Looking for the next von Braun
As the space community celebrated the 100th birthday of Wernher von Braun this year, the Student Launch Projects (SLP) program is trying to find another space exploration leader. Von Braun is remembered for being much more than a moon dreamer and a technical genius. He was a charismatic communicator, a creative visionary, and a master manager. His legacy of defining ‘rocket scientist’ finds resonance in these youth who spend a full school year learning about technology, organization, and teamwork to launch a science payload rocket successfully to a mile. NASA and NAR conduct this SLP course to expose students to the world of aerospace engineering and are giving them an opportunity and an advantage the young von Braun never had.

For many SLP team leaders, their rocketry adventure begins by checking for ticks in a steamy tent outside Manchester, Tennessee. SLP conducts an orientation workshop in the mid summer to explain the program to new team members and teachers to get them certified to fly high power rockets. The high schools are part of the Student Launch Initiative (SLI) and the colleges are in the University Student Launch Initiative (USLI). The

NAR pad managers are busy with final checks on the SLP rockets.
Photo by Ted Cochran.
The team from Presidio, Texas, that attended the White House Science Fair representing TARC meets Trip Barber again, this time as the SLI inspector. Photo by Vince Huegele.

Paul Holmes helps the Santa Fe University team load their rocket. Photo by Jim Wilkerson.

rookies build kits and launch them at the rural Tennessee sod farm surrounded by a southern forest during a monthly Huntsville Area Rocketry Association (HARA) sport launch. They get their first taste of H motor smoke and feel the burn of the walk to get it back.

In the first years of SLI, the summer sessions were a prize for teachers with the best TARC teams and were just tours of the Marshall Space Flight Center (MSFC) and launching Alpha III kits for fun (see “TARC Teachers Visit Rocket City,” by Vince Huegele, Sport Rocketry, April 2004). Then as TARC began to feed more teams into SLI the teachers needed more rocketry program training, so a tutorial of HPR and government proposal writing was added to the session. When USLI began, the workshop included an elaborate technical background with a discussion on regulatory motor handling issues. Now the course focuses on building and certifying the attendees at Level 1 to be able to lead their
teams through SLP.

After the familiarization at the workshop, the schools must write a proposal to NASA to be accepted into SLP. They must describe their rocket project and show that they have facilities and resources to perform the work. This includes listing an NAR mentor who will be dedicated to the team all the way to launch day. The NAR mentor for SLP has to do a lot more than the TARC consultant by being an active Level 2 flyer and impart those skills to the team. The team must build and test the rocket, usually at a mentor's club field, which brings the school more closely into the sport rocketry community. The team must also ‘build’ reports and presenta-

The AIAA Orange County SLI team demonstrates how their mission deploys a flexible wing UAV glider with a 3-axis magnetometer.

Photo by Vince Huegele.

Iowa State's payload was an automated controlled decent vehicle in the form of a cruciform escape pod.

Photo by Vince Huegele.

tion charts for the review boards. The real world lesson here is no matter how much you are a technology geek and love to tinker in the lab, you must develop communication skills to get credit for your work. Von Braun had to learn this too. When the rocket test flight is successful and passes the compulsory Flight Readiness Review, the team heads to Huntsville, Alabama, the capital of SLP. There the NAR Range Safety Officer crew thoroughly scrutinizes each rocket to approve it for flight.

Some teams are new to SLP, but others know the program well. Teacher Joe Vallone has brought a total of 12 teams from Plantation High School, Plantation, Florida, for seven straight years. Joe explains, “We keep
doing well at TARC and so we are eligible to keep coming back to SLI. Rocketry is a big part of our school now. Our program has grown from a club of fifteen students the first year to over 90 currently enrolled in our Aerospace Engineering courses.”

The day before the launch, teams display their rockets to the MSFC employees during a pizza lunch Rocket Fair, but mostly they display them to each other. The high schoolers eye the complex college payloads and the college kids marvel at the high school craftsmanship. Like salesmen at a tradeshow the students are eager to show off their cameras, sensors, gliders, or whatever payload gadget they’ve clev-

The LCO table was ably commanded by Greg Rothman, Art Upton, Ken Biba, and Keith Packard (pointing).

Photo by Jim Wilkerson.
erly integrated into their airframe. The NASA engineers are always impressed and affirm them with, “May the odds be ever in your favor.”

Besides the Rocket Fair, the students get to socialize together at the SLP banquet. ATK Aerospace Systems is the prime SLP sponsor that presents awards to the teams under the majesty of a real Saturn V at the U.S. Space and Rocket Center.

For every rocketeer the greatest interest in meteorology is on the days before a launch. After eight months of working toward a specific launch date, nothing puts an arrow in your heart like a shaky forecast. Storms and low clouds were predicted for launch day but the weather the day after was expected to be much better, so the game makers decided the launch would slip to the Sunday rain date as it did last year.

Many teams arrived at the field at dawn and fought the morning chill to be launched into the best expected air of the day. Rockets were on the pads and the sky was bright and clear when the waiver activated at 8:00 AM and the launching began. As the rockets rose and fell the NASA communication group twittered flight reports and streamed video to 50,000 viewers in the home districts.

The launch event is much more intense than the test flights in the relative privacy of a home field. As hard as it is to get a good flight off with a complicated payload.
in a dual-deploy recovery system, the pressure is multiplied when you are in front of a national crowd. SLP is a big show where each team has a turn to deliver a performance that can be a glorious triumph or a "valuable learning experience," but it's why they are here.

The success of the launch is due to the NAR range crew and John Lyngdal, the NAR Flight Operations Lead who is also the co-chair of NAR Standards and Testing, and a Board Trustee. After HARA birthed SLP and nurtured it into multi-state participation, Lyngdal has been able to take the launch to a fully nationwide level and sustain it. SLP is now the NAR's fifth national event after NARAM, NARCON, NSL, and TARC. "The student teams are individually and collectively impressive in their drive and commitment to completing their mission, and many of the scientific payloads are simply astounding in their engineering creativity and complexity," Lyngdal says. He assembled a world-class collection of sport rocketry experts to be the flight operations crew. This group functions with the precision of a military squad and the camaraderie of a college fraternity. They have just as much fun as the students they work alongside all weekend.

When the last rocket is launched, or more specifically, when the last rocket is found and carried back to the prep table, the data from the payloads is evaluated and the analysis of the results begins. There is still a final report to write and submit before the 2012 SLP is all over. When it is, the teams move on to the ultimate benefit. The rocketry education pipeline really works to lead students into STEM studies and career choices. It has happened hundreds of times. Here are a few testimonies.
Kyle Flynn, a former student of Joe Vallone explains, “The rocket program encouraged and fostered an interest in amateur rocketry, science, and mathematics I had since I was a kid. After high school I got my bachelors in science in aerospace engineering and I now work as an aerospace engineer for a fortune 500 company SAIC. It helped me build a network of friends and colleagues that still greatly influences my life six years after graduating from Plantation High School. I plan to eventually continue on for my masters, most likely in mechanical/electrical/aerospace engineering.”

Steven Gilmore is currently studying mechanical engineering at the University of Florida and interning for the summer as a mechanical engineer at Motorola Solutions for the second consecutive year. He says, “The rocket program at PHS was a really big help in determining what I wanted to major in as well as helping me land the internship. Being able to talk about the different reports we had to write, the payload experiment in the rockets I worked on, the way the competitions were set up and run, and the hands-on experience planning and carrying out the build of a rocket has con-

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The University of North Carolina explains their deployable GADTOR payload: guided autonomous descent through optical recognition.

Photo by Vince Haegerle.

The “Katalyst for Katastrophe” SL1 team's payload was a folding wing UAV released at 400 feet in order to survey the surrounding area of the launch site.

Photo by Bass Weitzel.

"For my confirmation I didn’t get a watch and my first pair of long pants like most Lutheran boys. I got a telescope. My mother thought it would make the best gift. I became an amateur astronomer, which led to my interest in the universe, which led to my curiosity about the vehicle which would one day carry a man to the Moon."

—Wernher von Braun

Winners of the best high school spirit award, the Lake Zurich team from Illinois, launches their rocket.

Photo by Ray Cole.

The University of Louisville team is happy to recover their rocket close to the pad.

Photo by Ray Cole.
tributed immensely at my internship as well as any other mechanical engineering discussion. It was really an inspiring program."

Kenneth G. Johnson is a second year Cadet at the United States Air Force Academy and tells his story: "I was a member and Team Captain on the St. Andrews TARC Team from Park Ridge, Illinois, for five years and had the honor and opportunity of being on the St. Andrews SLI Team for two years as well. It was a very special and rewarding time for me as many hours were spent designing, building, and testing out our TARC and SLI rockets. TARC was always a challenge and a lot of fun because each year the rules were changed for altitude and duration goals. This made for exciting new design calculations each year, which really brought out the math and science skills in our team. Each year competing for the TARC National Finals was a challenge and no guarantee to qualify was promised. Our team built up on its past TARC experiences and compounded these skills with all the STEM areas being able to successfully attend five consecutive TARC National Finals with the teamwork spirit and practice, practice, practice as a priority.

"When our Team had qualified to write a Proposal to the MSFC for SLI we thought that we were now in the Big Leagues of rocketry. To design, build, and test a high-powered rocket vehicle with an experiment to be conducted onboard during the flight profile was the ultimate in Rocket-mania for me. The SLI experience raised the level of rocket-science several notches for the team and me. Many more hours each week were spent coming up with an idea for our experiment and then designing our rocket around our payload for success. Writing proposals, PDRs, CDRs, FRRs, and PLARs for the MSFC engineers was also quite a challenge, especially when we had to present ourselves to them via video teleconferences. It was a lot of fun designing and test flying our scale model rocket in preparation for working on the actual much larger and much more powerful, in terms of thrust and total impulse, full-scale rocket. Our teams motto were the four Ss; which stood for making our rocket 1) Simple, 2) Safe, 3) Strong, and 4) Squirrely. The #4 Squirrely was added because we called ourselves "Squirrel Werks," just as Boeing is "Phantom Works" and Lockheed Martin is "Skunk Works." SLI was one of the greatest experiences that I ever had because of what we were able to do, where we were able to go working with real NASA engineers and especially meeting all the other students from around the country and seeing their rockets and experiments was a
The University of Minnesota Team Artemis has completed all preflight checks.

Photo by Vince Huette.

blast. TARC and especially SLI led me in a direction to study aerospace in the future.

“After two years with SLI and before my senior year in high school I was accepted into the INSPIRE Program at the Glenn Research Center in Cleveland, Ohio. For eight weeks I was working with nine other selected students and NASA engineers on the Upper-stage Simulator of the Ares 1-X rocket which was to be a rocket designed to transport astronauts into Earth orbit and beyond under the now cancelled Constellation Program. What an educational opportunity!

“Today I am currently a C3C at the USAFA. I want to thank TARC, SLI, and INSPIRE for helping me get to the USAFA, and I can literally say that I am looking UP to a bright future because of them.”

Besides building moon rockets, Werner von Braun understood the need for inspiring and teaching young people. Along with Apollo he created the U.S. Space and Rocket Center and sparked the idea for its Space Camp. He wrote, “All one can leave one’s children is what’s in their heads. Education, not material things, is the only legacy that no one can ever take away from them.”

Another engineer sparked an idea that is exemplified in SLP. Harry Stine said about his vision in creating the hobby and NAR, “The basic motive for my involvement in model rocketry stems from my youth when many scientists and engineers freely gave me advice and the means to do things. I also hope model rocketry will help set many young people on their course toward becoming astronauts and technicians.

**2012 SLP Teams and Awards**

**Colleges**

- Alabama A&M University - Normal, AL: **Best Looking Rocket Award**
- California Polytechnic University - Pomona, CA
- Clark College - Vancouver, WA
- Fisk University - Nashville, TN
- Florida A&M University - Tallahassee, FL: **Closest Altitude Award**
- Florida State University - Tallahassee, FL
- Georgia Institute of Technology - Atlanta, GA: **Overall 4th place**
- Harvey Mudd College - Claremont, CA
- Iowa State University - Ames, IA
- Massachusetts Institute of Technology - Cambridge, MA
- Mississippi State University - Starkville, MS: **Science Mission Directorate Payload Award, Overall 2nd Place**
- Missouri University of Science & Technology - Rolla, MO
- New Mexico State University - Las Cruces, NM
- North Carolina State University - Raleigh, NC
- NorthWest Indian College - Bellingham, WA
- Pennsylvania State University - University Park, PA
- Purdue University - West Lafayette, IN
- Rensselaer Polytechnic Institute - Troy, NY
- Saint Louis University - St. Louis, MO
- Santa Fe College - Gainesville, FL
- Tuskegee University - Tuskegee, AL
- University of Alabama - Tuscaloosa, AL
- University of Alabama in Huntsville - Huntsville, AL
- University of Alaska - Fairbanks, AK
- University of Central Florida - Orlando, FL
- University of Colorado - Boulder, CO
- University of Evansville - Evansville, IN
- University of Florida - Gainesville, FL: **Project Review Award**

**University of Louisville** - Louisville, KY: **Website Award, Rookie Award Winner, Overall 5th Place**
- University of Michigan - Ann Arbor, MI
- University of Minnesota - Minneapolis, MN
- University of Nebraska - Lincoln, NE
- University of North Carolina - Charlotte, NC
- University of North Dakota - Grand Forks, ND
- University of Notre Dame - South Bend, IN
- University of South Alabama - Mobile, AL
- University of Washington - Seattle, WA
- Utah State University - Logan, UT: **Vehicle Design Award, Overall 1st Place**
- Vanderbilt University - Nashville, TN: **Payload Design Award, Educational Engagement Award, Overall 3rd Place**
- Virginia Tech University - Blacksburg, VA
- Windward Community College - Kaneohe, HI: **Most School Spirit Award**

**High Schools**

- AIAA Orange County Section - Orange, CA
- Falls Church High School - Falls Church, VA
- Harmony Magnet Academy - Stratham, CA
- Hart County 4-H - Munfordville, KY
- Ingraham High School - Seattle, WA
- Katalyst for Katabfrosis - Spring Grove, IL
- Lake Zurich High School - Lake Zurich, IL: **Most School Spirit Award**
- Madison West High School Project Diffusion - Madison, WI
- Madison West High School Project Vibrations - Madison, WI
- Plantation High School Team 2 - Plantation, FL: **Best Looking Rocket Award**
- Plantation High School Team 1 - Plantation, FL
- Presidio High School Team Pride - Presidio, TX
- Presidio High School Team Spirit - Presidio, TX
- St. Thomas High School - Houston, TX
- Thomas Jefferson High School - Alexandria, VA