

Thomas Edison inspires the oscar awards you don't see

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A picture of the Pictorvision Eclipse in action. Credit: Courtesy Michael Lewis & Michael Vellekoop

Thomas Edison's invention of the first motion picture camera in 1891 inspired scientific and technological advances that he never could have imagined.

February 11 is the 165th anniversary of Edison's birthday, and an appropriate date for the Academy of [Motion Picture](#) Arts and Sciences to hold their Scientific and [Technical Achievement](#) awards in a ceremony, hosted by actress Milla Jovovich at the Beverly Wilshire Hotel in Beverly Hills, Calif.

Most people want others to notice the result of their hard work, whether it is a newly finished home renovation or a freshly painted car. But for

the scientists and engineers who work behind the scenes on movie sets, the mark of their success is when audiences don't notice their work at all.

Making Clouds

Seeing clouds in the sky is common, but creating realistic-looking clouds is a challenge. Usually, Andrew Clinton, a 3-D graphics programmer and Mark Elendt, a senior mathematician with [Side Effects Software](#), use computer software to generate voxels -- 3-dimensional pixels -- which show volume in order to create clouds, smoke, or fire, but there were limits to the software. There were times when Clinton and Elendt wanted to split a voxel into micro-voxels.

"For example, if a cloud is very far away (covering only a few pixels), the cloud might only be split into a few micro-voxels," said Clinton and Elendt. As a result Clinton and Elendt invented and integrated micro-voxels into Mantra computer software. Micro-voxels were used in 2007's "The Golden Compass" and "TRON: Legacy" in 2010.

Keeping Cameras Stable

Filming an action scene is difficult enough, but for a [camera operator](#), trying to film it from inside a helicopter adds a new degree of difficulty. Michael Lewis and Michael Vellekoop, both principal engineers at [Pictorvision](#), developed the Eclipse system, which is an externally mounted aerial camera platform that is controlled by an operator from inside the vehicle.

"The advanced steering and control system of the Eclipse results in faster flying speeds," said Lewis. "This kind of aggressive helicopter maneuvering for capturing shots not obtainable in the past."

"Plus, the Eclipse keeps wind, rain and vibration from affecting the shot," said Vellekoop. "The system would be used for thrilling action sequences like the ones in last year's film 'Green Lantern' or breathtaking beauty shots."

Helicopters aren't the only vehicles used during filming. Planes, boats, cars and even cranes are used to help camera operators close to the action. For Bob Nettmann, president of [Nettmann Systems International](#), his idea and construction of a family of camera and lens stabilizers mean that no matter what happens to the vehicle, the camera is always stable.

"The Stab-C is a cradle for stabilizing remote controlled camera systems," said Nettmann. "You can put the camera in the cradle and hang the whole system by a helicopter."

The technology was used to film the scenes around Dubai's Burj Kalifi tower, the tallest human-made structure in the world, for "Mission: Impossible-Ghost Protocol."

The technology even has a life beyond Hollywood.

"NASA's Jet Propulsion Lab used it to stabilize black boxes for the Mars Lander set to touch the surface of Mars in August," said Nettmann. "We are also working on filming the track and field event for the [2012] Summer Olympics in London."

Improved Camera Lenses

A cinematographer is only as good as the lens he or she is using. There are scenes that are more difficult to capture, such as always trying to keep the speaker in focus while two people are having a conversation.

"The one who is talking is in focus, but the other one at a different

distance to the camera is out of focus," said Uwe Weber, manager of the mechanical design department at [Carl Zeiss Group](#) which specializes in opticals and optoelectronics. "The magnification change, called breathing, can be seen easily, when the camera fixes an object and the focus changes. During the change of the focus, the size of the object changes at the same time. This looks like zooming and is disturbing."

The ARRI Zeiss master prime lens eliminates breathing and has a built in lens data system, which displays camera and lens information. The first blockbuster movie shot with master prime lenses was the 2006 film "Rocky Balboa." Others followed, including the 2010 film "The King's Speech."

Film Recording

In 1993 when "Jurassic Park" premiered in theaters, audiences were immersed a world of digitally produced images -- but they didn't even notice the artificiality.

"In order to bring these effect shots to the analog film world, a device is required which takes the digital images and records them onto 35-mm photographic film, picture by picture," said Johannes Steurer, principal engineer and project manager of the ARRILASER at ARRI. "These film elements can then be used in the ongoing film production process like regular film shots and distributed to the film theatres."

The ARRILASER is the first device where audiences could not tell if the images were digitally modified or not. According to Steurer, this changed the whole process of feature film production because now, you could complete feature [films](#) in digital.

"The device consists of a computer that receives the image data from a network, some complex control electronics, a set of laser light sources in

various colors, a deflection system that scans the laser beam onto the film, and mechanism to advance the film," said Steurer.

Movies such as the Lord of the Rings trilogy and the Pirates of the Caribbean series all used ARRILASERED technology.

Medal of Commendation

The [John A. Bonner Medal of Commendation](#) is awarded for "outstanding service and dedication in upholding the high standards of the Academy of [Motion Picture Arts](#) and Sciences." The 2012 medal is being award to Jonathan Erland, president of [Composite Components Company](#).

Erland is a visual effects technologist and was instrumental in establishing Visual Effects as a separate Academy branch in 1995, but it was his work on the 1977 sci-fi classic "Star Wars" that launched his career.

"To accomplish what was needed for the movie required a radical rethinking of the motion picture process. An entire system had to be invented before it was possible to even begin filming," said Erland. "Industrial technology, from the motion control for the cameras to the production of miniatures had to be melded with traditional motion picture technique."

This new way of approaching movie production led to many of the scientific and technological advances used on movies over 30 years later.

"Most of us in this field are proudest of the work we do that is never even noticed by the public," said Erland. "If you believe the images you see are real, then we have succeeded but of course, that's frustrating since, like anybody else, we like to be recognized for our

accomplishments."

Like [Thomas Edison](#), the award winners continue to make a visible mark on filmmaking history and even though audiences may not notice their contributions while watching the latest visual-effects masterpiece.

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