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Entertaining Engineering
ON ITS WAY
The Patriot, the longest, tallest, fastest full-circuit inverted roller coaster in the region, is under construction at Worlds of Fun amusement park in Kansas City, Mo. The $14 million roller coaster is expected to open in Spring 2006.

PHOTO BY FRANK PRIBYL

COVER STORY
Learn the truth about what makes roller coasters move

ALSO INSIDE
3 ..... Letter from the editor
4 ..... Contributors
6 ..... Humanoid robotics
12 ... CGI
14 ... Learn a word: Hologram
15 ... UNL mini baja team

BEHIND THE SCENES
Read a first-hand account about the staff's turbulent journey back to Lincoln from Worlds of Fun.
FROM THE EDITOR

Dear reader,

As the first issue of 2005 hits the presses, I can say with confidence that the Blueprint has emerged from its rebuilding phase.

Our second consecutive win of “most improved publication” from the Engineering College Magazines Association is testament to this.

It has been a difficult process, complicated by the loss of most of our senior staff to graduation and our adviser, Roxane Gay, to another school. At the start of this year, organization was something that was not plentiful. Even hard copies of previous issues were difficult to find.

Just a few short months later, due largely in part to our devoted interim adviser, Constance Walter, we have a new office, a new issue and a good number of skilled staff members. Yet this is not the conclusion of our work.

We are still looking to expand and improve further. We hope to increase our circulation to include every Nebraska high school, as well as improve our budget by developing an advertising program. While our staff is at its highest numbers in years, there are still plentiful opportunities for new recruits with a variety of talents.

As I was driving Assistant Editor Cecilia Orwig’s car down a pitch black interstate sans headlights, engine power, transmission or any other electrical system (see “Behind the Scenes,” page 11), I realized: It is the people and the dedication they show that make the Blueprint special … and I would gladly do the whole thing again next year!

I hope you find this issue as interesting to read as it was to make,

Frank Pribyl
Blueprint editor
Cecelia Orwig
Junior
Assistant editor

Cecelia Orwig is a junior English major with a minor in Russian. She graduated from Norfolk Catholic Junior-Senior High School in 2003 as salutatorian of her class. She enjoys reading and making glass mosaics in her spare time but is looking forward to giving this spare time to her baby, who is expected to be born in early December.

Chris Kohler
Junior
Advertising manager

Chris Kohler is a junior mechanical engineering major. He went to high school at Exeter-Milligan. He currently is a co-op design engineer at OPPD. His interests include all types of music and sports, especially racing and football.

Brian Hernandez
Sophomore
Page designer and reporter

Brian Hernandez is a sophomore news-editorial major and works at the Lincoln Journal Star as a page designer and copy editor. Brian is a member of the Society for News Design, American Copy Editors Society, College of Journalism and Mass Communications Student Advisory Board and student government. He also is a mentor for freshmen in the Honors Program and NU Connections.

Martin Gakuria
Sophomore
Reporter and Web site developer

Martin Gakuria is a sophomore biomedical engineering major from Kenya. He hopes to enter medical school after graduating from UNL. He enjoys reading and writing, too.
CONTRIBUTORS

Brian Watt
Freshman
Cover designer and photographer
Brian Watt is a freshman biological systems engineering and pre-medicine double major from Holdrege. Among being involved in Sigma Alpha Epsilon, NU Meds, and the Biomedical Engineering Society, he also is a photographer on the Blueprint.

Michaela McBride
Freshman
Reporter
Michaela McBride is a freshman from Lincoln majoring in biological systems engineering with an emphasis in biomedical engineering. She is involved in Chi Omega, FOCUS and the Student Alumni Association.

Joel Schulte
Freshman
Reporter
Joel Schulte, a Lincoln native and graduate of Lincoln Pius X High School, is a freshman mechanical engineering major. He hopes that writing will be a good break from the dry formulas of physics classes. He enjoys playing golf and soccer outdoors. He also plays guitar and piano.

Ashley Washburn
Adviser
Ashley Washburn is a writer for Engineering@Nebraska magazine and is the new Blueprint adviser. She graduated from UNL in 2002 with a bachelor’s degree in journalism. Ashley worked for the Nebraska Legislature’s Unicameral Information Office, where she wrote articles for the Unicameral Update and served as editor of the Nebraska Blue Book.

Not pictured: Karl Spurzem, sophomore, artist
BY BRIAN HERNANDEZ

The concept of robots dates as far back as 300s BC when Greek philosopher Aristotle penned his thoughts about automation:

“If every instrument could accomplish its own work, obeying or anticipating the will of others ... If the shuttle could weave, and the pick touch the lyre, without a hand to guide them, chief workmen would not need servants nor masters slaves.”

With each century, decade, year, now even day, that passes, Aristotle’s thoughts are becoming more of a reality.

WALKING THE WALK

Enough talking the talk: Scientists around the world take steps to advance humanoid robots.

What Aristotle called instruments, scientists are now calling humanoid robots. These humanoids emerged in science-fiction novels and movies and were depicted as robots with the same, if not more, mobility and cognitive skills than humans.

Now, scientists around the world are taking steps to advance humanoid robots to the level of their science-fiction counterparts.

In the United States, companies such as American Android, which specializes in developing state-of-the-art technology for humanoids, work to advance technologies that help robots move, think and learn better.

David Handelman, president and founder of American Android, said he wants to build “dexterous, agile and robust” robots that can move as well as athletes can move.

To achieve that desired result, American Android has had to address the degree of freedom or flexibility of motion for a robot’s structure compared to a human’s joints. Handelman said the more joints a robot has, the harder it is to control.

American Android’s limb-coordination technology and All-Terrain Biped are easing this problem. Its limb-coordination technology is improving posture and balance, and creating angles for joints that make a more agile robot. The All-Terrain Biped focuses on giving two-legged robots better mobility and balance.

With funding from NASA and DARPA, Handelman said, American Android has helped create Robonaut, a humanoid robot intended to assist astronauts with space assembly, inspection and maintenance tasks.

Once the technologies advance to level comparable to human movement, he said, robots would be used to perform or supplement humans in performing tasks that fall under the three Ds: dull, dirty or dangerous tasks. Such tasks include homeland security, defense, firefighting and search and rescue.

Although some advances in robotics are occurring in the U.S., George Bekey, a roboticist and professor of computer science at the University of Southern California, said American companies haven’t had the motivations to build them as often or as effectively as other countries.

“The current state of humanoid robots is best illustrated by the Japanese robots,” said Bekey, who in the past year led a group of roboticists to about 50 labs in Europe, Korea and Japan. “Their culture is a lot more oriented to robots than ours is. Japanese companies are much more willing to invest for the long term.”

Every major Japanese company, he said, is making some type of humanoid.

For example, Honda has the ASIMO, an acronym for Advanced Step in Innovative Mobility. Since beginning its research in 1986, Honda has created 11 humanoid prototypes. Honda’s most recent venture began in 2000 with the development of the ASIMO.

In 2002, Honda added intelligence
technology to ASIMO, which allows it to interpret human postures and gestures; greet and follow people; recognize human faces; and address humans by name. Honda’s Web site claims that the ASIMO is the world’s first humanoid robot to exhibit such a broad range of intelligent capabilities.

Now, ASIMO weighs about 115 pounds and stands nearly 4 feet tall, making it the most compact humanoid Honda has built. According to its Web site, Honda engineers’ ultimate goal was to build a humanoid that benefited people in their daily environment.

Sony has taken a different approach to advancing humanoids. Toshi Doi, an executive vice president at Sony, has been quoted as saying, “Sony doesn’t make useful robots. Sony makes robots that entertain.”

In September, Sony unveiled Qrio, a robot that has been called the world’s first running robot. At the unveiling, Doi said the technological breakthrough with the Qrio is getting its two feet off the ground at once, mimicking the running stride of a human.

Until recently, the 23-inch, 15-pound Qrio was known as the Sony Dream Robot, which entertained crowds with its dancing. Now, Qrio can run at a speed of 15 yards per minute, which is equivalent to a human walking at a speed of 1.5 miles per hour.

Other Japanese companies have thrown their efforts into advancing humanoids, too. Fujitsu has HOAP, Humanoid for Open Architecture Platform, which is being used to research movement control and communication.

As the humanoids in Japan and around the world inch closer to resembling humans and performing tasks as well as or sometimes better than humans, both Bekey and Handelman believe ethical questions will arise.

Although ethics play an integral role in the future of robotics, ethical questions have been asked and addressed before in science fiction, Bekey said.

Take Isaac Asimov, for example, who in the 1940s wrote science-fiction novels. Asimov addressed ethical concerns by creating the “Three Laws of Robotics,” a set of rules that robots followed:

- Law One: A robot may not injure a human being or, through inaction, allow a human being to come to harm.
- Law Two: A robot must obey the orders given to it by human beings, except where such orders would conflict with the first law.
- Law Three: A robot must protect its own existence, as long as this does not conflict with the first two laws.

Asimov wrote the three laws before robots existed, but Bekey said they reflect ongoing concerns some people have about robots.

“Those laws will grow in importance as time goes on,” he said. “This is a very important social issue.”

Handelman agreed, saying labor as far as the displacement of workers is the most prevalent concern.

“The use of technology to replace manual labor has been going on since the Industrial Revolution began,” Bekey said. “If technology advances, then we need to find other things for these people to do: Train them. Send them back to school. Enable them to do new tasks.”

- George Bekey, a professor at the University of Southern California and roboticist who in the past year led a group of roboticists to about 50 labs in Europe, Korea and Japan

One area – elder care – is an area in which Bekey and Handelman said humanoids are likely to be implemented.

In this instance, Handelman said, the social implication is beneficial. He believes because Japan has an aging population, people are interested in building machines that can take care of people in nursing homes.

However, Bekey, who believes humanoids may be used in nursing homes within 20 years, said “the emotional and physical relationships become crucial. You want to make sure they don’t injure humans.”

Another question being asked is “will humanoids ever have robot rights similar to the way humans have human rights?”

“I think as robots get smarter, we will need to address the issue of their rights,” Handelman said. “However, we have a long way to go before that.”
When falling more than 200 feet in just a few seconds, most roller coaster riders don't realize that the contraption they're riding in does not have an engine. In fact, at 75 mph, riders are held to the track only by gravity, friction wheels and two sets of track wheels that keep the car following steel pipes.

It sounds dangerous, but a person is safer riding a roller coaster than driving a car.

The effects of gravity give the roller coaster the initial kinetic energy to drive through the entirety of the ride.

Waiting the full minute for the ride to pull the cars to the top of that first hill now seems worthwhile to riders.

The friction wheels control the motion to either side of the track so the car does not fly off the track when following corners at 75 mph. Running wheels act as a guide for the roller coaster, and a final set is used only for coasters with inversions to keep the cars on the track when the running wheels are separate from the track and guide cars through the loop.

The National Consumer Product Safety Commission said only 7,000 of the 270 million patrons who visit amusement parks each year — 0.0026 percent of riders — receive medical attention for ride-related injuries.

Deaths and injuries on amusement park rides are usually preventable. Lack of routine maintenance and disregard for safety rules take the bulk of the blame.

Each ride has a set of guidelines that operators and patrons must follow. These include age, weight, or height restrictions, and medical conditions.

Worlds of Fun uses a rating system with level one being low...
risk, and level five being high risk. The park’s haunted houses are level five attractions, along with the roller coasters. Even the Ferris wheel has a four rating, which warns patrons about the risk of heart, back and neck injuries. No rides allow pregnant women to board. These rules are created by the ride’s designers, who understand the key forces associated with the ride.

But which type of roller coaster produces the most thrilling ride: A wooden track or a steel track?

Worlds of Fun has two roller coasters that serve as perfect comparisons for this discussion. The Timberwolf is a wooden roller coaster, which was added to the park in 1989. Its lift height is 100 feet with its first drop reaching 45 mph. At a more than two minutes in length, the ride features hairpin curves and an unusual 560-degree helix. Although the maximum speed is relatively low, the Timberwolf makes up for speed through added sway and bouncing, which is characteristic of wooden roller coasters.

The Mamba is a steel track roller coaster that lifts riders 205 feet in the air and sends them hurtling toward the earth at 75 mph. Built in 1998, it marks the single largest expansion in the park’s history to date. It is one of the longest and fastest roller coasters in the world, stretching almost 5,600 feet and providing a ride that lasts approximately three minutes. Steel roller coasters have the added perk of being able to supply inversions and loops with few mechanical limitations. But makers of the Mamba take pride in the coaster’s ability to create thrills through sheer speed instead of loops.

“When you get to the top, you feel weightless,” said Martin Gakuria, a Blueprint staff member, after riding the Mamba.

What can be more thrilling than the Timberwolf or the Mamba? Worlds of Fun hopes it’s the Patriot, which will be unveiled in spring 2006.

The Patriot will be 149 feet tall and stretch 3,081 feet wide. Built with blue cars on a red and white track, supported by blue columns, this coaster is set to
a ride smooth as glass. Its track includes four inversions: an 89-foot loop, a zero-gravity roll, an Immelmann loop and a corkscrew. The track also features an inclined bank curve and an s-curve with a top speed of 60 mph.

The Patriot will cost $14 million, the most expensive investment in the park’s 33-year existence.

Park officials predict that the two-minute, 18 seconds ride will be wild.

Bolliger & Mabillard (B & M) of Monthey, Switzerland designed the Patriot.

With so many innovations in the roller coaster industry, developers are working to satisfy riders’ dreams of roller coasters with even greater heights and tighter curves. Until then, coasters built during the Roaring Twenties will be enjoyed for decades to come.

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**OPENING IN 2006: THE PATRIOT**

This computer rendering of the Patriot, which is being dubbed as “The American Scream,” shows what Worlds of Fun in Kansas City, Mo., has invested $14 million to build.

**COURTESY PHOTO**

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Each year, the National Amusement Park Historical Association surveys national theme park enthusiasts to compile a list of the top 10 roller coasters in the world. This year, the list includes five steel track and five wooden track coasters. Eight of the world’s top 10 roller coasters also are in the United States.

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### TOP 10

**Roller coasters in the world**

1. **England’s Nemesis ride at Alton Towers is an inverted roller coaster built in a ravine. Riders said their feet almost scrape the cavern walls.**

2. **Magnum XL-200, built at Cedar Point in Sandusky, Ohio, is No. 2 overall but is the No. 1 steel coaster. Magnum XL-200 opened in 1989 and was the first coaster to break the 200-foot barrier while reaching speeds as fast as 71 mph. Combined with the scenic view of Lake Erie, this coaster also delivers the weightless thrills enthusiasts crave.**

3. **The wooden Cyclone at Astroland, in Brooklyn, N.Y., was built in 1927 during the height of Coney Island’s popularity. The coaster broke records in height and speed and is the world’s most famous and imitated roller coaster. Its first drop is 58.6 degrees, and it reaches 60 mph.**

4. **The Steel Phantom at Kennywood, near Pittsburgh, Penn. The ride produces G-forces greater than those NASA astronauts experience during launch.**

5. **Megafoobia is considered Europe’s best wooden coaster. Built in Oakwood Coaster Country in Pembroke, Wales, the ride gives unforgiving air time. The coaster uses its brakes only at the end, just before riders return to the station.**

6. **The inverted Raptor at Cedar Point in Sandusky, Ohio, is 3,790 feet long and 137 feet tall. The coaster was the world’s longest, fastest and tallest of its kind when it opened in 1994.**

7. **The Beast at Paramount’s Kings Island near Cincinnati, Ohio, is the world’s longest wooden roller coaster. It also boasts one of the longest ride times, at four minutes, 50 seconds. Built in 1979, The Beast® is 7,400 feet long with two lift hills and a helix finale.**

8. **The Steel Force, at Dorney Park in Allentown, Penn., was designed and built by those who built the Mamba at Worlds of Fun, and boasts the similar characteristics.**

9. **The Comet was built in Canada in 1927 as the Crystal Beach Cyclone. The coaster was rebuilt in 1947 as the Comet. The Comet moved to The Great Escape Lake George, N.Y., in 1993 and is one of the best coasters because of its historical significance, hills and drops.**

10. **England’s Nemesis ride at Alton Towers is an inverted roller coaster built in a ravine. Riders said their feet almost scrape the cavern walls.**
A simple, 10-hour road trip to Worlds of Fun in Kansas City, Mo. on Oct. 9 could not have been more difficult for four Blueprint editors and an editor’s significant other.

Frank Pribyl, editor in chief and photographer; Staci Edwards, our editor’s girlfriend; Cecelia Orwig, assistant editor; Brian Hernandez, layout editor; and Martin Gakuria, Web site editor, planned a wonderful day of photography and research on the Patriot, a $14 million roller coaster under construction at Worlds of Fun.

The drive to Kansas City and research at the park went smoothly, and Frank was able to take many construction photographs of the Patriot. Everyone except me rode the roller coasters because I’m seven months pregnant. Worlds of Fun was kind enough to provide us with free press passes, and we used them.

On the drive home to Lincoln, just five miles outside Kansas City, my car began experiencing technical difficulties. I’d had trouble with my battery three weeks earlier and had bought a new one for $30, which an employee at a local auto shop told me would solve the problem. I discovered later that Wal-Mart provided this diagnostic for free.

My ABS light came on, followed by the red battery light. Next, the headlights dimmed. Finally, all dials fell to zero and the transmission locked into fourth gear.

As the fuel injector began to fail, we knew we were in trouble. Needless to say, I was hormonal and frustrated, so we “calmly” searched for the next exit and wound up at a truck stop just outside Faucett, Mo.

We inspected the damage and concluded that the car had a dead battery, and we needed help dealing with the problem.

One man, who was walking to eat at the nearby Mexican restaurant, poked around in the engine and told us our battery was dead. Thanks.

The next man, a semi-trailer driver, offered us a ride to Lincoln in his truck bed. We declined on the grounds of his creepy grin.

Finally, the gas station attendant was able to get in touch with a local mechanic. The mechanic came and gave us a quick diagnostic. He came with a spare battery, but instead told me the alternator was no longer functional. His daughter offered to drive us to St. Joseph, Mo., to stay the night at a motel, and he would fix my car in the morning. We told him we would discuss the idea, as this would be an expensive repair to do so far from home. He left us his phone number.

After a full two hours of weighing our choices, Frank opted to purchase a $40 battery charger pack, in hopes of recharging the battery every five miles, all the way back to Lincoln.

Staci and I had work the next morning. Brian had a midterm. Everyone had class.

Luckily, Staci and I were able to convince Frank of the dangers of driving at night without headlights, dials or a functional transmission. We compromised and chose to take the interstate for the five-minute drive to St. Joseph, with the hope that a jump start from two young men in a pickup would keep us running.

Initially, we left Kansas City at 5:30 p.m. It was now approaching 9:30 p.m. The sky was black, and the temperature had dropped. To conserve energy, we kept the heat, lights and traction control off. Less than two minutes outside Faucett, the lights went off again, and the fuel injector faltered. Frank was driving this time, and he...
On many computer screens throughout Walter Scott Engineering Center, students work on design projects through computer-aided design (CAD).

Three-dimensional models, systems, and machines bring calculations and creativity out of each designer. Most designs are envisioned to exist in reality — but some may not. Some are intended only to be seen on a bigger screen and perhaps help generate some popcorn sales.

In modern times, CAD is a staple of the engineering world. But throughout its history, it has branched out heavily into the entertainment industry.

Computer Generated Imagery (CGI) is a common term for most three-dimensional designs created by computers that are applied to special effects. The origins of CGI date to 1962 and a program called Sketchpad, created by Ivan Sutherland, a Ph.D student at the Massachusetts Institute of Technology. The Sketchpad was a mere skeleton of the programs used today.

Sutherland worked with David Evans, a professor at the University of Utah, to create the first academic computer graphics department. This program developed many technologies such as virtual reality and desktop publishing.

Evans and Sutherland founded the world’s first computer graphics company in 1968, Evans and Sutherland. A year later, the company created the first corporate workstation for CAD programs. Previously, computers that were capable of making graphics were costly and often used only by the military. Evans and Sutherland opened the doors to corporate use of CGI technology.

CGI was first implemented into the big screen in the movie “Star Trek II: The Wrath of Kahn,” which featured a one-minute scene created completely by computers. George Lucas founded the company responsible for this scene. Lucas was instrumental in helping computer graphics make the transition to the big screen. He began in 1978 when he hired Edwin Catmull from the New York Institute of Technology to start the Lucas Film Computer Development Division, which researched the impact computer graphics could have in the film industry.

The mid-1980s marked a time of incredible improvement in technology for CGI. The computers needed to engineer these images became less expensive and easier to get. Lucas’s Industrial Light and Magic (ILM) computer division was instrumental in jump-starting the CGI industry. In 1989, the ILM was used to create a water creature in the movie “Abyss.” This was the first realistic and believable character in a movie generated by computers.

The 1980s also marked the explosion of the video game industry. However, this side of the entertainment industry would take some time to catch the 3-D trend. Early prototypes and simple 3-D rendering games surfaced in the late 1980s, and by the mid-1990s, many first-person computer games such as “Doom” in 1993 and the release of Nintendo’s gaming console Nintendo 64 brought 3D into the video game mainstream.

UNL alumnus Joel Gompert (B.S., Computer Engineering; M.S., Computer Science) works for Infinite Ward, a programming company owned by game manufacturer Activision. Gompert sheds some light on the video game industry’s progress: “They (game manufacturers) have been a few steps behind movie CGI,” Gompert said. “The goal

‘That will be a huge step when viewers are no longer able to tell the difference between CGI and the real thing.’

- Joel Gompert, UNL alumnus and employee at Infinite Ward, a programming company owned by Activision

BY MICHAELA McBRIDE and JOEL SCHULTE
of creating video games, of course is to create something that runs on consumer hardware. So, games have often been making the same leaps in capability as film, just several years later.

Recently, CGI has entered the center ring of film production. Pixar’s “Toy Story,” released in 1995, was the first full-length film to be created solely using computer generated images. Toy Story was not only a huge hit in box offices, but it also was a huge landmark for the movie industry. It even created a new definition for cartoon. Previously, animations were simply flowing sequences of drawings on paper that became frames of a movie. The use of computers brought film creators a seamless way to animate, not to mention a third dimension. Following Toy Story’s lead, many other films such as “Shrek,” “Finding Nemo,” “Monsters, Inc.” and “Shark’s Tale” have made CGI a standard for animation.

CGIs are becoming more detailed and are boldly expanding past the children’s arena of filmmaking. A well-known and prime example is the character Gollum from the “Lord of the Rings” trilogy. Gollum’s features and movements reached an all-time high in detail. His presence within a live-action film, interacting with real actors, may have been an even bigger landmark. Gollum was a more sophisticated CGI; however, he was not designed from scratch on a computer. Rather, he was generated from a live actor, Andy Serkis.

Using a method called motion-capture photography, an actor performs the character’s movements and dialogue, only he or she is dressed in a suit (often nicknamed a “mo-cap” suit) with many motion sensors located on various joints and contours of the body. Places of more complex movement, such as the hands and face, have a higher concentration of sensors. When a scene is completed, the movements and behaviors of each sensor are recorded to a computer, where a CAD system reproduces the actor as a wire frame. The wire frame can then be tweaked, given textures and shadows, and finally become a fully digital character. The computerized process is still nothing short of complex.

“When creating CGI for film, the back end is very heavy,” Gompert said. “They (filmmakers) don’t need to render at 60 frames per second on consumer hardware, so they can have huge render farms that perform all the raw computation to produce the final images. The images are often rendered in a distributed manner on large computer clusters, and it still may take days to render one frame of a film.”

Motion capture photography traces its roots to the video game production industry.

Athletes often are used to create the most natural and realistic movements for sports video games. Big name sports stars often are called into studios to zip on a “mo-cap” suit and perform a signature touchdown celebration or a special slam dunk so their characters can be easily replicated in game play.

At the beginning, computer animations had very little personality, but technological advancement has enabled personality to be their center focus. But even throughout countless technological advances, creating the human character remains the highest hurdle to clear.

“Humans are so good at recognizing subtleties in the human face and in human movement that we can easily detect a fake,” Gompert said. “That will be a huge step when viewers are no longer able to tell the difference between CGI and the real thing.”
The word **hologram** is formed from two Greek words: holos, meaning whole and gramma, meaning message.

Usually, a 3-D image, produced by capturing a laser light interface pattern on film, a **hologram** is the perfect practical example of the wave nature of light.

While engineers often think of light in terms of photons, light also is a wave.

The different colors of light humans see are different wavelengths of the light: red waves of light are the longest, blue waves are shorter and green waves are toward the middle of the spectrum.

Laser light is a pure source of light with only one color or wavelength containing orderly waves, which is most preferred for **hologram** technology. When two beams of laser light come together, they form an interference pattern.

Interference is the main form of a wave laser. Interference is illustrated when one throws two rocks in water, laser light is split into two beams. One is reflected off an object and scatters to the film, while the other beam goes directly to the film.

The two beams meet at the film, causing an interference pattern of microscopic bright and dark lines.

The film captures this pattern, creating a **hologram**.

TRIP continued from page 11

pulled off the interstate onto the shoulder of a bridge. Thanks, again.

He tried to jump the battery, but it only got us to the other side of the bridge. Frank jumped the battery again, and we took the next available exit, “St. Joseph Downtown.”

Apparently, no one ever heard of placing the “Downtown” exit in downtown, and we soon found ourselves in pitch black, rural Missouri, with no headlights, and no way of letting any other drivers know we existed.

Frustrated, Frank ignored the warning on his battery charger, “Do not use as a battery,” attached it to the dead battery, and closed the hood on it. We drove 10 mph until we found the nearest Wal-Mart.

Since my battery was less than a month old, Wal-Mart replaced it for free and ran a quick test to check my alternator.

The alternator was pronounced dead at 9:58 p.m., two minutes before the Wal-Mart automotive department was scheduled to close for the night.

Even with the new battery installed, the attendant told me the car would get us to a local motel that night and a repair shop in the morning but would not survive the drive to Lincoln. We stayed at a Motel 6, waiting to take the car to Midas in the morning.

Approximately 18 hours and a $397 Midas bill later, we were back on the interstate with Brian singing “On the Road Again.”

I’ve never been happier to see that simple sign emblazoned with “Nebraska – the good life.”
Imagine driving a car designed and built by your classmates. The probability of you cruising O Street in a car made by the man or woman sitting next to you in class is slim – but not impossible.

The University of Nebraska-Lincoln’s Mini Baja team has transformed this thought into reality since 1996, the year it joined the Society of Automotive Engineers’ Mini Baja tournament.

In the past, the team consisted of as many as 25 undergraduate students from multiple disciplines of engineering.

This year, however, the team boasts 44 participants.

Brent Wilson, research assistant professor for mechanical engineering, is the team’s adviser.

Each school in the mini baja competition is provided a 10-horsepower Intek Model 20 engine, donated by Briggs & Stratton Corporation. The rest of the vehicle must be financed, machined and assembled by a team.

The UNL team spends $4,000 to $5,000 on its vehicle, including travel expenses.

Members earn this through fundraisers and sponsorship drives. Thanks to generous local businesses, the team is able to use a Honda ATV transmission, and Kawasaki usually donates the tires and rims.

Justin Pflanz, the team’s president, said students assemble all basic parts, including the pedals. The UNL team uses aluminum-chrome tubing for the cage, which Pflanz said is a standard for the organization.

The students also design the parts using Solid Works. Then they use cosmos for finite element analysis, which Pflanz said “provides a color-coded map of forces” that act on the part.

The students then know the vehicle’s weakest points and how to strengthen them for the competition.

They divide into three groups and work on a specific part of the design — front, rear and cage. The groups work independently until late in the fall semester.

Think the Mini Baja team is merely a small faction of car-crazy engineers?
More than 300 teams compete in the worldwide contest. Most notably, Brazil and Canada offer competing teams.

Each school enters only one team. Teams enter their all-terrain vehicles in a series of tests, including a hill climb, a rock climb, acceleration, maneuvering and agility, and the final endurance race.

A different school hosts the competition each year. The 2006 Midwest regional will be held in Milwaukee, Wis., and the 2006 West regional will be held in Portland, Ore., and Washougal, Wash.

Before competitions, UNL Mini Baja team members can take the vehicle through the field tests.

For the trials, drivers are chosen first by their interest and availability to travel, followed by a point system based on attendance at weekly meetings and special events.

Team members’ skills and attributes also are a factor. As a rule of thumb, Pflanz said, “you want your smallest guy for the acceleration contest.”

UNL earned seventh place, its highest overall rank, in 2001. More notably, the UNL Mini Baja has never failed the endurance race, being one of 50 or more vehicles to survive the final contest each year.
PHOTO OPPORTUNITIES
AT WORLDS OF FUN

The Nebraska Blueprint staff went to Worlds of Fun in Kansas City, Mo., to gather information for this issue’s cover story. SEE PAGE 8

(Left) A Worlds of Fun haunted house employee (from left), staff members Brian Hernandez, Martin Gakuria, Cecelia Orwig, Frank Pribyl and Pribyl's girlfriend Staci Edwards pose near the entrance at the amusement park's haunted house. COURTESY ART

(Top left) Nebraska Blueprint Editor Frank Pribyl holds a Worlds of Fun press pass in Kansas City, Mo.

(Above) Brian Hernandez, Martin Gakuria and Staci Edwards prep for a ride at Worlds of Fun.

PHOTOS BY FRANK PRIBYL

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WRITE TO US:
Send letters to the address on the left or e-mail comments to blueprint@unlnotes.unl.edu

NEBRASKA BLUEPRINT
402.472.0451
203 Othmer Hall
Lincoln, NE 68588-0642
www.nuengr.unl.edu/cet/blueprint