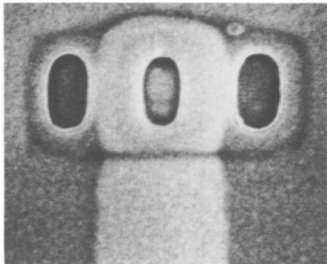


Record-breaking transistor, robot

In 40 years, computers have shrunk from the size of a room to that of a phone book. This miniaturization has been made possible by ever tinier components and ever more precise manufacturing technologies. Last month, scientists pushed the limits even further by introducing the world's smallest transistor and an extremely dexterous robot.



IBM Research Division

Tiniest transistor

The new metal-oxide semiconductor field-effect transistor packs its active area — 1/75,000 the cross-section of a human hair — into a space 1/20 the size of any previous transistor, according to Clive M. Reeves and his colleagues at the IBM Thomas J. Watson Research Center in Yorktown Heights, N.Y. The largest memory chips today can store about 16 megabits of information, but this new transistor should enable engineers to pack 4 gigabits of memory into a single chip, the researchers reported in Orlando, Fla., at the 36th International Symposium on Electron, Ion and Photon Beams.

To make a robot that could build better computer packages and circuit boards, IBM's Ralph L. Hollis built a high-speed micro-robot hand that can position parts to within 0.2 micrometer, increasing robotic precision more than 100-fold. This "fine positioner" contains just one stationary part and one moving armature, which face each other. Compressed air keeps the two parts separate and allows the armature to move without rubbing against the stationary part. A computer-

driven electromagnetic field then controls vertical, horizontal and rotational motion of tools held in the armature. IBM uses this robot at several factories, says Hollis, who described the new device at the IEEE International Conference on Robotics and Automation in Nice, France.

Microscope's misleading tips

Although atomic-force microscopes reveal atomic-scale details not seen with many other imaging techniques, Swiss physicists warn that those details may not always be real.

These microscopes map the landscape of a surface by monitoring fluctuations in the forces between atoms in a very fine imaging tip and those in the material under investigation. Scientists have used the microscopes to study active molecules and to move molecules around (SN: 3/17/90, p.165). But P. Grütter and colleagues at the University of Basel in Switzerland have discovered that imperfections in these tips can lead to spurious results.

In the June 1 *APPLIED PHYSICS LETTERS*, the researchers show how one atomic-force microscope tip misrepresented the topography of a diamond film. Examination with a scanning electron microscope and with a scanning tunneling microscope revealed that the film surface consists of sharp tips and steep facets formed by oriented crystals. But the atomic-force microscope depicted the surface as truncated pyramids. The microscope's tip had that same squared-off shape.

Tips are etched in batches on silicon wafers. The scientists found three flawed tips in a batch of 10 and concluded that dust or imperfect processing led to the bad tips. They suggest that scientists characterize and calibrate tips before using them.

Over one million Americans now suffer from the slow, degenerative nervous disorder known as Parkinson's disease. It is estimated that by the year 2000, approximately one out of every twenty Americans over the age of fifty will have some form of this difficult ailment, for which there is still no cure.

In this accessible guidebook David Carroll describes what Parkinson's is and, using case histories and anecdotes, discusses how to cope with such frustrating symptoms as tremors, slowness of movement, sexual dysfunction and slurred speech. He gives a thorough analysis of the various available treatments, including drugs (and their side effects), exercises and physical therapy programs and diet. Lastly, he discusses ways for caregivers and families to cope with the adjustments necessary to maintain an independent life for the Parkinson's sufferer. This book is an indispensable reference for every caregiver whose loved one is suffering from Parkinson's.

— from the publisher

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Living with Parkinson's

A GUIDE
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PATIENT
AND
CAREGIVER

Based on methods developed by the
Brookdale Center on Aging
DAVID L. CARROLL
Author of *WHEN YOUR LOVED ONE HAS ALZHEIMER'S*

HarperCollins, 1992, 241 pages,
5 1/2" x 8 1/2", hardcover