even more in the future. As of July 2015, 3G and 4G wireless access is available in 176 countries, and the majority of their citizens have a device that allows them to access the internet. By 2020, initiatives like OneWeb™ may allow the majority of people on Earth to have this kind of access. Similarly, IBM alone currently has 45 cloud computing centers around the world, and people everywhere (except central Africa and the polar regions of other continents) are within 1,000 miles of at least one of these centers. IBM and other companies are committed to growing their capabilities to meet the demand.

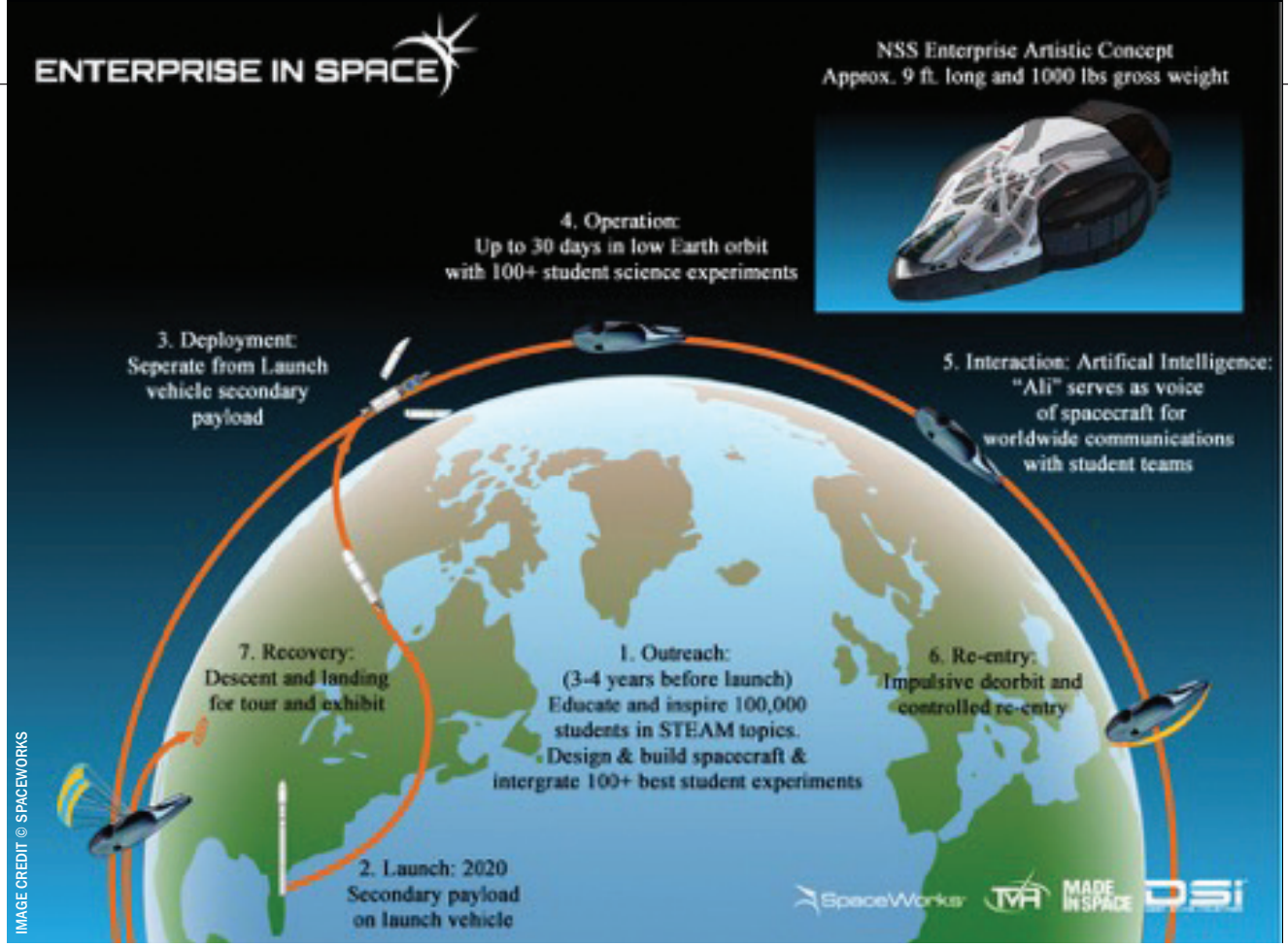
To be ready to serve the language needs of a global population, these companies are also developing natural language tools to expand capabilities beyond the currently served 2.3 billion people speaking English, Spanish, Portuguese, and Japanese. Ali could be a personal tutor to a third of the world's seven billion people now, and be able to reach nearly every student on Earth by approximately 2020.*

How Ali Makes EIS Education Work

The EIS team is developing educational curricula for students related to future endeavors in Science, Technology, Engineering, Arts, and Mathematics (STEAM). They are incorporating Ali in order to assist each student's learning process. Using a natural language Socratic dialog and visual examples, Ali will function as a mentor, engaging students one-on-one with lessons that stimulate critical thinking. She will have a friendly personality, one that actively seeks to help students learn independently. She has access to the web of human knowledge, never tires of explaining, and helps students connect science and technology to the history of ideas, art, and literature. Ali enables each student to go beyond any curriculum because she is attuned to each individual's thinking.

The NSS Enterprise payload of 100+ experiments represents the best of three yearly worldwide student design competitions open to students from kindergarten to the post-graduate level. The EIS team is developing partnerships with universities to provide mentoring opportunities and high level, multi-year competitions in the fields of space solar power, nanotechnology, artificial intelligence, astronomy, and medical research. Students can also participate in one of the many non-experiment activities or collaborate in space-related projects with other students around the world. EIS will bring students together to create the first generation of global space collaborators.

For humanity to thrive, live, and work in space, people with diverse skills will be needed from all walks of life, and they will need STEAM skills to be hired by the space-related companies of today or to form their own companies in the future. Those who participate in the EIS education program



will learn many of those diverse skills. They will learn about the scientific method, experimental design, and data analysis. They will gain research, writing, and presentation skills—all with the help of Ali. Designing an orbital experiment; witnessing integration, launch and recovery; and engaging with an international team to study its results are life-changing opportunities for any student.

Ali will coach the student teams from the development of the flight experiment proposal through the orbiter integration process. During the orbital mission, Ali will provide the voice and mind of the NSS Enterprise and communicate between students and their experiments aboard the spacecraft, just like the computers in the Star Trek™ series did with their crew members!

The Future

After the flight, NSS/EIS will continue to support Ali for years to come as she uses STEAM as the basis for teaching students all over the world. The flight and recovery of the first Enterprise in Space, with the voice and mind of the NSS Enterprise supplied by Ali, will dramatically publicize the capabilities of a unique artificial intelligence-based educational tool, a world-changing technology that will put a personal tutor in the hands of every child. EIS is showcasing a new way to bring people on our planet together to work on the problems of today and achieve the great future that lies ahead for humanity. We hope you will support Enterprise In Space™ as we engage and inspire the pioneers of tomorrow.

To find out more, check out Enterprise in Space online at *www.enterpriseinspace.org* and our partner Value Spring Technology, Inc., at *www.thevaluespring.com/enterprise-in-space/.*

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* Assumes sufficient funds, expansion of global access to broadband internet, computerized Mandarin, and access to Western cloud services by China.