

## MARCH 1997 ISSUE OF THE DPRG NEWSLETTER

We're marching forward, and getting so much accomplished. Interest is building by leaps and bounds. Almost every day I get a few emails from interested souls wanted to know more about the DPRG. At the last meeting, I had a flock of people come up to me and say, "Remember me? I spoke to you by email." After they told me who they were and I was able to match their face with the email, I felt it was good to meet them face to face and especially to see such a diverse group of people all interested in robotics. It looks like this infusion of people will only be growing and growing from here. Maybe we need a "Welcoming committee?" We definately want to make everyone feel welcome and to take part in our robotics quest.

The Dallas Personal Robotics Group is one of the nation's oldest special interest groups dedicated to the development and use of personal robotics and has been around since 1984.



Check out the crowd at the February meeting. Officially we had 24, and then a few more came in a little later. There were several that were out this month for various meetings. They sure missed a great meeting!

### Listserv Is Up

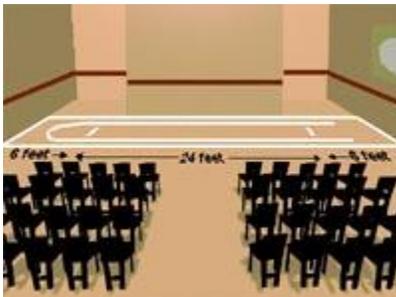
[Steve Rainwater](#) of [Network Cybernetics Corporation](#) installed the listserv software, tested it and now we can use it! (Steve is the owner of the computers that host the DPRG web page, and he is the one who sponsors the domain name for us.) A listserv is a program that broadcasts email automatically to everyone on it's list. You can find out how to subscribe to the list by viewing the online document at: <http://www.dprg.org/listserv.html>. A listserv will benefit us in that all will be able to chat about robotics without having to send email to me first. Also, this will take a great load off of me in that I won't have to keep a list of email addresses - the listserv will automatically do it. Let's give Steve a big round of applause for all of his generous donations of time and effort to make the DPRG a real success.

### DPRG's Upcoming Contest

DPRG will be having a robotics contest in May with trials to start in April. The purpose of the contest is to raise participation in the group. Hopefully this will inspire those who have half-built robots to get them built so that they can do the course. Last time (Nov 93) we had the contest many said they'd have a robot, but only 4 actually tried (although there seemed to be some dispute about that number). Roger Arrick's D-Bot won.

At the February meeting we talked about wall hugging robots could use the side wall of room 1061 with the end wall being the back wall of the room. That would allow a wall along the course and a wall at the end of the course. This is a slightly modified course from the one in the [February Newsletter](#).

The last contest we had was in November of '93. Everyone I spoke to said that we should have contests on a more regular basis (than every 3-4 years). Some mentioned that they'd like to see a contest every 3-4 months.



The simple premise for the contest is for a robot to autonomously go from the start area (on the right) to the end area (on the left), and back in the best time. Although this seems like a simple task, it's amazing how few were able to come up with a robot that could do it for the last contest. (click on the image to see a 120k animated gif of a robot running the course).

The contest area will be the length of the current room we are meeting in. The length will be roughly 36 feet total: 6 feet on each end and 24 feet in the middle. Also the contest area will be 6 feet wide. The bounds of the contest area will be marked with 1 inch masking tape. For line following robots, a 1 inch piece of masking tape 1 foot from any bounds will run the back side of the course, will have a turning radius (about 4 feet in diameter) end the end area, and

will run the front side of the course back to the start area (again 1 foot from the bounds). The tape designating the start of the end area will not interfere with the line following tape 6 inches on either side.

For the DPRG Robot Contest Rules and Regulations, see the [February newsletter](#)

## DPRG T-Shirts are in!



The DPRG T-Shirts are in and boy do they look great! They were unveiled at the meeting and everyone seemed to like them. On the front where a pocket would be is the text "DPRG" in big 2 inch letters and below that is the text "Dallas Personal Robotics Group". On the back, is the DPRG logo at the top, the Dallas Skyline at the bottom, the text "Dallas Personal Robotics Group to the Left", and a robotic arm and hand that is reaching for the Reunion Tower (a well known Dallas Landmark). The shirts come in Ashe color and we also have some in white. The T-Shirts are made of 100% Cotton. We still have about 33 T-Shirts left.

We purchased the T-Shirts from W & W Silkscreening, 2509-M Weaver Street, Fort Worth, Texas 76117, (817) 834-3331. They did a very good and professional job. The 3 colors were positioned perfectly! Some people at the DPRG group seemed sceptical before the unveiling that they wouldn't look right, but after seeing the shirts everyone was impressed.

So far, of the 24 people there, 15 shirts have already been sold. We purchased 48 T-Shirts total. In ashe color shirts we ordered 3 S, 7 M, 20 L, 10 XL, 2 XXL, 1 XXXL, in white color shirts we ordered 2 L, 2 XL, 1 XXL. We need to sell 24 of the 48 T-Shirts to break even, and we're nearly there just from the sales of the first DPRG meeting since we've received them.

If anyone wants a T-Shirt, send your check of \$15.00 plus \$4.00 for shipping and handling (\$19 total) made out to Jim Brown to: DPRG c/o Jim Brown, 2326 Phoenix, Garland, TX 75040. The sizes we have left are Adult S, M, L, and XL in Ashe color T-Shirts. We also have a few large in the white color T-Shirts.

The T-Shirts cost \$400 total to the DPRG. The breakdown is as follows: 48 T-Shirts at \$8.00 each (we saved about 50 or 75 cents a shirt by tacking the W & W Silkscreening logo to the bottom of the image), Plus \$16 for the upcharge for the shirts that were XXL and XXXL.

You'll be stylin' in your DPRG T-Shirt. Don't hesitate, send in your check today!

## Tech Tools donates products to DPRG



James Vroman, an employee of [Tech Tools](#) in Garland presented Tech Tools donations of 3 of their impressive products to DPRG. Tech Tools donated two of their 1 meg Eprom Emulators to be placed in the DPRG hardware library, and one of their 64K Eprom Emulators to be given away as a prize in the upcoming contest to be held in May. The 1 meg Eprom Emulators are valued at \$349 dollars each, and the 64K Eprom Emulator is valued at about \$250 each. This is a very sizable donation from Tech-Tools of which we are very grateful. These Eprom Emulators ease and speed up development by allowing programmers to download their data directly to the device via a PC's parallel port. To the embedded MCU board they look just like an Eprom.

Roger Arrick has a few of their products and he speaks very well of them.

I believe that Tech Tools has also donated some of their products to other Robotics Groups as well. They have a great interest in helping us robotic developers. So be sure to put in a good word to your employer about their fine products.

Tech Tools also makes other devices that are very impressive for the embedded developer. Be sure to check out their web pages of their impressive devices.

### **More Stuff from Tech Tools**

I spoke with James Vroman of Tech-Tools this week and he informed me that after negotiating with his boss for a while, he managed to score some more stuff for the DPRG!

The products that [Tech-Tools](#) will be donating was actually a prototype run of an 8051 board that had one simple mistake, but ruined the lot. The mistake seems to be a simple swapping of the 7805 chip legs so that the center ground pin was moved to the outside instead of being in the center. All ya have to be willing to do is swap the legs of the 7805, and you've got a nice 8051 board! All of you electronics gurus probably already know just how *you* would do it right?

Tech-Tools is donating 10 bare boards to the DPRG! As best as I can remember from what James told me, these boards have a place for a 7805 (pins accidentally swapped), a max232, rom, ram, and a gal. The gal is used for addressing, but it can be left out and addressing pins wired manually for a default configuration. You'll need to get the gal and program it if you wanna overlay code and ram space.

James mentioned that they have about 30 of the bad boards, and if anyone wants to buy one, he'll sell one for \$10 bucks (bare board).

We need to figure out if we wanna give them away at the next meeting, or as prizes for the contest. I thought that if we do give them away, then maybe some of the boards might be able to be used in a robot to be entered in the contest in May. Any thoughts?

James mentioned that he will bring the boards to the next meeting.

Again, great going to James and Tech-Tools for the donations! We should make good use of them as best we can.



### **Bryan Lyde brings his ROACH robot**

A visitor, [Bryan Lyde](#), who I spoke with on the email, agreed to bring in his R.O.A.C.H. (Remotely Operated Automatically Controlled Hardware). Bryan Lyde is a graduating student from DeVry, and the ROACH was one of his projects developed while attending DeVry.



The ROACH boasts several nice components all of which are controlled via a radio link back to a base station that talks to a PC. Bryan states that one of the items on the ROACH robot is a Doppler radar. This radar extends a couple of feet from the robot to detect walls and other obstacles. The radar can be configured via a pot to range from a few inches to several feet. The Doppler radar he stated broadcasts at a screaming 900ghz. He stated that the cost of the Doppler radar was a mild \$40. Also extending about 8 inches in 4 directions are bumper sensors to detect obstacles. I suppose they are in place to detect obstacles that may be invisible to the Doppler radar. To the end of the bumper sensors were flashing red LEDs for the wow effect. Attached to the front of the device was some sort of shock sensor.

The radio link to the base station was running at 300Khz (I'm not sure). The robot sat upon a base purchased from [Mondo Tronics](#) and was a two track dump truck base. Bryan removed the toy motors, and replaced them with servo motors which were modified to turn 360 degrees. On the top was a plastic five inch clear dome. The electronics consisted of an 8751 based microcontroller and radio, motor, and sensors. The base station was also 8751 based and could talk to a PC and transmit 16 radio commands to the robot.



Some of the design problems that Bryan had to work out were the two track motors. He mentioned that no matter what he did, one track would always turn a little out of sync with the other causing the robot to not track straight ahead. He mentioned that the way he fixed this problem was for the software to correct the difference by using pulse width modulation to slow one of the tracks down slightly for the correction.

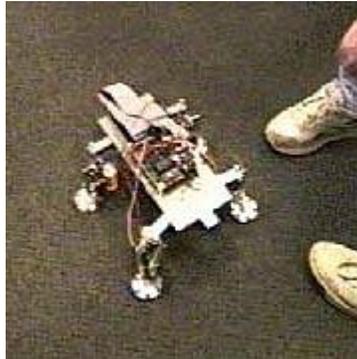


Another nice feature of the ROACH robot was that at the top was a DIP header for attaching a 8051 MCU board. This was used for development purposes and once the logic was figured out, the software was burned onto the 8751 onboard the ROBOT, and the 8051 MCU temporary board was removed.

Bryan mentioned that to see the robot work, the base unit must be attached to a PC. At least one member of the DPRG volunteered to bring a lap top to the March meeting so that we could see the robot work. Bryan states that the software which is stored on a CD-Rom is also nice to demo with great graphics of the robot.

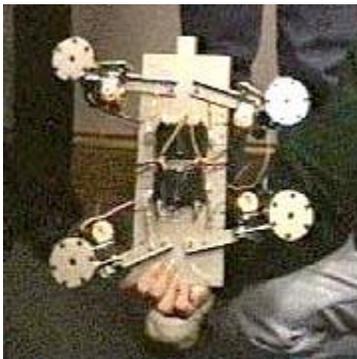
Bryan mentioned that he received sponsorship for this project to the tune of about \$1200. He mentioned that in his development they did a few of the normal things like frying a few chips and what not, and the aforementioned amount is how much their receipts came to.

## Roger Arrick brings his Walker Robot



[Roger Arrick](#) of [Arrick Robotics](#) and one of his employees, Aaron, showed off their very impressive walker robot. When Aaron casually set the robot down and turned the robot on, "Oohs and Ahhs" could be heard from around the room. The walker robot walks! It looked like something out of the movies! One leg at a time, the robot trudges forward about about one step a second. It pulls up a leg, swings it forward, and then pushes the leg down (and the body stays up). It was a most impressive display of hardware and software guiness from the Arrick robotics team.

The electronics of the walker robot appears to be 8 servos tied to an I/O controller. The servos were controlled by pulsing the milisecond pulses the servo needs through software (ie, no Scott Edwards boards here). The I/O controller is attached to a central brain. Both the I/O controller and the central brain appear to be 8051 based. There were a plethora of other chips on the board also, that I didn't investigate, but all in all it looked like a most impressive and well thought out board.



Everyone stood spellbound as the walker robot trekked across the floor. As it neared someone, they would step out of the way as if it were the king, and they would let it pass. Roger picked up his creation and turned it over for all to see the components that were attached to the bottom of the walker. On the bottom were four of the eight servos. The servos on the bottom were for pulling the legs forward and back. Roger then set it back on the floor to walk back the direction from which it came.



Aaron then threw down a catalog that was about one inch thick to demonstrate how easily the walker robot could walk over obstacles. It appeared that when Aaron threw down the book that just as it was putting down its front paw, that it was caught under the book, so it couldn't lift its leg that was stuck under the book. Someone moved the book forward a few inches, and then the walker robot had no trouble at all stepping onto and over the one inch high book.

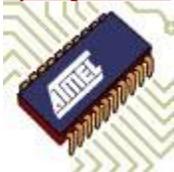
The design seems almost perfect. The batteries and four of the servos are placed on the feet. That drastically reduces the amount of weight the servos have to lift at any one time. A wise location in my opinion. The legs and body were made out of aluminum to further reduce the weight. I believe those servos can lift about 42 ounces, so that still leaves plenty of weight that can be added to the top for sensors and other items.

I heard that this will be Arrick Robotics' next robotic product, brother of the Trilobot they now sell. Although I'm sure this is a preliminary and unofficial price, I hear it'll sell for around \$1500 when all of the design decisions are worked out, and all the bells and whistles are added.

I asked Roger how well does it turn? He answered, "One step at a time."

## Review of Atmel FLASH Microcontrollers and the ATM52 programmer

By Roger Arrick



Atmel, the maker of Flash-style memory chips has used their expertise to create 8051-style microcontroller chips with on-board Flash program memory instead of the typical EPROM type.

On the surface this doesn't sound like a big deal but if you've ever developed a microcontroller project without an emulator, you know it takes endless cycles of program, burn, test, UV erase.... The longest phase of this process is the UV erase which typically takes 20-30 minutes. Because it takes that long, you end up needing to have about 10 chips so you can be working while chips are erasing. In general, erasing is a headache. UV erasing requires that the chip have a window. OTP (one time programmable) versions of microcontroller chips are exactly the same as their EPROM brothers but simply don't have the window and therefore can't be erased. Why leave off the window you ask? Well, cost. That little window adds several dollars to the cost of the part, sometimes much more. Since the Atmel flash microcontrollers don't require UV erase, you don't need the window, and guess what, they're cheaper. Another guess what, you don't need to UV erase, simply stick it in your programmer and select erase. This normally takes a few seconds.

What's the downside you say? Well, the flash parts can't be programmed with the same programmer/programming module as standard 8051 parts. Most programmers like the Needham EMP20 (\$450) already come with a module for the Atmel parts. Others may require a custom module or even new software. The cheap programmer I had (~\$100) couldn't even do this part with new software so I had to get the more expensive EMP20.

Atmel currently offers a handful of versions of Flash 8051 micros. Here's a partial list:

- AT89S51 - 80C51 with 4k flash, 128 bytes ram, 2 timers, 40 pin package.
- AT89S52 - 80C52 with 8k flash, 256 bytes ram, 3 timers, 40 pin package.
- AT89S1051 - 1k flash, 64 bytes ram, 20 pin package, 1 timer, No UART.
- AT89S2051 - 2k flash, 128 bytes ram, 2 timers, 20 pin package.

There are others, request an Atmel databook for more information.

The 20 pin parts will give any PIC micro a serious run for its money. You can use standard 8051 programming development tools. But, you do need to have a programmer that can program the special parts.

At the time I began using Atmel parts, the Needham EMP20 looked like the best bargain for a programmer but it still cost \$450. The Needham products are top-notch and not nearly as expensive as some of the other options. Their software has a huge array of supported parts. The package comes with several personality modules for different types of parts. A very well made product for sure.

Now there's several on the market that are lower-end and would be affordable to a tinkerer and made specifically for the Atmel microcontrollers. After looking around and comparing features I selected the ATM52 by MITE, a CZ company. You can find them on the web at [www.mite.cz](http://www.mite.cz). The ATM52 is designed to program the Atmel

89S51,52,2051, and 1052 only, no EPROM or standard 8051 parts can be done. This was fine for my requirements and the unit only costs about \$100.00. They sent me an order form via fax and I filled it out with a credit card #. I'm not too excited about giving my card # of the net just yet. Give it time though. The shipping charges were a whopping \$30.00 but overall this seemed like a fair deal. After about 2 weeks the unit arrived in a small cardboard box. The box contained an AC adapter, 3.5" PC diskette, serial port cable, and the board itself. The board contains a 40 pin high-quality ZIF socket, is about 4" x 5" and has 4 rubber feet on the bottom.

The first thing I noticed was the fact that the AC adapter was a strange (to me anyway) 220v European model with 2 round prongs instead of what we have here in the states. Since the voltage was 12VDC, I just found one I had and used it instead. The European model went into my junk pile to be used for future projects. The next thing I noticed was NO MANUAL. At first I thought it was missing, but now I realize that this thing is so easy to use, no manual is needed. I simply created a directory on the HD and copied the 2 files from the floppy into it. On my Windose 95 desktop, I clicked the right mouse button while pointing at an open folder, selected NEW, found the .exe file, and placed it into the folder. No problem. Clicking the ICON causes the DOS program to pop up where there are several pull down menus and a memory display. The first thing that happened was, well, nothing, then a message appeared saying that communications could not be established. After double checking the serial cable and com port #, I noticed that the power light on the board was off. After much head scratching, I noticed that the adapter needed to have the center pin minus and the outside ring positive, the exact opposite of what I expected. I clipped my AC adapter's wires and switched them. Plugged the connector back in and everything worked just fine. MITE had placed a blocking diode to protect the board in the event of such a screw-up - good going guys! Remember it costs \$30 to ship this thing. Using the software is so self-explanatory there's no need to go into it here. A small but useful on-line help file is available to answer all but the dumbest questions. All in all, I like what I got for my money and would recommend it to others tinkering around with micros. There's not too many products which cause me to realize an important lesson of life but this one did - I've got 4 power strips on my workbench and that's not enough!!!

## **The Beginnings of a Group Robot?**

Last month I reported that we might receive a wheel chair robot to be the base of a group robot. This month, I'm happy to report that we've received it! It's a little worn, but we believe that the motors are in working order. James Vroman of [Tech-Tools](#) volunteered to take it home and check it out for the group.

## **Walter Bryant Speaks**

[Walter & Bev Bryant](#)

Feb. 9 1997 Hello DPRG!!!!

Bev and I are so glad to hear that you are alive and well!!! As Jim Brown said recently in the DPRG News Letter, I happened upon the Internet address of the DPRG a short while ago and called Jim on the phone. We had lost contact with the club after we left Texas in 1990, and feared the worst for the club. We tried several times to contact the club from a distance, but failed each time. You can imagine how proud and impressed we were when we first viewed your fantastic Web Site!

Jim told me that apparently, many if not most of the early news letters and history of the first years of the DPRG have been lost. I looked through every thing we have and made copies of all that I have. I am sorry to say, I do not have but a portion of them. Stan Spielbusch was the last editor to the news letter that I knew of. He is a very thorough and detailed person and if he can locate him, I am sure he will have a copy of all of the early news letters.

Let me tell you of the first days of the DPRG. Bev and I both worked at Texas Instruments. I was a Manufacturing Engineer and Bev was working as a Software Tech, going to college at night at NTSU. I asked Bev, what am I suppose to do in the evenings while you are in class, (in addition to wash cloths, clean the house, etc., but that is another story).

Bev suggested I join a club that I was interested in. We had just purchased a kit from Heath Kit, which was a Hero I Robot and I was very interested in Robotics. Bev said, well join a club in Robotics. I said I have already looked, and there are none! She said, well start one.

We put up a one sheet flier at both of the Heath Kit stores with our names on it and a short paragraph stating that we wanted to start a robot club. We had our phone number at the bottom. (I have looked for a copy of that sheet, but I have not found one yet.) We received at least two calls; Joe Row and Rob Winingham. After speaking with both of these people, (who had both just purchased a Hero I Robot also), we decided to meet at Joe's house because we lived way out in Lewisville.

Joe fortunately knew the most about clubs because he had been in several, including president of some of them. Tentatively, we said Joe would be the acting president, Bob would be the vice president, and I would be the editor to the news letter.

We created more fliers, (I have included a copy of this one, the meeting date was Saturday, June 16, 1984), and placed them at the Heath Kit stores, Texas Instruments, and a few other places. I forget the man's name, but he was the sales man at Heath Kit that sold us the robots, he became the treasurer at the first meeting. I can not find notes of the first meeting (yet), but I think there were five or six people present.

We had a great time and I could see (I thought), that the club was going to have a great future. It did. For several years we grew constantly and did incredible things. I will not try to include them here at this time because it would take a very long time to list them all. However, if I may, I would like to write more in the future as I find the time. I am proud to say, I do have copies of many of the first news letters, not all of them, but I have included copies of all the ones I have found so far.

In addition, I have copies of most of the Hero I and Hero 2000 programs the club wrote. I will send copies of those in the near future. Further more, I have copies of many of the club's activities that I will send in the near future - maybe 20 or 30 hours worth!! Included in these programs and tapes are;

a) Joe Row's Continuous Consciousness Program, for the Hero 2000 - This is a very intricate and capable program which runs off of the built in clock. It allows the robot to tie together all it's numerous programs and to execute them, on its own, at the most logical times. This program also used a random number generator to allow the robot to act in a some what unpredictable and more interesting way, yet still perform logically.

b) An add on compass - this program I wrote. I used an oil filed compass (I still have the compass), in a small plastic box, which was read by optic fibers. I used the photo cell (I temporarily relocated from Robby's eye port) (Robby is the name of our Hero I robot.) This allows the robot to navigate, using the compass, and always know true north, within a few degrees.

c) A Home Navigation Program, for the Hero 2000 - Bev and I wrote this program. We created a path network around the entire downstairs of our home. Seldon, (the name of one of our two Hero 2000's), could navigate the entire downstairs using this node system. He could determine his exact position within less than 1/2 inch, and know his attitude or the direction he was facing, within one or two degrees. Using Joe's program, Seldon would wake up at 5:30 a.m. on Monday morning, disengage from his power supply, align himself with the wall in the Robot Room, navigate out of his room, through the foyer, into our bedroom, past the foot of the bed to Bev's side of the bed, and say; Good morning Bev, it is Monday morning at 5:32 a. m., what are your instructions?

d) A Mechanical/Optical Scanner/TV Camera, for the Hero I - (I have included print outs in the news letters I am sending.) Again I used Robby's eye port, a parabolic reflector, many soda straws, a large paper tube, and some black paint, to make a mechanical sensor. Using this crude device, Robby could distinguish between a circle, a square, and a triangle on the wall, several feet away. (It would take him up to 15 minutes to mechanically scan just one picture.)

There are many more things I would like to talk about, but I have run out of time. Ed Rivers is the only guy I recognize that is still in the club. I saw a picture of him in a recent news letter. He joined the club within a year or so of it's beginning, as I recall, and I am sure he can fill in many of the details.

Again, Bev and I are very proud of the DPRG and would like to participate from a far, if we may. Maybe we can help write programs, or anything the club might be interested in. Using a camcorder, we could copy any program and send copies of it to the club to view during a club meeting, and/or to distribute through the club library.

Thanks, Walter & Bev Bryant

**Editor's note:** I received a packet of information from Walter and Bev this week. The first three pages was the letter above, the next page was the picture you see to the right (text below), and a bunch of early newsletters. Thanks to Walter and Bev for sending us this great information.