

Cataract Surgery Tool

A cataract is a condition in which the lens of the eye becomes opaque, restricting vision and leading to potential blindness. Surgery to remove the cloudy material is necessary to restore vision. More than 400,000 people a year need such surgery in the United States alone. Traditional surgical technique requires a 180 degree incision, and then numerous stitches to close it. Since the possibility of infection is high, patients are kept in the hospital 10 days after surgery.

Seeking to improve this technique, Cleveland eye surgeon Dr. William J. McGannon, the Retina Foundation of Boston, and NASA-Lewis joined to apply advanced technology in the fields of fluid mechanics, high-speed rotating machinery, miniature mechanisms, pumps, seals, and bearings.

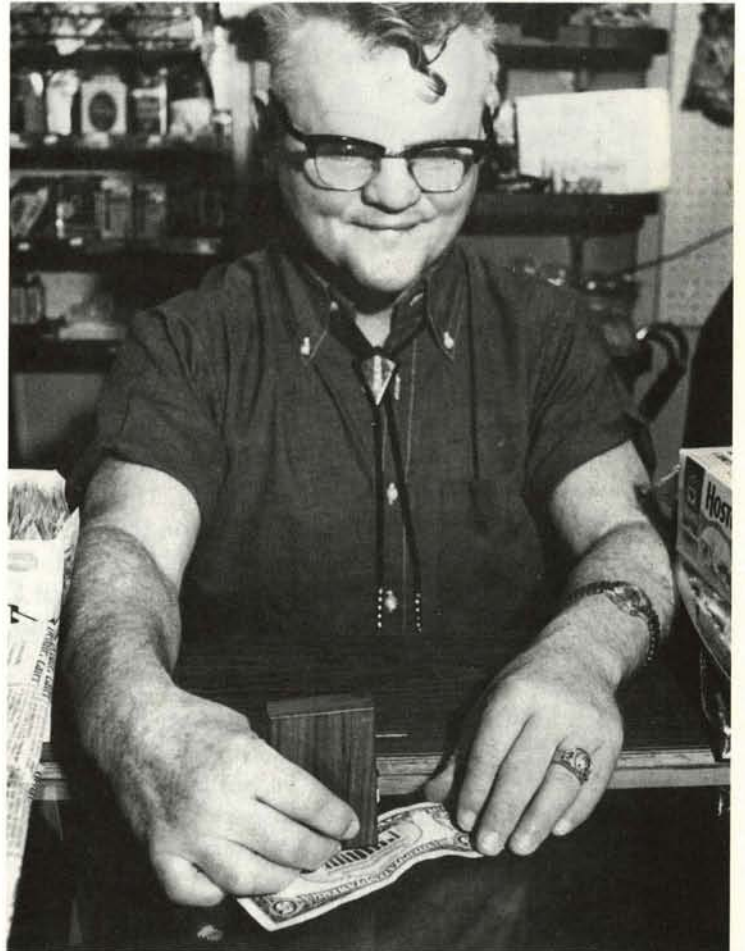
The resulting NASA-McGannon cataract surgery tool is a tiny cutter-pump which liquefies and pumps the cataract lens material from the eye. Inserted through a small incision in the cornea, the tool can be used on the hardest cataract lens. The cutter is driven by a turbine which operates at about 200,000 revolutions per minute.

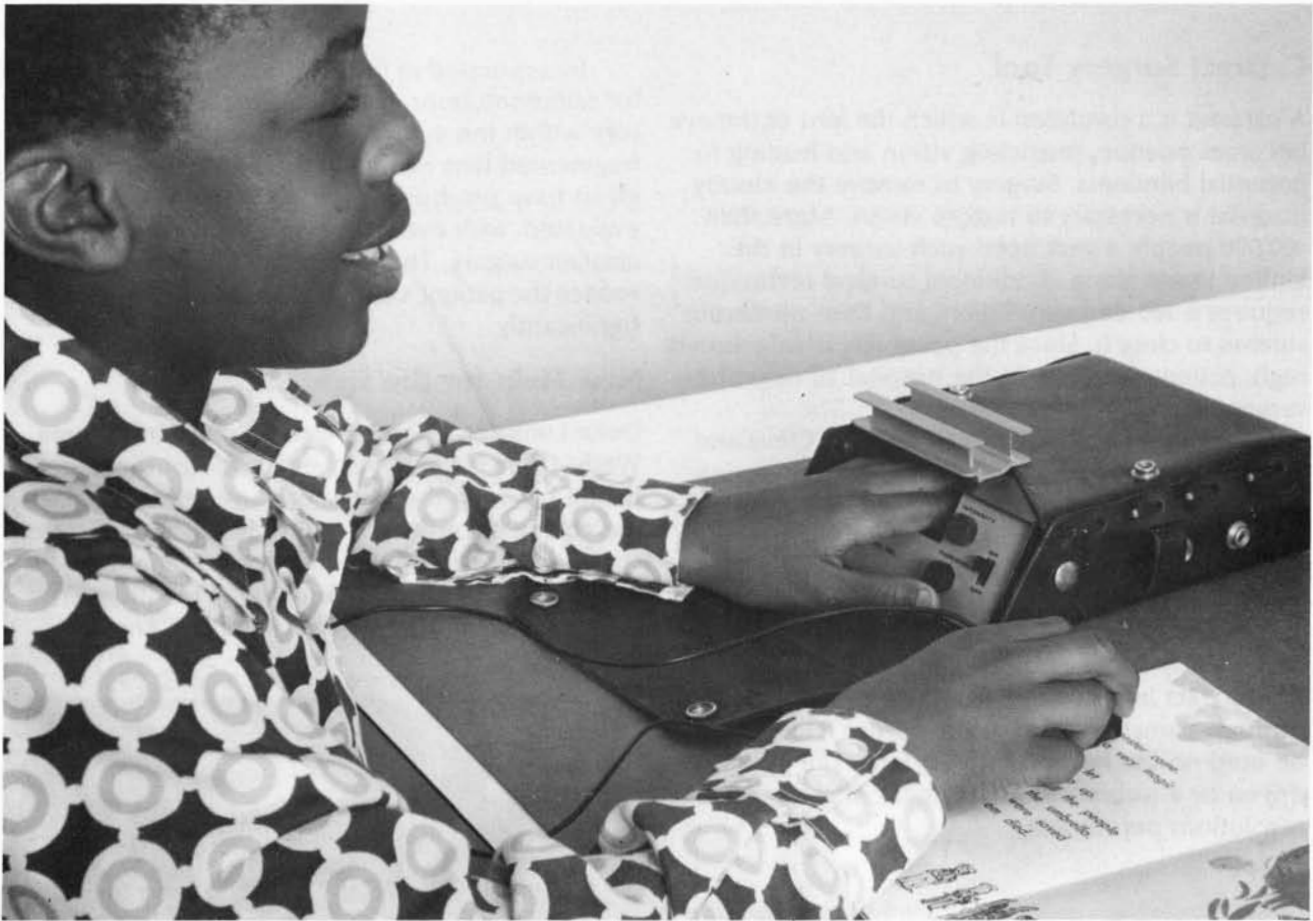
Duke Lumsden, blind concession operator in Tacoma, Washington, can identify denominations of American bills with the help of his Paper Money Identifier. The device is a spinoff from space-developed optical-electronic scanning technology.

Incorporated in the mechanism are two passages for saline solutions, one to maintain constant pressure within the eye, the other for removal of the fragmented lens material and fluids. Three years of effort have produced a design, now being clinically evaluated, with excellent potential for improved cataract surgery. The use of this tool is expected to reduce the patient's hospital stay and recovery period significantly.

New Help for the Sightless

Duke Lumsden operates a candy shop in Tacoma, Wash. Duke is blind, yet he has no trouble differentiating between the values of currency he handles in the course of business. He is aided by a spinoff from space-developed optical-electronic scanning technology known as the Paper Money Identifier. The PMI is manufactured by EMR Ltd., Los Angeles.





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It's not distinguishable by the human eye, but each denomination of American currency has a unique distribution of colors. This fact enables the PMI to tell the difference between different denominations of paper money.

The device, the size of a cigarette pack, emits a narrow beam of invisible infrared light. This beam reacts to the reflectivity of the colors on the bill and causes an oscillator to generate an audible signal. As Duke passes his PMI lengthwise along the back of a bill, he hears a distinctive series of tones that identifies each denomination.

Duke Lumsden is very pleased with the paper money identifier, which he got through Tacoma's Technology Transfer Center. He not only handles paper money with ease, but he has discovered another use for the device. Before receiving the PMI, he had difficulty operating his tape recorder because he couldn't determine which track the tape was using; now his PMI tells him, by reacting to the different colors on the switch button light.

This blind child is reading, thanks to a device called the Optacon. The boy is passing a mini-camera over a printed page with his right hand; with his left he is sensing a vibrating image of the letters the camera is viewing. The Optacon allows the blind to read almost anything in print, not just braille transcriptions. The system originated in research performed at Stanford Research Institute under NASA sponsorship.

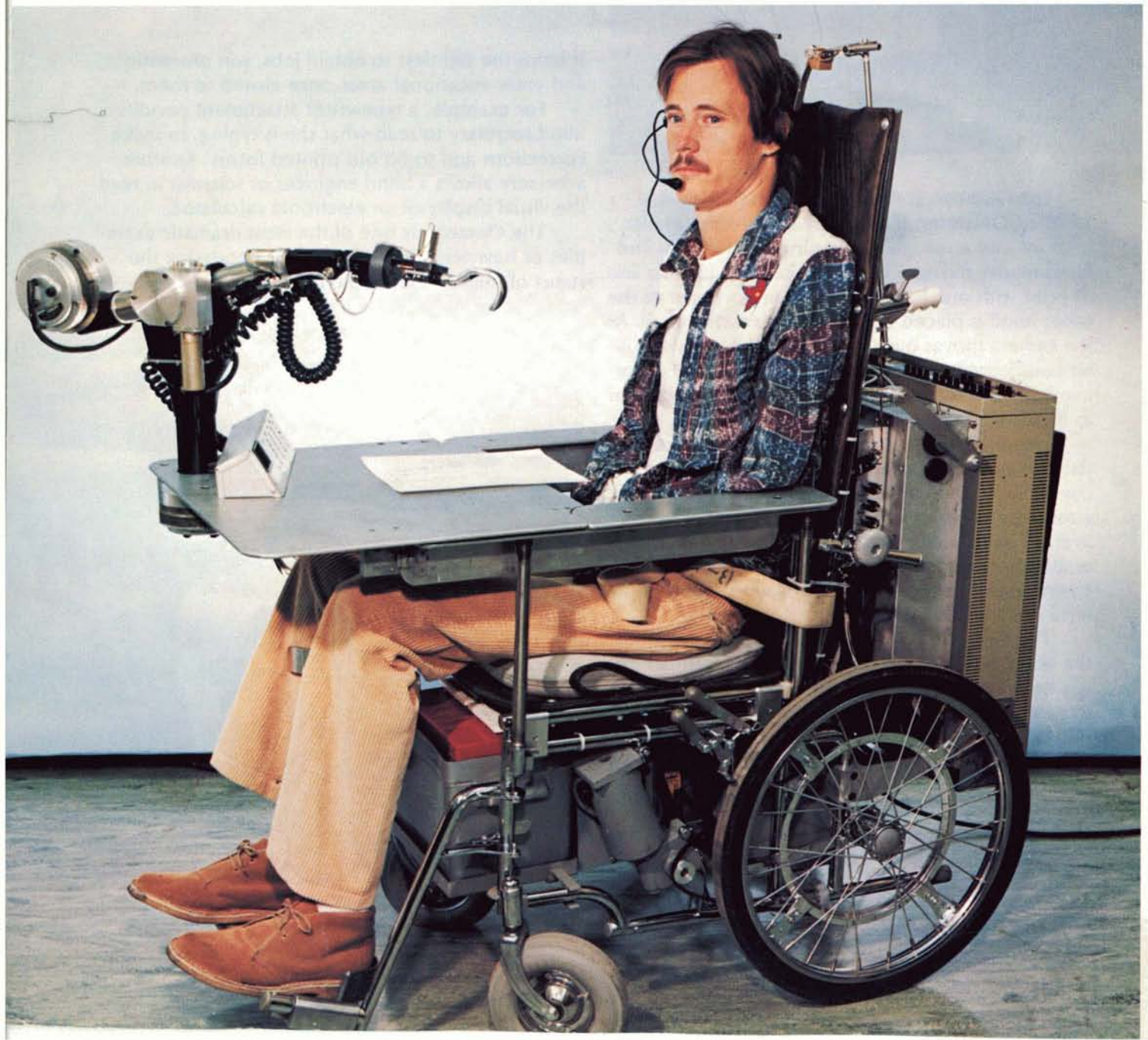
Thanks to another aid to the sightless called the Optacon, a blind person may be reading this printed page. The Optacon is an important advance for the blind and the deaf-blind, because it permits them to read almost anything in print, not just braille transcriptions.

The concept behind the Optacon combined optical and electronic technology and incorporated research performed at Stanford Research Institute under NASA-Ames sponsorship. A newly-formed company, Telesensory Systems Inc., Palo Alto, Cal., then continued the development with assistance from Stanford University and funding provided by the Department of Health, Education & Welfare and the Office of Naval Research.

Michael Condon, a quadriplegic from Pasadena, California, demonstrates the NASA-developed voice-controlled wheelchair and its manipulator, which can pick up packages, open doors, turn a TV knob, and perform a variety of other functions. A possible boon to paralyzed and other severely handicapped persons, the chair-manipulator system responds to 35 one-word voice commands, such as "go," "stop," "up," "down," "right," "left," "forward," "backward." Heart of the system is a voice-command analyzer which utilizes a minicomputer. Commands are taught to the computer by the patient's repeating them a number of times; thereafter the analyzer recognizes

commands only in the patient's particular speech pattern. The computer translates commands into electrical signals which activate appropriate motors and cause the desired motion of chair or manipulator. Based on teleoperator and robot technology for space-related programs, the voice-controlled system was developed by Jet Propulsion Laboratory under the joint sponsorship of NASA and the Veterans Administration. The wheelchair-manipulator has been tested at Rancho Los Amigos Hospital, Downey, California, and is being evaluated at the VA Prosthetics Center in New York City.

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A Houston five-year-old known as David is getting a "space suit," a vitally important gift that will give him mobility he has never known. David suffers from a rare malady called severe combined immune deficiency, which means that he was born without natural body defenses against disease; germs that would have little or no effect on most people could cause his death. As a result, he has spent his entire life in germ-free isolation rooms, one at Houston's Texas Children's Hospital, another at his home.

The Optacon gets its name from OPTical-to-TACTile CONverter. It works by converting regular inkprint into a readable, vibrating tactile form. The blind reader moves a miniature camera across a line of print with one hand while the index finger of the other hand is placed on the system's tactile array. As the camera moves over a letter, the image is simultaneously produced on a tactile array by small vibrating rods. The reading finger feels the enlarged letter as it passes over the tactile screen.

Telesensory Systems provides the training essential to master the Optacon. The standard course covers 50 hours in nine training days. Reading speed after training varies from student to student, the average being about 10 words a minute. After considerable practice, speeds of 40 words a minute are common and speeds as high as 90 words per minute have been achieved.

The Optacon opens up a whole new world for the blind, who are no longer limited to material that has been tape recorded or brailled. It enables them to carry out a great many everyday reading tasks.

For school use, the Optacon makes the instructional materials of the sighted available to the blind.

It helps the sightless to obtain jobs, win promotions, and enter vocational areas once closed to them.

For example, a typewriter attachment permits a blind secretary to read what she is typing, to make corrections and to fill out printed forms. Another accessory allows a blind engineer or scientist to read the visual display of an electronic calculator.

The Optacon is one of the most dramatic examples of how technology transfer is improving the status of millions of people in all walks of life.

