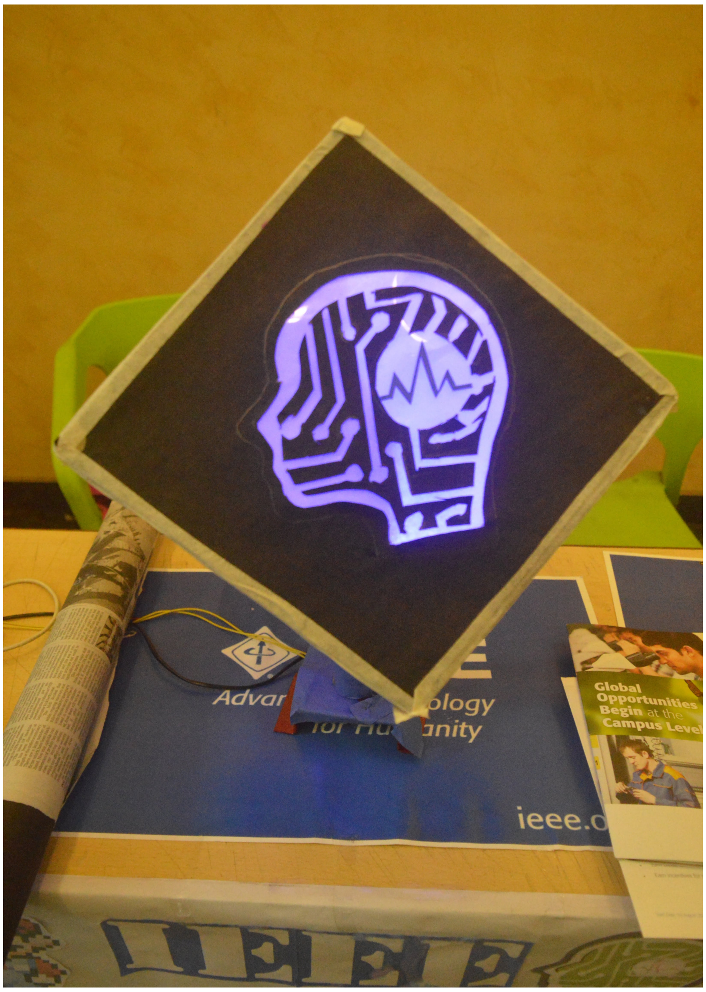
# IEEE Brainwaves

IEEE Brainwaves Newsletter is published by the IEEE Brainwaves student chapter of D.J. Sanghvi College of Engineering

## IEEE Brainwaves Feature Events :

### IEEE Workshops and Project Highlights




· A “PC Internals” workshop was conducted by HOD Prasad Joshi wherein students were exposed to all the prevailing as well as previous components that constituted a PC. Different versions of Integrated circuits were compared and observed. · A seminar on Electronic Circuit simulation and AVR microcontroller was also organized by IEEE student chapter which was led by our student speaker Sunny Agrawal. It was followed by a seminar on AVR microcontroller by our faculty speaker Vivek Nar.

WEEKEND PROJECT CLUB: Now the HIGHLIGHT of IEEE BRAINWAVES 2014 is the WEEKEND PROJECT CLUB. Senior junior mentorship for project execution occurs at the club. The importance of paper work and how to go about the project is explained by the organizing committee. This concept is developed by the organizing committee which actually would add value to a students profile. The vision is to develop the project club over the years. The components required for the project are supplied by the IEEE BRAINWAVES free of cost to the members. The club meetings occur on Saturdays after college hours.

# IEEE Spectrum Article :

## Inexpensive, Durable Plastic Hands Let Robots Get a Grip

This rubber-jointed hand can pick up a telephone and use a drill

The human hand is one of nature's marvels—and a stupendous challenge to engineers who would replicate it. It's an intricate assemblage with 29 flexible joints and thousands of specialized nerve endings, overseen by a control system so sensitive that it can instantly indicate how hot an object is, how smooth its surface is, and even how firmly it should be grasped.

No wonder, then, that creating robot hands with even a fraction of human capabilities has proved an elusive goal. But increasingly, researchers are concluding that copying nature is not the right approach in this case. The better idea is to decide which of the hand's critical functions are to be emulated and how this can best be accomplished with the technologies now available.

*Illustration 1: Nailed It: Thin metal fingernails let the iHY hand capture and lift tiny objects like this ball bearing.*

Industrial robots have, of course, been manipulating objects for decades. But these generally employ simple parallel-jaw grippers that open and close on command to grasp, hold, or move a single type of object that they've been specifically programmed to handle. That inflexibility isn't a problem on the assembly line, but it won't suffice for future robots designed to interact with people in a much less structured environment.

Like many robotics researchers, we envision a new generation of robots roaming around residences, nursing homes, factories, and the like. These machines will be called on to brew coffee, deliver medications, and shuttle components around a shop floor. These functions will in turn demand many smaller capabilities. For example, opening a jar will require a robot to identify the size and shape of the object, grasp it effectively on the first try, and then apply enoughpressure and torque to open it—but not enough pressure to break it. To meet those needs, robot hands will need the flexibility to adapt to a huge variety of situations on the fly, as well as a gentler touch.

The quest for a versatile robot hand has produced designs that precisely mimic the human hand and others that look more like metal clamps. Two of us—Dollar at Yale and Howe at Harvard—have been working for almost a decade on a compromise between these two methods: hands that have some of the dexterity of human appendages but without their great complexity. The hands we've developed don't look human, but they have proved adept at gripping and manipulating a wide variety of objects in many different settings and tasks.


*Illustration 2: Starting From Scratch: To develop a robotic gripper that can handle objects large and small, researchers at Harvard, Yale, and iRobot abandoned the familiar human hand, aiming to re-create its functions with a simpler design.*

We got a chance to find out just how adept at a competition sponsored by the Defense Advanced ResearchProjects Agency (DARPA) not long ago—the Autonomous Robotic Manipulation program. Inspired by the success of the agency's Grand Challenge, which helped to spur innovation in the field of self-driving cars, DARPA asked teams to develop multifingered robotic hands that could complete a variety of tasks, like picking up a telephone handset or operating a power drill. After years of work, it was a chance for us, along with our colleagues at iRobot, to see how our design approach stacked up against those of other researchers.

Since the 1980s, researchers have been able to produce robotic hands with three or four fingers and an opposable thumb, replicating the structure of the human hand. These hands had a futuristic, sci-fi look, and they attracted lots of attention, but most of them weren't very effective. Re-creating the many joints of the human hand increased the complexity and cost of anthropomorphic hands

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