GEEK LABORATORIES

by Ilsa Shaw

RIT is brick-filled breeding ground for off-the-wall ideas and innovations. This Institute-turned-incubator births inventors of all types and interests, each of whom brings a high degree of ingenuity and technical aptitude to the table. In the spirit of all things geeky, *Reporter* recently sat down with several such inventors. Read on, and witness a sampling of the work that RIT geeks are capable of producing.

AL BILES, CREATOR OF GENJAM

Imagine, if you will, the ability to induce natural selection in live music at will. Imagine being able to improvise duets with a digital flutist, and having the power to stamp out every awful sound before it ever offends your ears. Professor Al Biles, creator of GenJam, has invented such a musical partner. GenJam, short for Genetic Jammer, is an interactive piece of software that is based on genetic algorithms and learns to play jazz solos.

Through Biles' instructions, GenJam evolves to play music which is more favorable to his own standards. These are manned through the simple tap of a keyboard letter in a console window— "G" for good, "B" for bad. To use GenJam, Biles plays something on the trumpet through a microphone. The music is first processed by a pitch-to-midi converter, and then sent to the computer. There, all of the information is mapped to a numerically-based chromosome structure. These chromosomes are mutated and played back to its creator in a "musically meaningful" and more developed way, which Biles then has the choice to accept or reject. In doing so, many different "soloists" can be created, all of which will, according to Biles, eventually be trained to play what is musically more pleasant. Each soloist, however, has a specialty when it comes to the type of jazz that suits them best, and it all depends on their "training," those small taps from the keyboard.

Biles completed the first version of GenJam in 1993, while on sabbatical. He never imagined it would ever become as large a hit as its current status seems to suggest. "I thought, 'Well, I'll go to some computer music conferences and get some papers out of it.' After I had the first version built, I started listening to it, and it really didn't sound that bad," remarked Biles, who recalls receiving a surprisingly amiable response to several on-campus performances at the time. "Over the years, my conception of it has totally evolved from a piece of technology that happens to be based on music to a musical performance system that is based on technology. And now, I think of it as a music system, not as music technology." Biles has an impressive line-up of future gigs, both scientific and recreational, at which GenJam will be demonstrated.

Aside from performances, Biles has big hopes for the future of GenJam. It has already been requested as a tool for musical education, a use he hopes to emphasize in any future developments. Although the current version of GenJam software functions relatively well for his personal use, Biles admits that before any marketing can be done, a more user-friendly interface must be designed.

Biles is frequently greeted by puzzled looks from audience members when he arrives on stage with his paraphernalia: a trumpet and laptop. It is quite difficult for him to explain the concept of GenJam after a performance. "I've played recordings for people, where they thought the flute player was the human and the trumpet player was the machine— I don't know what that says about my trumpet playing," jokes Biles. Even so, he admits to preferring this small ensemble. After all, it's less hassle than playing with other human beings, and has been tailored to match his specific tastes.

RIT MULTIDISCIPLINARY ROBOTICS CLUB, CREATOR OF OVERLORD

Over two years ago, the RIT Multidisciplinary Robotics Club (MDRC) was faced with a particularly interesting challenge: to build a completely autonomous robot that could follow GPS waypoints. This challenge was a demand of the 15th annual Intelligent Ground Vehicle Competition, held in Rochester, Michigan. It required robots to stay within two white lines while navigating through an area. MDRC President Jose Torres could only describe it as "a typical battlefield scenario," full of such obstacles as sandpits, cones, and fences.

The robot they entered in the competition, known as Overlord, included features such as a wireless emergency stop, software control, and a large, easily-accessible red button on its back (for mechanical emergency stops, per competition rules). After a six-hour drive to Michigan, the team still had quite a bit of work to do, and worked frantically throughout the night in hopes that Overlord would function smoothly during its time to show. "Our robot wasn't completely built, and we had no time to test the full system," recalled Torres.

After a few expected mechanical issues, MDRC was satisfied with the result. Overlord displayed an impressive degree of ingenuity, creativity, and innovation. "We were completely speechless,