

The Authoritative Star Raiders II

By Aric Wilmunder

In 1983 I was offered my dream job. I was a college student at USC and before the break for summer I had mailed a request to Atari to work there as an intern. I had a long list of programming credits. Growing up in the heart of Silicon Valley, I had started coding when I was 12. By the time I was 19, I was a contractor for one of the first games companies, Automated Simulations. In less than two years I had shipped the Atari versions of "Star Warrior", "Crush, Crumble & Chomp", "Temple of Apshai", "Hellfire Warrior", and "Datestones of Ryn". In addition, my boss was Anne Westfall, who with Jon Freeman wrote "Archon", and my artist was Paul Reiche, designer of the "Skylander" franchise.

When I received the acceptance letter from Atari I was ecstatic. These were the professionals, the rock stars. I envisioned game scientists in white lab coats standing behind one-way mirrors watching test subjects playing their games. I had played every arcade game, most if not all of the computer games, and this offer wasn't from just any part of Atari, I was hired to work in Atari Corporate Research. What I found instead was a pure research organization doing little game development. The staff was great, but I had envisioned working alongside someone like Flynn from the movie Tron on the next great game.

I had always been a fan of Star Raiders, and wanted to understand how it had been done. I asked around, and someone gave me an article about an algorithm for rotating points around a center using only addition and subtraction. In my evenings, I started experimenting with moving stars around the screen, and after some effort I implemented my own version of the first-person star field used in Star Raiders. Next I needed a space ship so I set out to develop a system to do vector or line-bases ships. In addition I wrote a demo of a rotating planet that I could scale up with no decrease in frame rate.

I met other programmers at Atari and we would exchange demos, and a manager in Atari Coin-Op contacted me and asked if I wanted to put these together into a game. Atari was split into different divisions, with the Consumer Electronics Division focusing on consoles, Home Computer on the Atari 800 line, and Coin-Op focused on the arcades. This manager had a position in Coin-Op, but a charter to develop titles across all platforms. I had finished up my project in Research and my girlfriend was finishing off her bachelor's degree. We had planned to travel to Europe for six weeks, so I accepted the position contingent on being able to take the trip. My new manager agreed and told me he wanted a sequel to Star Raiders, and so in the few days before I left, I sat down and began writing the design document for Star Raiders II. As I was preparing to leave,

my boss mentioned that while I was away he would be hiring another programmer to begin working on the project.

This hung over me throughout most of the trip to Europe. I had written a foundation of code from high-speed pixel routines and line draws, through the 3D routines needed to move stars and ships. How was someone just going to walk in and do anything productive? When I returned to Atari, my fears were realized as the engineer had taken a tentative look at my code, scratched his head, and decided to write something new. The engineer was very talented and had worked previously with my boss, so I had to be very tactful, and after a few weeks of trying to make it work we all agreed that it was best to return to my original code and design. Around this time, Atari Marketing had acquired the rights to “The Last Starfighter” movie, convinced that it was the next Star Wars, and wanted a coin-op arcade product to tie in. That project needed an experienced engineer, and my co-worker was very interested in the project, so we met with our boss and split up the team. Little did I know how much that marketing decision would affect me just a few months later.

Working in Coin-Op was my vision of Heaven. Coin-Op liked to call itself the ‘Real’ Atari. I found myself among the most creative and talented engineers and designers on the planet. Across from my office was the team that developed the “Star Wars Arcade” game. Down the hall, “Marble Madness” was under development. There was a lab devoted just to developing sit-down simulators. You had to be careful since some of these machines spun 360-degrees and would knock you flat if you didn’t watch out. We toured the manufacturing warehouse filled with hundreds of identical arcade machines lined up ready to ship out. I was like a roadie on tour with my favorite band. My boss’s boss had developed “Tank” and “Asteroids”. At lunch I was playing volleyball with the designers of “Centipede” and “Missile Command”. Clint Eastwood stopped by during the development of “Firefox”. I met the developers from Lucasfilm Games while they were working on the prototypes of “Ballblazer” and “Rescue on Fractalus”. This was my dream finally come true.

I hunkered down and focused on developing a new version of Star Raiders that stayed true to the original. My boss tracked down a copy of the source code to the original game, but by this point I had already developed solutions to the majority of the technical issues. The best guide for me was the game itself and the high standards that it set. In the original Star Raiders, everything just worked perfectly, the way it should.

Some compared the strategic part of Star Raiders to “Trek”, the Basic computer game where the Enterprise hunted down a force of Klingons. This was convenient since when I was 15, I had typed in a version of the game onto my school’s HP-2000 computer. My father was an engineer at Stanford and he found a broken Hayes modem that he got working, and one of the early ‘intelligent’ monitors. By intelligent, you could send it commands to move the cursor different places on the screen. At night, the school didn’t use the computer, so in effect I had my own personal mainframe. My father tracked down a manual and let me loose. Over a matter of months, I had rewritten Trek to take

full advantage of the display monitor, and converted it from a turn-based game into a near real-time strategic space game.

Other forms of inspiration came from the nights in high school when my friends and I would go bowling over at the Tressidor Student Union on the Stanford campus. A group of Stanford Grads had taken a PDP-11 computer and built one of the first Coin-Op games, "Space War". This was a vector-based top-view multi-player game, imagine "Asteroids" with two ships on the screen. There were lots of control options, the ability to hyperwarp, and mostly it inspired me to want to make great games.

Well I had taken up a significant challenge. Developing a sequel to Star Raiders was no easy task. The team developing the Star Wars Arcade game was now working on Empire, and after seeing the flyover with the Imperial Walkers, I decided that I wanted to introduce the ability to fly over terrain. To do so, I needed to be able to display planets and fly down to their surface. Based on my experience with 'Trek', I also wanted a much more dynamic galactic chart, where units could move freely over the map.

Work progressed at a good clip and I was focused on bringing all of the parts together, but I was so focused that I hadn't been watching what was going on in the rest of the company. When I joined Atari, there were over 8,000 employees. With the poor sales and products like ET, costs were being cut and staff was being let go. Over time, it began to feel like you were working in a minefield. You would come in in the morning and someone would be walking down the halls letting you know that 'Charlie' was gone. I would try to keep my head down and focus on the project, since sticking your head out seemed like a way to draw attention to yourself. I was a few months from release when completely out of left field I got a terrible shock. Marketing released Star Raiders II.

At first, this made no sense whatsoever. I wasn't aware of any other teams working on a sequel, and eventually the pieces began to fit together. Marketing had paid a small fortune for the rights to "The Last Starfighter". A team of 4-5 engineers and artists had been formed to create a game based on the license. The movie had been released to mostly unfavorable reviews, and it wasn't the hit that they had anticipated. Faced with releasing the game under the Starfighter license, they decided to punt and rebranded the game as Star Raiders II, leaving most of the game's tie-ins with the movie intact. I didn't have much time to worry about what to do next, since while I was at Atari, the overall employee count had whittled down to barely 500, and I found myself with a game just a few months from release, and holding a layoff notice.

Still, I wasn't ready to give up on Star Raiders II, and at this same time, the Tramiel brothers, the sons of the founder of Commodore, had purchased what was left of the Atari Consumer Division and renamed it Atari Corp. A few weeks after leaving Atari, I managed to arrange a meeting with the Tramiels. I showed them the work that I had done, and asked for their permission to continue to develop the product. They agreed, and I started by purchasing a 6mb Corvus hard drive, the development environment that I had used. I then worked for another month on my own dime. I set up a second

meeting and showed the progress and got positive feedback and I asked if we could get an agreement in writing for the work I was doing. At this point it became clear that they would be happy for me to finish the game, but they weren't willing to make any commitment.

I grew very discouraged, but it was at this time that I received a call from Lucasfilm Games in Marin. We had stayed in touch after our meetings back at Atari and they were aware of my work on 3D first-person games. I was asked if I could meet with them and give a dog-and-pony show of my work. I brought a box of floppies of the different demos that I had worked on, boxes from games I had shipped, and concluded the presentation by inserting a cartridge version of Star Raiders II that I had been working on. Everyone seemed impressed and I was thrilled to have been invited to visit their facility.

A few weeks later I received a call and was asked if I was interested in working for George Lucas. Among my classes at USC, I had studied Cinema and so this wasn't a very difficult decision. I asked when they wanted me to come up for an interview, and to my surprise the answer was that they had interviewed me during my visit, they just hadn't told me.

I packed up my Atari 800 computer along with Star Raiders II into a box I kept in the garage for the next 29 years, not forgotten, but I was never quite sure what to do with it. At the end of July in 2013, I saw a posting from a friend on Facebook about "Lost Levels". I sent the webmaster, Frank Cifaldi, an email and to my surprise he and I had met a few months earlier. I was speaking on a panel at PayPal, and he had brought a copy of one of my earlier games to sign. After the exchange of a few emails, we set a date in August when he and his boss, Mike Mika, could meet me at their office. I arrived with two boxes of disks and my old Corvus drive and we spent the next ten hours going through 29-year-old documents and disks. After a few minutes of unpacking and getting equipment ready, I pulled out the box with the label 'SRII'. Much to our pleasure, the disk spun up, the computer began to load, and a game that I had shown only once in all that time booted perfectly and began to run.

So where to go from here? My first regret is that the game was never truly finished. I was working on new spaceships and enemy combat AI when I packed everything up. I also wanted to do a better job in the opening. This was a sequel to Star Raiders and I wanted the story to be that Earth had defeated the Zylons during the first war. A truce was made and a neutral zone between the two races was developed. The opening of the sequel was the beginning of the second Zylon war showing their units as they entered Human space. A new Star Fighter was built, and you are sent out on the newly commissioned ship. Well, that was the plan, but the current intro doesn't make it as clear to the player as it should be.

Improving the AI was the other important task. There is an aspect to the original Star Raiders that is either overlooked or not fully understood. You, the player, are actually the enemy AI. In the three-dimensional model used in the game, you are looking

forward through a cube of space and everything is moving from the front to the back through the cube. When a star hits the back of the cube, it is regenerated as a new star on the front. To move the stars, all you have to do is add the speed of the ship to the star's position, and you appear to move forward. The question then is how do you rotate stars, and the answer to that came from the article I had been given months before. To move a star around a center point, all you need to do is to add a fraction of the Y to the X position, and add a fraction of the X position to the Y. That point will rotate about you in a circle, and over time it will degrade, but for short durations this works quite effectively. To rotate the stars in your cube of space, you just do some very simple addition or subtraction. Now here's the trick about the enemy AI.

In the original Star Raiders, the enemy torpedoes always move straight back through the cube. The enemy ships fly in a very simple pattern and release torpedoes on a regular interval, but most of these torpedoes simply fly above or below you and miss you entirely. Here is where you become your own enemy. By moving the joystick and placing the enemy between the crosshairs, you have just centered the ship along the center axis of the cube. Now, when the enemy releases a torpedo, it will travel directly down that path towards your ship. You can cause it to miss by turning away, but the better you are at targeting the enemy, the more accurately his torpedoes will come in directly down your gullet.

I did not fully understand this when I redesigned the Star Raiders II weapons system to use a cursor to fire on the enemies. By using a cursor, you were able to target the enemy ships without putting your own ship in harm's way. I was realizing my mistake and had analyzed the problem, but hadn't come up with an alternate approach before the project ended. One option would have been to lock the lasers on the center of the screen and force you to rotate the ship to aim. I didn't have time to try out this alternative.

One of the current ideas is to release not only the game, but to release all of the source code as well. I wanted to have a variety of enemy craft, and more complex AI's to accompany each type of ship. Perhaps someone will model and write these.

If you do decide to review the game, I only ask that you view the game from the technological perspective of 1984, and that you remember that it never had the opportunity to go through a testing and feedback phase. Other than that, enjoy this piece of gaming history. Sorry that you had to wait so long.

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