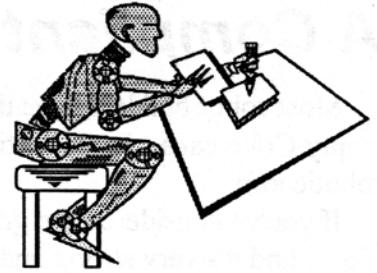


DPRG

DALLAS
PERSONAL
ROBOTICS
GROUP



June 1993

A Newsletter for Personal Robot Enthusiasts

May Meeting Highlights

The May meeting had several interesting sights including Tom's new robot (I don't know its name yet). The concept is simple and practical. There are three layers made of aluminum sheet. The bottom layer has the drive wheels which are connected to size 23 stepper motors via timing belt reducers. This is the first robot we've seen that uses steppers for drive motors. Tom used bearing brackets and hardware from some old medical machinery which gives the robot a very professional look. Also on the lower level are the battery packs which can be moved to balance the entire system. The middle layer will contain the computer based on a 386SX motherboard, a floppy, and maybe a hard disk in the future. Current consumption is a couple of amps so far. The upper level will contain the sensors, speaker, and who knows what else. I predict Tom will have great success with his new creation. We look forward to watching his progress. Good luck Tom!

Attendees of the May meeting picked up their **FREE** LCD data books which were donated to the group by a local Rep. Several members are connecting LCD's to control computers for output since they have low power consumption.

Steve Rainwater brought his RC 4-wheel-drive truck base and his new driver modules. He'll be controlling the servos using the PIC microcontroller mentioned in a recent issue of Computer Craft Magazine. Go-Steve-Go.

Another Great Meeting.

June Meeting Events

The June meeting will be on Saturday the 5th, 1:30pm at the Dallas INFOMART. As usual, many members are expected to bring their personal robot creations. We'll see what progress members have made and discuss some new topics.

ROBOTICS/AI BBS

(214) 258-1832

Give the INTEROCITOR BBS a call. Tons of files related to robotics, AI, Expert systems, Natural language processing, speech output/input, genetic algorithms, and, well you get the picture!

President's Note

This month you'll find two interesting articles in the newsletter. The first one describes a compliant robotic gripper I designed to pick up test-tubes in a laboratory. I learned quite a bit about grippers and thought I would share it. The next article is much more exciting - The Robot Contest. In order to increase participation in the club, a series of robot contests will be held at DPRG meetings every four months or so. The complexity of the contests will increase each time. We're hoping this type of competition will get many people involved in building a personal robot (or reviving an old one from the scrap heap) Watch for details in future newsletters. Better yet, come to the next meeting!

Roger Arrick

A handwritten signature in black ink, appearing to read 'Roger Arrick'.

A Compliant Robot Gripper

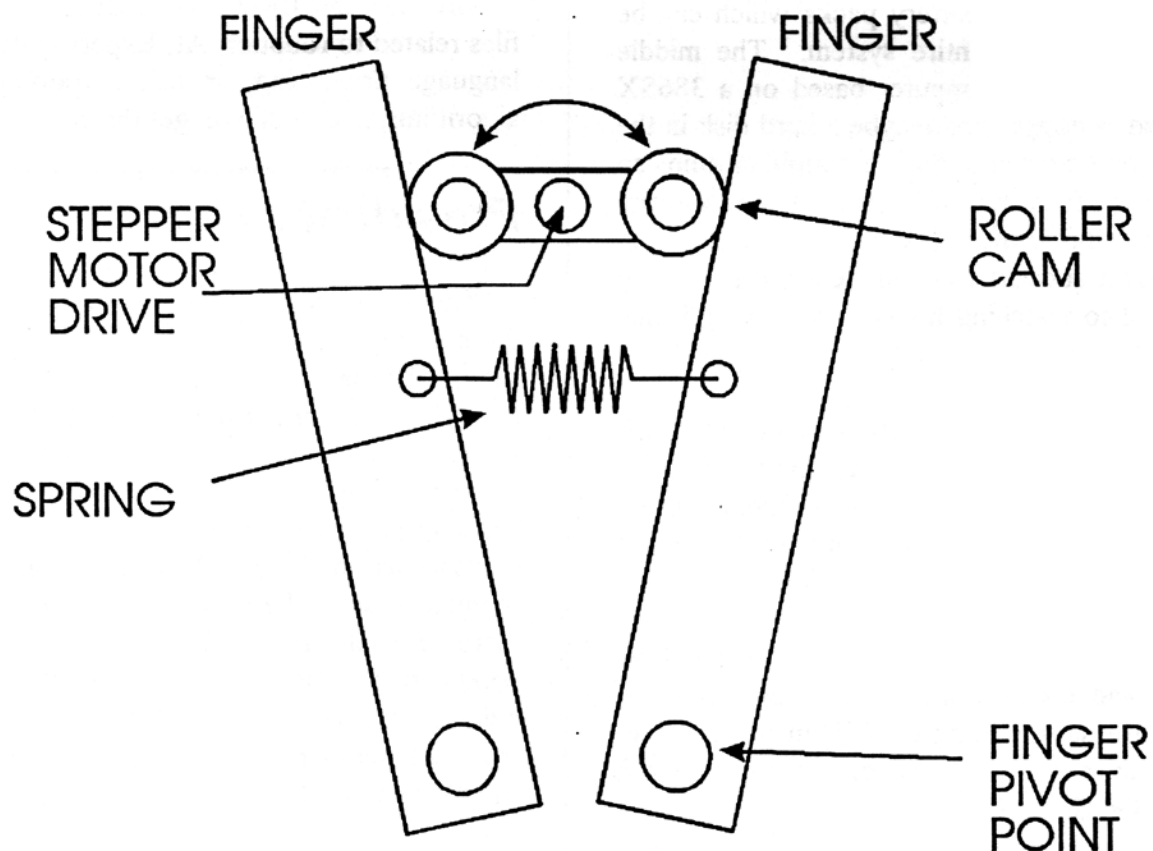
By Roger Arrick

Most robot builders have dreams of grand creations that move through the house picking up dirty clothes and empty Coke cans. In this article, we'll talk about building a gripper that can be attached to the end of a typical robotic arm.

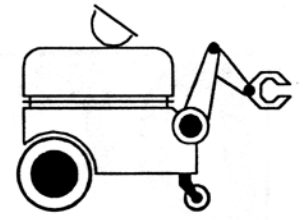
If you've considered the gripper problem, you may have looked at your own hand to see how it was designed. You'll find it's very strong and very compliant. Compliance is the ability of the fingers to comply and conform to various objects. Designing a gripper with compliant fingers may, at first glance sound easy, but once you start making some drawings you'll quickly find out different. Each finger must comply individually. If one finger comes in contact with an object before the other one does, it must not rip the teeth off of the gears or bend any metal. When you reach down to pick up a glass of water, notice that one finger comes into contact with the glass first then stops while the other finger(s) close around the other side. This is individual compliance and is an important part of a successful gripper design.

There are several devices that can create compliance in a gripper design, the easiest being a spring. In the design below, the fingers are spring loaded in the grip direction. A cam driven by a stepper motor moves the fingers apart against the spring loading. Notice that the fingers are not rigidly connected to the motor, they are allowed to comply to an object. In this design, the force that the fingers can apply to an object is the force of the spring and is not controllable. This arrangement would not be good for gripping objects from the inside (like a donut) since doing so causes the fingers to be rigidly coupled to the motor. Other, more complicated designs, would allow both compliance and adjustable force for both inside and outside gripping actions.

The author built the gripper below using sheet metal for the base, 1/2 aluminum bar stock for the fingers and a geared Hurst stepper motor. I Hope this gets you thinking about the next task your robot can perform - human back scratching!



DPRG Robot Contest



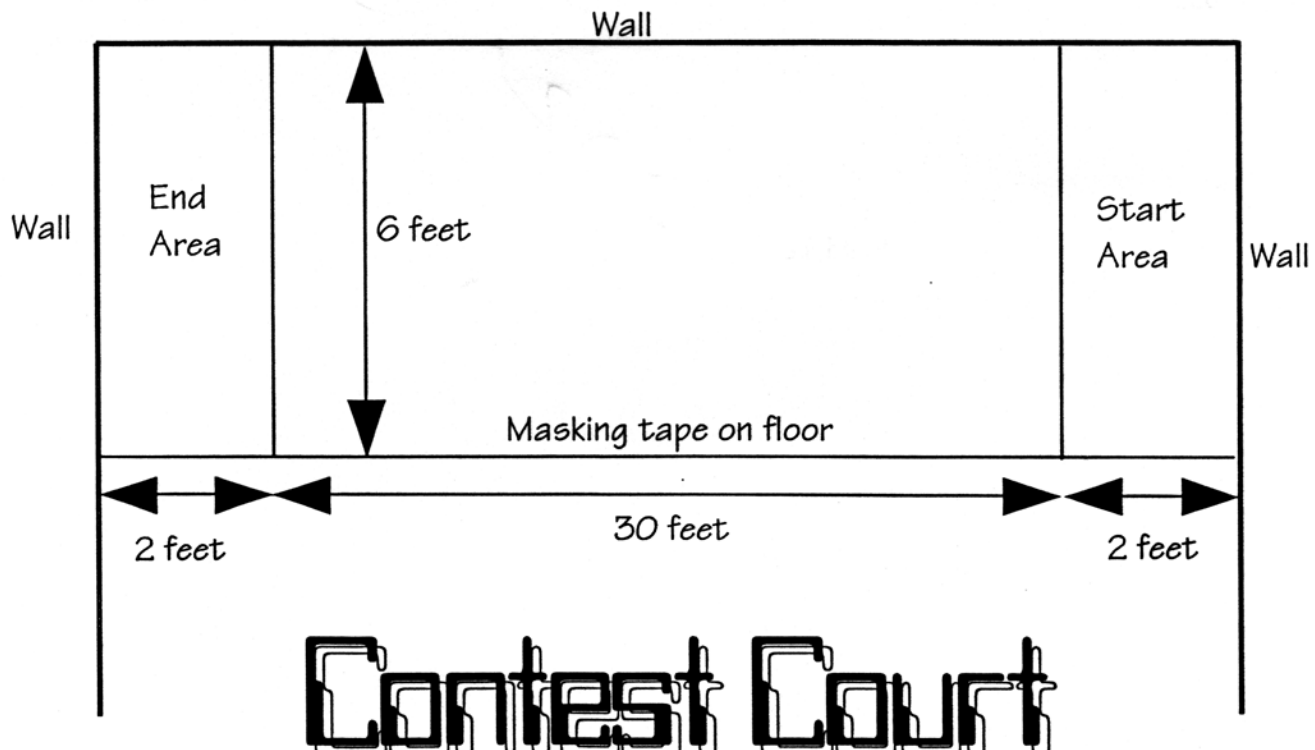
In an effort to encourage homebrew robot builders and to generate interest in personal robotics, DPRG members have decided to have a series of contests. Nothing like good old fashion competition to get a project going! To get started, we must first construct a simple set of contest goals, rules and prizes. A discussion at the May meeting generated a number of ideas. The first idea agreed upon, was to have a very simple goal for the first contest and to gradually increase the complexity for each contest. Each contest will be about 4 months apart. The following is a Preliminary description of the first contest goals, rules and prizes:

- * The first contest will be at the September DPRG meeting at the Dallas Infomart.
- * The contest entry fee is \$20.
- * The contest is free to all paid DPRG members. (hint, hint)
- * The robot must begin in the 'start area' travel to the 'end area' then turn around and come back to the start area.
- * The robot may be positioned any way within the 'start area' to begin.
- * The court is enclosed by walls on three sides and 1" masking tape on one side.
- * The robot must not travel off of the court (Completely over a line).
- * The robot must not have any human intervention except for starting. No radio controls, speech, joysticks, etc.
- * The robot may touch any wall.
- * Guide lines, tape or tracks are not acceptable.
- * The robot must be completely self contained. No cords, etc.
- * Each robot may attempt three times to accomplish the goal.
- * The robot must not damage any property or human.
- * The fastest successful robot wins the contest.
- * First Prize is a Polaroid Ultrasonic Driver Board and Transducer (Value \$50)
- * Second Prize is an AirPax linear stepper motor (Value \$25)
- * Third Prize is a 12 volt, 6 ah rechargeable battery (Value \$15)

LAST PLACE?

If your robot is unlucky enough to come in last place, don't worry, we have a special prize for you. The coveted 'Bucket of Bolts' Award will be graciously presented by the DPRG president.

Please leave any comments or suggestions to Roger Arrick on the INTEROCITOR BBS at (214) 258-1832.





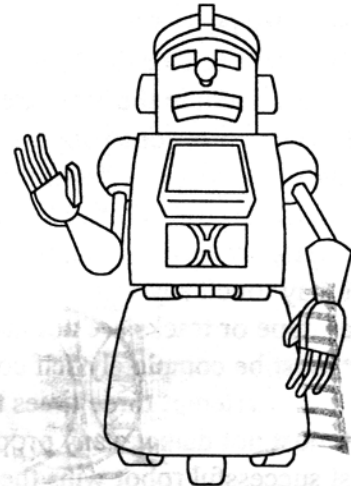
June 1993
NEWSLETTER

Inside -

- May meeting highlights***
- Preliminary Robot Contest Rules***
- A Compliant Robot Gripper***
- Miscellaneous Robotic Chit-Chat***

June Meeting:

Saturday the 5th, 1:30 PM
At the Dallas INFOMART



Dallas Personal Robotics Group
C/O Roger Arrick
P.O. Box 1626
Hurst, TX 76053

