



ABOVE: The first computer mouse was invented in 1963-64 as part of an experiment to find better ways to “point and click” on a display screen. Due to space restrictions, the first mouse (pictured above) had only one button and was carved out of wood. An improved mouse eventually contained three buttons — an “upgrade” that was limited due to space required for the three micro-switches.

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The Lincoln Near-Earth Asteroid Research project, or LINEAR, uses a 1-meter aperture telescope located near Socorro, N.M. to detect and track potential NEO candidates. This telescope uses highly sensitive electronic devices called charge-coupled devices (CCDs) to photograph the sky, while computer algorithms process the images and quickly detect any changes from one observation to the next. Asteroid observations are forwarded to astronomers at the Minor Planet Center in Massachusetts, who then calculate the object’s orbit and provide discovery acknowledgments.

The LINEAR system incorporates innovative technologies, including:

- Large format, highly sensitive, back illuminated CCDs,
- Fast frame transfer readouts that allows a new image to be collected while the previous image is being read out — thus yielding very high search efficiency,
- New camera systems for improved sensitivity, and
- Customized, high throughput data processing systems.

These technologies combine to allow LINEAR to search more than 12,000 square degrees per month, to a limiting magnitude of approximately 19.5 (250,000 times dimmer than the human eye can detect), compared with the typical 1,000 square degrees obtained by “competing systems.”

This leads to a very productive searching system for NEOs, comets, and main belt asteroids. Since March 1998, LINEAR has been responsible for the discovery of more than 70 percent of the NEOs detected worldwide.

LINEAR’s state-of-the-art technology is an integral part of the Air Force’s initiative to modernize the Ground-based Electro-Optic Deep Space Surveillance, or GEODSS, system. The system, which consists of 1-meter telescopes and 1970’s television technology, is part of the Space Surveillance Network run by the Air Force Space Command.

Additional information may be found at: www.ll.mit.edu/LINEAR

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ABOVE: The red area shows the coverage of the earth during a given month, LINEAR achieves coverage of 12,000 degrees out of 16,000 degrees in the entire sky. The black area indicates areas that were not covered due to daylight, horizon blockage, weather, or other factors. The Ecliptic line shows the plane of the solar system where most asteroids exist. Undulation caused by 26 degree of earth rotation.

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BELOW: The GTS-2 telescope is a 1-meter folded prime focus Cassegrain design identical to that of the Ground-based Electro-Optic Deep Space Surveillance (GEODSS) telescope used by the Air Force for space surveillance. It is located at the Experimental Test Site (ETS).

