Engineering A Light Sculpture

Guy Marsden

Guy Marsden and Milton Komisar team up to create an analog-driven program for Komisar's new kinetic color composition.

Komisar's sculpture, installed at its permanent site near Chicago.

I first met Milton Komisar in Montreal, where we were exhibiting at the annual "Images du Futur" show. I had seen his work several years before in Los Angeles and remembered being very impressed with the sophistication and degree of control he had over the dozens of colored lamps in his work. He recognized a kindred spirit in my visually choreographed musical neon artwork and we established a good rapport. When I told him I make a living as ART TEC, helping artists with engineering, he asked me to work with him on his commission for David Bermant.

Milton's earlier works were based on a modular design, using 32 small white plastic polyhedrons connected to each other by varying lengths of 1/2" clear acrylic rod. Each of these modules was illuminated from within by three lamps and by using the three primary colors, he could achieve a broad range of colors by switching them on and off. These pieces had a calligraphic quality due to the small widely spaced light sources and fine illuminated lines of acrylic. His intention for the new work was that it deal with the surface quality of broad areas of color.

The true art in Milton's work is the 20-minute long compositions in moving color that he programs for the work. It is the visual music equivalent of orchestral music in which many color themes interact continuously. The computer technology he had been using was based on binary on/off controls which precluded the ability to softly change light levels. Milton was ready to move into this softer style, and we had many long discussions about the potentials of "analog" technology and its effect on

his work. With finer control of lamp brightness the range and subtly of color would be virtually unlimited.

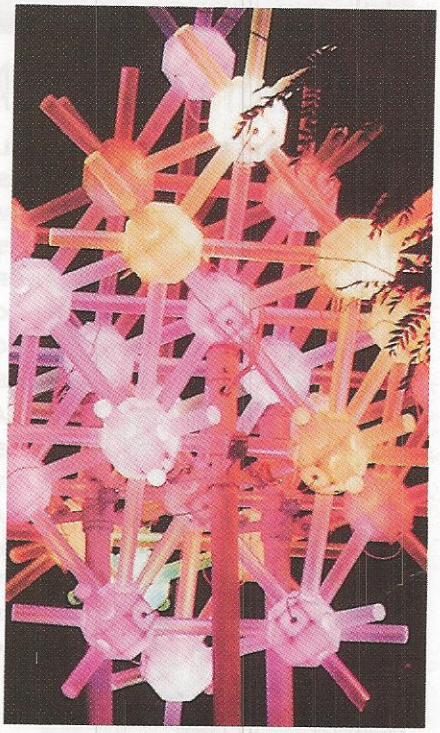
I take a synergistic approach to my business; the more I know about the client's needs, the more I am able to contribute. So when Milton told me that the bids on the moldmaking for larger modules were beyond the scope of his budget, I was able to locate a shop in Los Angeles that could do the moldmaking and production for a reasonable fee. The lamps he intended to use were 12-volt high intensity lamps, which run very hot. Again, I was able to introduce him to a company (JKL Components Corp., in California) that makes colored silicone rubber "boots" that fit over these lamps and are not affected by the heat. The primary colors they had in stock produced very nice results.

By using digital dimmer technology, he would have up to 255 brightness levels available for his lamps, with a very fine degree of control of the brightness contours for fades, etc. Since the original lamps were relatively small, they did not consume very much power and the original 12-volt power supply (which converts 120 volts AC to 12 volts DC) was no bigger than the proverbial bread box. The new lamps would draw considerably more power (about 150 amps), requiring much larger power supplies. I found that the most cost-effective types of 12-volt power supplies are made for CB and Ham radio equipment. We purchased nine 25-amp units for a generous 225 amps total. Connecting the lamps in groups would provide what engineers call a graceful failure mode, meaning that if one power supply failed it would not shut down the entire artwork. This stack of 2/3 cu. ft. power supplies also generates some heat which necessitated forced ventilation.

I decided to base the programming system on an IBM 386 clone computer that would be fast enough to keep all 96 lamps "updated" 30 times each second. If the update rate were lower, the brightness transitions would become noticeable, creating flickers in the fades. The power and speed of this computer would also be sufficient to provide Milton with a friendly programming design tool. For this I contracted my friend Paul VanCamp, an expert software developer with lots of experience with lighting control. Milton had already established his own language and conceptual tools for programming his work and he needed to apply this conceptual approach to the new work. Basically he uses a set of Boolean logical rules to control the interactions of various patterns as they affect each lamp. This system was rather simple for on/off and expanding this philosophy to varying values required some changes to his thinking. We all had lengthy discussions concerning his approach and the ways in which his existing tools could be modified to work with analog values. Ultimately Paul was able to produce an absolutely marvellous program that runs in Windows using a very friendly mouse-driven visual format. Paul's software gave Milton all the degrees of control he required, and some he hadn't considered due to the added complexities of analog interactions.

The electronic design took two phases. First I designed the system to program the work, then I built another system to operate the piece for installation. The electronic controls divide naturally into three "channels," one for each color, with 32 lamps per channel. I prototyped an interface card that plugged into the computer's internal slots—like an accessory. This card would then connect to a driver board that would control the power to the lamps. My hand-wired prototype card tested fine with miniature lamps, and I proceeded to design production circuit boards for the interface card and drivers. Three sets of each board were manufactured—one for each channel.

We discovered that when running the sculpture for 20 minutes, the hard disk was doing a great deal of work pumping out a megabyte of data to the lamps every two minutes or so. We were concerned that continuous use of the hard disk would cause a wear problem risking early failure of the computer. I designed new electronics to eliminate the computer and use programmable memory chips (EPROMs) to store the program directly on the circuit board. This approach proved to be much more cost-effective. Also, we made enough equipment to control several more works which Milton plans to produce in the next year or so.



The completed work was first shown at the Yerba Buena Center for the Arts in San Francisco from February through April. It was installed at its permanent site outside a Circuit City store at the Cermak Plaza Shopping Mall near Chicago in mid-June.

The sculpture lights up the night in various colors.

Guy Marsden lives in Santa Barbara, CA, where he creates kinetic light sculpture.