





The STEM Challenge

The *FIRST* Championship is an Olympics for bright young minds

By: Sharon Stancavage

From a logistical standpoint, the event is huge. It takes place in two cities, is spread over multiple venues, and, ideally, involves a convention center and the stadium next door. Game play takes place on 18 separate fields, and is bookended by opening and closing ceremonies. “There’s nothing I can say to prepare someone for the event; it’s not part of anyone’s point of reference,” explains Stephen Fink, a partner at Solomon Group, the event and exhibit design, production, and fabrication firm based in New Orleans.

The events under discussion are the *FIRST* [For Inspiration and Recognition of Science and Technology] Championships for STEM and pre-STEM students. Teams come from around the world; competitors from the US are divided into eastern and western geographical sectors. “We had teams from 35 other countries competing in Houston, and from 33 nations competing in St. Louis,” explains Andrea Mikus, *FIRST* director of events.

Solomon Group provided design services, lighting, video, and crew for both events, which took place in Houston and St. Louis earlier this year. Attendance over four days of competition in Houston was around 29,000, with close to 33,000 in St. Louis.

There are four programs: *FIRST* LEGO League Junior (FLL Jr, focusing on ages 6 to 10), *FIRST* LEGO League (FLL; grades 4-8), *FIRST* Tech Challenge (FTC; grades 7-12), and *FIRST* Robotics Competition [FRC; grades 9-12.] “*FIRST* LEGO League Jr. is designed to introduce STEM concepts to kids 6 to 10 while exciting them through a brand they know and love—LEGO,” says Mikus.

All photos: Dan Donovan/Courtesy of The *FIRST* Championship



The activities at Minute Maid Park in Houston took place exclusively on the infield, so the grass wouldn't be damaged.

Student-built robots compete in all other divisions. Mikus notes, “*FIRST* LEGO League teams research a real-world problem, such as food safety, recycling, energy, etc., and are challenged to develop a solution. They also must design, build, and program a robot using LEGO MIND-STORMS, then compete on a tabletop playing field.”

She continues: “*FIRST* Tech Challenge and *FIRST* Robotics Competition are both geared towards older students, but are completely different in structure and in terms of the actual games themselves. Both programs give high school—and middle school, for FTC—students and their adult mentors an opportunity to work together to solve a common problem. Teams are challenged to design and build a robot using a kit of parts, with a common set of rules, to play a sophisticated field game. FTC is a very affordable program, and reaches many schools in challenged areas with special and financial limitations. The FRC program operates under strict rules, limited resources, and an intense six-week time limit.”

The games, which change annually, are announced at

various times of the year, with the FRC program made public in January. Fink notes, “What drives our coverage of the event is the game itself. Every year, it’s a new game.” In 2017, the FTC game involved tennis balls and the FRC game involved whiffle balls.

Every program has several fields for competition at the *FIRST* Championship event. FRC had six fields running simultaneously during the competition, while FLL had eight altogether, with four at the same time. FTC also had four fields, but only two were used simultaneously. “The field size ranges from 8' by 8', for *FIRST* LEGO League, upwards to 30' wide by 80' long for *FIRST* Robotics Competition, and vary between standing tables and floor-based fields on carpet,” Fink says.

Lighting

The lighting design, Fink notes, “can’t impact the competition. Every field has to be illuminated identically, to make sure we’re giving everyone the same experience. It’s really pretty simple—we used a nice white wash.”



Fink was able to use the house lighting system to augment his rig for the finale in Houston.

Also, he says, “The robots have cameras in them that are hitting targets. We had issues this year with the venues’ ribbon boards, because of where the robots had to look; we had to modify the ribbon boards, going to static looks, because they were impacting the vision sensors of the robots.”

For a sports-lighting feel, Fink and his team turned to a LED solution. “This is the first year we moved to the Chauvet [Professional] STRIKE 1,” he says. “It’s an LED blinder that we used for key light. The Strike is 2,700K, so it’s a little warm, but most people like warm. In the past, we used ETC Source Four PARs for white light, and, like everyone else in the industry, we’re moving towards more LED products to cut down on our power consumption.” The change from incandescent to LED changed the lighting rig considerably. “In the past, we’ve used 48 Source Four PARs for each FRC field; I’m doing it now with 12 Chauvet Strikes. One socapex ran everything on that field: LED, lighting, and audio power, if needed. For us, that’s a huge labor-saver; anything we can do to cut down on our infra-

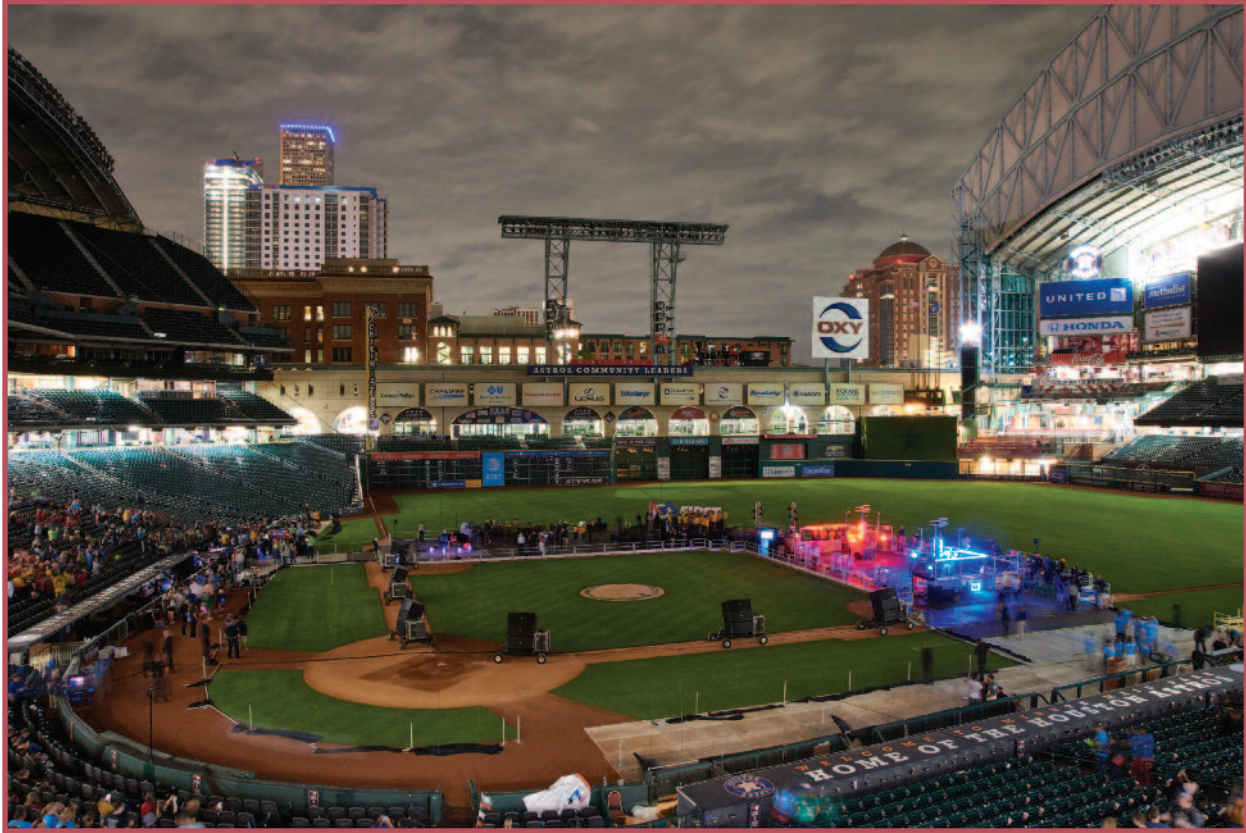
structure is really important, because it’s a massive event across a very large space.” The Strike 1 also features 16-bit dimming control, adjustable PWM to control on-camera flicker, and a CRI of 93.

Fink reports, “No one said a word to me about how the Strikes were doing; they replaced the ETC products with no issue. The change worked out great.”

In Houston, the FTC fields were home to a total of 24 ETC Source Four PARs and 14 Martin by Harman MAC 350 Entours, while the FLL fields used 24 ETC Source Four PARs and 16 Martin Mac 101s. In St. Louis, the FTC fields were illuminated by 24 Chauvet Professional COLORado 1 rig RGB PARs and 14 Martin Mac 350s; the FLL lighting was identical.

Control for the FRC fields in both Houston and St. Louis was by MA Lighting. “All the fields are controlled off our main grandMA2 light; it doesn’t change ever; it’s a set-it-and-forget-it configuration,” notes Fink. In both cities, the FTC fields were controlled via a Martin M1 console; the FTC fields were run off a Martin M2GO.

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Below: Finding the perfect location for the PA, which was rolled in on carts for the finale in Houston, was a challenge.





St. Louis: The video screens were used for both IMAG and to present scoring of the matches.

Sound

From an audio standpoint, Fink says, “The cities are different because the venues are very different. At each field, we used Midas M32 consoles; it just made our lives so much easier. Any operator can walk out into any field and know what’s going on. The channel strips are laid out the same; everything is in the same place. From an operator perspective, it’s a lot easier to train.” Noting the event’s highly specialized nature, he says, “We like having operators who have done it before; we’re building a pool of people. Our core sound crew sets up the show, and the operators fly in the day before the show, only to operate. It’s very different from any other event anyone is going to operate.” The control, microphones [Shure UHF-R wireless combos], and headsets [DPA 4066s] are essentially the same at all the fields at both venues; only the quantities change.

The PAs in each city were quite different, however. “In Houston, each FRC field had two truss lines that run parallel to the seating, for white lighting and the PA hang,” Fink explains. “Each field had eight QSC K12 series cabinets [one hang of four cabinets in the center of each truss] that provided PA coverage for the seats, as well as the field itself.” In Houston, bleachers were used to create an arena configuration, with audience members seated on both

sides of the field; this will be the configuration in Detroit in 2018. Audio gear was provided by Houston-based LD Systems.

“In St. Louis, we used one line array for the FRC fields,” Fink continues. “This year, we had a [Meyer Sound] MICA array comprised of eight cabinets with two Meyer UPJ-1Ps and a Meyer M32 console. Each field had a single hang of PA, so it was a little different from Houston.” The audience in this configuration is on a single side of the field, which resulted in fewer overall hangs. The PA setup for the FLL and FTC fields in St. Louis were identical to Houston. VER Tour Sound, based in Antioch, Tennessee, provided the PA setup in St. Louis; rigging was supplied by Syracuse, New York-based JR Clancy and the Las Vegas office of SGPS Show Rig.

In terms of control, Fink explains, “One field can drive the audio and video on [the others]; for example, they can do a welcome in the morning on one field that is seen on all the playing fields. Everybody is connected together via fiber [specifically a Riedel RockNet fiber system]; we’re all on same comms system [Clear-Com Helixnet], and they each have their own little world they’re in, but they’re also connected.”

Audio at the FLL and FTC fields in Houston and St. Louis were the same. The FLL fields featured 18 L-

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For the closing ceremony in St. Louis, Fink and his team used a package of Martin by Harman and ETC gear, controlled by a grandMA 2 console.

Acoustics KIVA cabinets and four L-Acoustics SB18 subs; the FTC fields featured eight L-Acoustics 115XT HiQs, eight 8XTs, four SB18s, and four Meyer UPJ-1Ps.

Video

The video aspect of the events was perhaps the most complex. “For the FRC competitions in both cities, we used subcompact Marshall Electronics POV [CV500] cam-



eras with SDI,” says Fink. The manned Sony DXC-D35WS camera and unmanned cameras had completely different duties. “For every match, the announcer introduces the team play, so you need a manned camera for that. It does-

n’t do anything during game play; it’s there to cover everything but the game. We have fixed cameras for the game coverage.”

The LED walls played a critical role. Fink says, “On the screen at one time are three cameras, plus a graphic that gets keyed, which is basically the scoreboard. The scoring comes in off of the *FIRST* computer system that gets chroma-keyed into the shot.” Houston had two ROE Visual MC9H 9' x 16' nine millimeter LED screens on the FRC fields, paired with a Barco ImagePro2 Scaler; St. Louis had a single Roe MC9H screen.

The FTC program used projection instead of LED walls; specifically two Christie HD14K-M projectors, two 9 x 16 DaLite screens, four Barco HDX-W20 FLEX projectors, and two custom-fabricated 32 x 9 screens. The FLL fields utilized four Christie HD14K-M projectors with four 8.5' x 14' DaLite Screens. The overall configuration was the same for FTC and FLL in both cities.

Instead of hiring a director, Solomon Group tried an unconventional approach. “The same thing happens on those fields over and over again,” Fink says. “Every match is the same sequence of events. So we program the [P.I. Engineering X-keys XK-60 custom control panel] so anyone can be trained to run it in five minutes. It’s really not a typical directing job. You’re not making a lot of decisions; you’re following the bouncing ball. There are 100 matches over two days, and a professional director won’t really be interested in it, as it gets to be monotonous. We moved that job down to a volunteer level, because it’s just someone who needs to pay attention to the game. It’s the first year we did this, and it worked really well. It will be the model going forward. This keeps our costs down, and it gives us someone who is really engaged in the match.”

Fink notes, “For FLL, we actually hire directors, because they have a little bit more work to do.” These fields make use of eight Marshall Electronics CV500 POV cameras—one for each field—and two wireless manned cameras [Sony F-900 HD cameras] for the announcers.

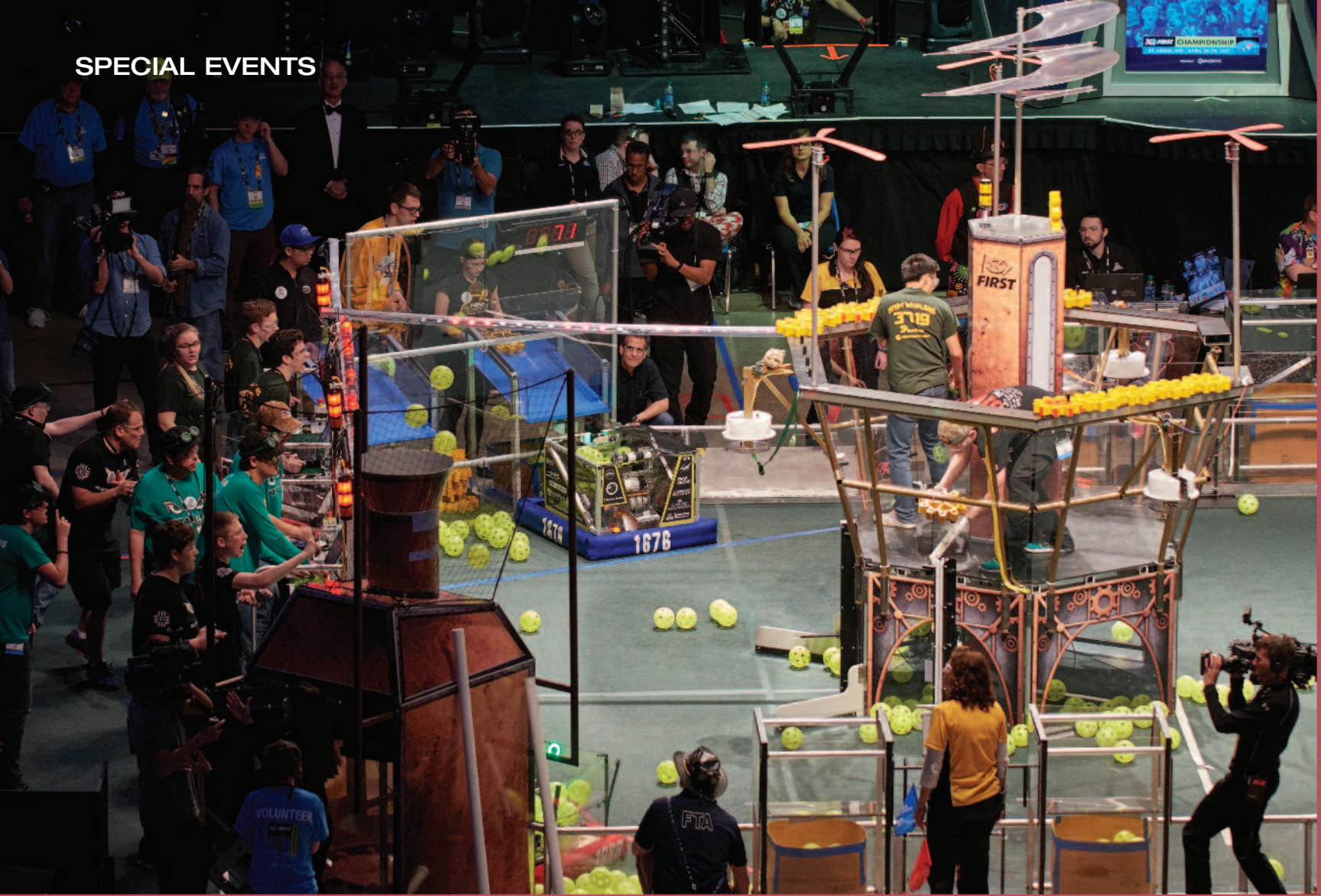
Opening/closing events

Both cities have dedicated opening and closing ceremonies. This year in Houston, Fink says, “We basically had a welcome reception of sorts. In previous years, they’ve had true opening ceremonies in St. Louis, but in Houston they don’t have a venue that’s necessarily available for that.”

For the Houston opening, Fink says, “We used the park across the street, called Discovery Green. We had a Stageline SL320 stage and presented four musical acts.” The event also included a silent disco, which was quite the hit: “All the kids wear headphones, and you see people dancing, but you don’t hear anything.”

The entertainment on stage was supported by, from L-Acoustics, twenty-four K2 line-source boxes, one SB28

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The FRC competition in St. Louis.

subwoofer, and four X8 monitors. Front-of-house and monitor control was via two Avid Profiles.

"We had a nice Martin moving light package," says Fink; it included 12 Mac Viper AirFXs, 12 RUSH MH 3 Beams, and 12 Mac Auras. "The lighting console was a grandMA2 Command Wing," he adds.

"What we did in St. Louis is typical of what we usually do for the opening," Fink says. "There's a big house stage and a parade, where a representative from each state and country in attendance are introduced. We're in the Dome at the Americas Center, so it's 21,000 people watching a show." The festivities include speakers and the sponsors as well.

The lighting rig was comprised of 22 Martin Mac Viper AirFXs, 22 Mac Viper Profiles, 12 Mac III Performances, 48 Rush MH 3 Beams, 42 Mac Auras, and 48 ETC Source Four PARs. All were controlled via a grandMA2 console.

"For the PA in St. Louis, we had four hangs [six cabinets each] of JBL VTX 25s covering the lower bowl. We

used the house PA, which is 48 JBL A9s, for the upper deck," Fink notes. The PA also included 12 JBL VTX G28s and eight JBL VerTec VT4887s.

The closing ceremony in St. Louis also took place at the Dome. "We added an FRC field, but it's basically the same technology package as the opening," Fink says. "So we build it once and it simply stays there."

Fink adds, "For the closing, we had 15 cameras, a combination of four wired HD [Hitachi Z-HD5000 HD cameras] and two wireless HD cameras [Sony F-900 HD cameras], with the balance being Marshall POVs [specifically, CV500s]. We also had a jib and Steadicam in St. Louis as well." Special effects were provided by St. Louis-based Gateway Fireworks.

The closing ceremony posed a variety of challenges for the Solomon Group team. "We used Minute Maid Park [home of the Houston Astros], which is the baseball stadium," Fink says. "The only thing that you can touch in a baseball stadium is the dirt; it was baseball season, so we



The effects were provided by ProFX Inc. and Gateway Fireworks.

couldn't touch the grass."

The Astros had a game on Thursday night; the closing ceremony was on Saturday. "We didn't get the building until Friday morning at 8am, and we had to get everything in for a show that started at noon on Saturday," Fink says. "We had to do FTC and FRC competitions, we had speakers doing awards, and we had entertainment, all on a baseball field where we couldn't touch the grass. It required a lot of Plan Bs and Plan Cs, since the original plan didn't always work."

Also, Fink says, "We had to bring in the PA on carts, and finding the optimal location for them was very difficult, because they couldn't be in the way of anybody. Basically, we were trying to put a concert PA in a baseball stadium with no rigging. And there's no place to put the carts." Each cart was filled with Electro-Voice Xvls cabinets—18 in total. "We made it work, and got through the show," Fink says. "Next year, we'll probably go with a more compact array that we can position easier. The carts were a lit-

tle too big, and next year we'll make some modifications." The audio package also included eight EV SX250a monitors and a Yamaha PM5D console.

While the PA and staging was a challenge at the stadium, Fink says he and his team got a break in terms of the lighting package: "We took control of the sports fixtures; there are 488 Musco LED lights that make up the lighting package for the stadium. We took DMX control with an grandMA2 light and created our lighting looks from that." Working in tandem with the stadium lights were 12 Martin Mac Auras. Austin-based ProFx Inc. provided the special effects.

"The closing, in particular, is a long show, and we have a huge team working on it," Fink says. "We have a sports desk with talent and there were field reporters; basically, we're calling a five-hour TV show. There's a field and there are teams; we even have a stage manager at the playing field. It's a live sporting event with awards intermixed."

In 2018, the *FIRST* Competition will take place in Houston on April 18 – 21 and in Detroit on April 25 – 28. 📡