TIMOTHY HAYS

Associate Professor of Computer Science and Software Development

Developer: Advanced Artificial Intelligence Programming, Mobile Apps:

Over 40 years experience as a developer on over 100 products/projects in the areas of Medical Devices, Science simulations, Digital Signal Processing (DSP), Spectral-analysis/Spectroscopy/Spectrograms, artificial intelligence (ai), entertainment, education, business training, biotech, and defense, published senior member of the IEEE with 2 patents awarded, both relating to AI design and display of intelligent characters in games.

Top Skills:

Unity3D Pro Applications development, Self-Adaptive Artificial Intelligence (AI), Evolutionary Computation (EC), Artificial Object Neural Networks (NN), Genetic Algorithms, Intelligent Agents, Networked Distributed Computing, Fuzzy Logic, Adaptive Machine Learning, Pattern Recognition, Predictive Analytics, Signal Processing, Sensor Processing (spectral, imaging, sound), Data Mining, Visual Studio .NET with C#/C/C++/ASP, MonoDevelop, WebGL, HTML5 with CSS & JavaScript, WebServices (server-side request/response 24/7 processing), Game Design, Mobile Applications, Virtual Reality (HTC Vive), Augmented Reality (Android), Real-Time simulations with dynamic performance balancing, Adaptive Learning, Competency-Based Learning, Educational Assessment, SCORM, Moodle LMS, Embedded Systems, Adobe Creative Cloud (suite), Video Editing, Sony Vegas Video Pro editing, Custom codecs & Video Compression, Spectroscopy analysis with curve-fitting & pattern matching

Key Abilities:

– Applications R&D on various platforms: Medical Device development, Simulations, Games, etc.

– Unity3d product development for WebGL, iPhone/iPad, Android, Windows, Mac

– Creating real-time 3D games, science, and military simulations

– Advanced data processing/mining with adaptive machine learning (EC)

– Writing Product Design Specification Documents & Technical Designs, technical writer and reviewer

– Experienced Filmographer, from capture to deployment on various media

Experienced in C#, C/C++, JavaScript, ASP, .NET, PHP, AS3, assembly, and more on:

– All Windows platforms including Mobile, Apple iOS for iPhones & iPads, Android Phones & Tablets, in-browser Web apps including WebGL/HTML5 with video, web-services (Windows web-servers), Sony PlayStation, various game consoles.

Excel in Programming:

– Unity3D apps, plus I own my own Pro license for iOS, Android, Web, Mac & Windows

– Multi-player/agent ai such as in real-time Sports/Military/Combat Simulations

– Science and entertainment applications using advanced Computational Intelligence methods

– Medical Applications for tablets or computers with custom device communications & processing

November 2019 to Present: **Cerenetex, Inc.**, Newport Beach, CA

Development of CereView Stroke system, enabling LVO ischemic stroke detection non-invasive medical device, hardware, and software. Methods include volumetric DICOM (MRI file) viewer indicating the position of known LVO and using a non-invasive device with multiple sensors to determine position based on DSP pattern-matching and further machine-learning to refine the new algorithm to quickly determine LVO and relative position of such, saving time to treatment. Additionally, post-stent patients can be monitored for the relative assessment of the condition of turbulent flow during the healing process.

November 2018 to October 2019: **Xinetix, Inc. – Equinox**

Medical device software development for non-invasive treatment of Glaucoma using negative pressure. Required custom USB/COM-port communications with the device to Windows computers with support for fetching all treatment history data and device programming, graphical (GUI) features as per ongoing R&D.

April 2017 to August 2018: **Headsense Medical, Inc. – Cranial Waves, Inc.**

R&D Medical devices for non-invasive neural assessment. Responsible for device software (Android tablet & Windows): signal processing, machine learning, pattern recognition, big data collection & processing on custom web service running in Cloud, with the app running on Windows and Android devices with web app output viewable in WebGL compatible browsers.

Sept 2014 to Mar 2017: **LuminousOrtho LLC**, Pasadena CA,

Position: Data Scientist, Medical Device Computational Imaging, Unity3D Software Developer

Performed software development for the medical devices the company has under development. The primary focus was software for imaging from custom Endoscopes, spectral analysis. The initial effort was for me to write many real-time video and sensor filters that would drastically improve the quality of the data compared to the raw input and display the results in a before-and-after window for comparison in real-time, with support for stereo-imager (3D.) This project was a success and the company is awaiting funding in order to continue onto the next computational imaging and spectroscopy project(s) assuming that the funding comes through. I also performed the initial patent searches and contributed to the efforts on several patent filings.

April 2015 to August 2017: **Interplay Learning**

Four (4) products were completed in two years. Performed software development on learning simulation platform "Comptia" designed to train network administrators on how to determine faults and fix wireless and wired system faults using a 3D simulated environment. Completed two products for WebGL Platform: "HVAC 3.0" training simulation designed to train technicians on how to determine problems and perform appropriate repairs on Heating and Air Conditioning systems including HeatPumps with an addition version specifically for the client Carrier for their series of HeatPumps with intelligent logic. Work performed using the Unity3D development software for browsers supporting WebGL and supported mobile devices (Android and iPads.)

April 2014 to July 2014: **Animus Interactive**, New York,

Position: Data Scientist, Artificial Intelligence, Unity3D Software Developer

Performed work on the MMORPG "Avalon Lords", specifically the Artificial Intelligence (AI) which ran on the client. I designed and wrote the AI system that functioned using several Levels Of Detail (LODs) such that the highest AI-LOD would affect the world-level with regard to the movement of armies, then the medium-level AI-LOD would perform actions on squads within the armies, and the low-level AI-LOD would perform functions for individual soldier units. The system was starting to really come together and work well when the company ran out of money.

April 2005 to April 2009: IEEE Senior Member, New York:

From IEEE Officers and Board of Directors, in recognition for contributions, Timothy J. Hays has been selected for the grade of Senior Member. Contributed as a subject matter expert to the review process of IEEE paper submissions. Examples: IEEE 2005 Symposium on Computational Intelligence & Games, Proceedings of IEEE, Proceedings of 2004 IEEE Congress on Evolutionary Computation, IEEE Press.

March 2000 to Jan 2014: **Natural Selection, Inc.** (NSI) 5910 Pacific Center Blvd #315, San Diego, CA 92121 (866) 395-8798, also includes sister company **Digenetics, Inc.** which was the game's publisher

Position: Senior Staff Scientist II, Cognitive Scientist, Software Developer

Working well over a decade as a cognitive scientist, "Hays TJ" as a published Senior Member of the IEEE, gained recognition in the science community as a specialist on advanced artificial intelligence methods, reviewing papers as a subject matter expert, focusing on Evolutionary Computation, artificial object Neural Networks, Agents and other AI methods. Tim worked on the application of automated evolved pattern recognition tables & object neural networks to improve machine learning methods for military simulations (Departments Of Defense DOD, National Institutes of Health NIH, National Science Foundation NSF) and commercial software products with examples: *Evolutionary Checkers Starring Blondie24* (Digenetics, 2001) and *Chess with an Attitude!* (Digenetics, 2003). Tim Hays has two patents awarded (1: Video Game Characters have Evolved Traits), (2: Method for presenting a virtual reality environment for an interaction), both relating to the design and display of intelligent characters in games. Many projects were covered under non-disclosure and "clearance" for military projects of which Tim Hays is not allowed to discuss specifics of these projects. However, the projects which Tim worked on that have been cleared to discuss in terms of general methods are self-adaptive AI used for several military simulations, pattern recognition for discovery of miRNA coding sequences for possible patent applications, "Connect™" NN Tools, Traveling Salesman Problem game, graphical interface and display (GUI) custom hardware-interface and multiple real-time sensor signal processing for gas-chromatograph mass-spectrometer (mini-gc) performed on 1Ghz Windows notebooks and Windows Phone (mobile), radioactivity alarm system, hazardous chemical alarm system, pattern recognition for bio-hazards, pattern recognition and GPS location way-point optimization for vehicle time-to-target and fuel utilization, implementation of military Course Of Action (COA) expert system with self-adaptive (evolved) eCOA, adaptive training simulation with dynamic individual performance assessment and group performance assessment, an adaptation of genetic programming (replacing NN) using EC with the focus being to perform adaptive ai in real-time on relatively slow CPUs, NIH Small Business Improvement Research grant (SBIR) funded Phase I/II self-adaptive sound-masks for Tinnitus with human clinical trials, NSF SBIR funded Phase I/II Software Development Kit (SDK) for NN & EC with scalable CPU-utilization through network distributed computing and stand-alone support for slow systems including mobile (to support low CPU-load) for both real-time simulations and offline continuous adaptive evolution which could run for weeks or months (24/7.) Most software was developed for Windows using Visual Studio (various versions), primarily in C#, ASP, or C/C++. However, some development was for Linux and one variant also used Python. Also performed

technical writing for the "open calls" for grant submissions of which we were awarded several over the years. I developed a couple of more game applications for the sister company Digenetics: "My Forever Puppy" and "Ultimate Soccer Boss". Both systems required me to develop a server-based ASP/C#/.NET web-service, running in the cloud on Windows servers, which listened for a service call and routed the commands and data from the game running in the user's browser for AI processing to be performed using EC on the server, which would then update a SQL database that could be queried by the game program running on the user's browser to fetch the latest evolved data for that character. To clarify: in this manner, all the AI processing was done in the cloud and the user's game running in a browser would merely send the latest performance data to the cloud and then receive the updated data for the next game. This was done for several reasons: increase real-time performance on slower mobile devices, have absolute control over user-matchups for the soccer game, make sure the users were not hacking any data, and to monitor the continual evolution of the data that was constantly adapting 24/7.

2011-2014 UQ, Inc. San Francisco, CA

Position: Unity Software Developer

I was involved in all aspects of "Red's Adventure", a multiplayer 3D adventure game for child development that has several scenes and many characters, for iPads, Androids, and HTML5-compatible browsers. The system used SmartFoxServer 2X to allow for parents to join in the game-play with the child and offer hints while being able to follow along. As the first programmer on the project, I created all scenes and developed the character animation system for all 3D character locomotion and animations featuring motion-capture (mocap) data (BVH files and Autodesk MotionBuilder compatible bipeds) including placeholder characters, and continued to work with closely with all artists to develop actual characters used in the game and all other elements, developed using the Unity3D platform of which Tim has his own Pro license for iOS, Android, Mac, Windows, and browsers. I also developed the HTML5 browser interface and HTML5 tutorial.

2012-2013 Eco Building Products, Inc (ECOB), Vista CA

Position: Executive Producer, Web developer, Filmographer, video editing, marketing

I developed the corporate online presence through the creation of several websites and content for such. Institute of Defensive Building Practices (IDBP.org), ECOBUniversity.com, created ALL videos on ECOBMEDIA.net with the exception of a couple of news clips, developed the science behind the story of the product(s) so that a non-chemist could understand the benefits. I developed about 86 videos on company YouTube channels. Developed two broadcast television commercials (visit: LittleStud.com, FireBreak.com).

2009-2012 University of California San Diego (UCSD), San Diego, CA

Position: Subject matter expert, consultant to departments: Artificial Intelligence, Gaming, Robotics

I was brought in to consult on software methods to the above mention departments. The most interesting thing is that the Gaming department was actually using the Unity3D platform for game development and I was immediately able to participate in helping students with their projects. Also, the robotics department was designing toys for commercialization with a specific company in Japan and wanted to control their "Arduino" boards on the robots with mobile devices using wireless "Bluetooth" and I was able to assist in getting them up and running also using the Unity3D software development platform and Android phones as the device controls (Apple requires iPhone apps to be in the App Store, but not Android which is easy to create an '.APK' installation file.)

2007-2008 Hard Licks Sports Games, LLC., San Diego

Position: Unity Software Developer

I was the only programmer working with one artist, developing all the AI and the elements for a multiplayer Football game for iPhones, iPads, Android Tablets and Phones, Mac, Windows, and web browsers. The AI was mostly complete and you could play through an entire game, but the artist quit when the company ran out of money, prior to completing all the animations. So, the demo looks good (click link for Unity Football Browser Demo, use spacebar to hike & throw, arrows when moving) with exception of the animation problems. Keep in mind that Football games require a large team and I was the only programmer.

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2000-2014 United States Online University (USOU.edu), Institute of Training and Development (ITD)

Position: Software Developer, curriculum content developer/writer

Competency-based learning platform development for CD/DVD/Web/iPad/iPhone/Android Tablets and Phones. I developed curriculum (courseware) for online accredited University including MBA programs with examples: "Organizing for Results", "Planning", "Human Resources (HR)", Handling Objections Strategy Training (HOST 1 & 2), Handling Objections Response Training (HORT 1 & 2) and various training and assessment programs. I developed the Sales Training Assessment Review (STAR) and Sales Organization Assessment Review (SOAR) programs. The most recent product "Performance Simulator", I developed as an HTML5 app for iPads, which means that it functions without requiring it to be in the Apple App Store, was SCORM compliant, and also functions on Android Tablets and HTML5 compatible web-browsers on other platforms. Simulator for BASF (Flash version, enter any number to start). I also performed website development and Flash animation. Started the "Job Contender" project of which the company is still looking for funding.

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Jan-Feb 2000: **Paramount Pictures** & **Interplay**:

Position: Software Developer

"**The Making of Star Trek Klingon Academy**" for PC CD-ROM, shipped

Dec 1998 to Dec 1999: **Shiny Entertainment**, 1088 N.Coast Hwy., Laguna Beach CA 92651 (949)494-0772

Position: Contracted Computer Programmer

Completed work on the **Sony Playstation** version of the **'R/C Stunt Copter'** game. The primary focus is the entire front-end, including 3D animated menus, plus 2-player gameplay, multi-controller support (including 3D ASCII 'ORB'), PAL support, foreign language versions, physics adjustments, and display engine optimizations. Also worked on character-interaction AI for the PC game **'Messiah'** using **Visual Studio** 6.0 (with **DirectX** and **Glide** support). Finished **"The Making of Messiah"** CD-ROM. Three products shipped.

Mar 1998 to Dec 1998: **Hyperbole Studios**, 2225 Fourth Ave, Seattle, WA 98121

Position: Contracted Computer Lead-Programmer/Producer

Worked on creating the **Sony Playstation** version of the **'X-Files'** game, which requires 4 CD-ROMs (shipped.) Development was done on an IBM-PC in Win'95 using **Visual Studio** (IDE v5.0) and SourceSafe. I also wrote several tools for this product, which ran on the IBM-PC. Some tools were 'windowed' and some ran within a Dos window. This project allowed me to get familiar with programming **movie playing** using **QuickTime 3.0** and the new **Sorensen codec**.

Mar 1997 to Feb 1998: **Savvy Moon Studios**, 8880 Rio San Diego Dr, San Diego 92108

Position: Contracted Computer Programmer/Game Designer/Producer

Worked on creating networked multi-player game logic used in the core of **several proprietary multi-player gaming engines**. Researched, designed, documented, and created a core wagering system to be used **on Web-based gaming systems**. Primary project development was done using **Visual C/C++** (v5.0). The product was a **Hybrid CD-ROM** with **Web-connected PC** running**Win'95/WinNT** using **OpenGL, DirectDraw/DirectX** (v5) **and Fastgraph APIs**. Researched **DVD Movie-Game** & **DVD-ROM**game development and completed several product designs and technical designs (TDRs) for both.

<u>Nov 1996 to Mar 1997:</u> **Studio Arts Multimedia**, 2236 Rutherford Rd, Carlsbad 92008

Position: Contracted Computer Programmer/Game Designer/Producer

Worked on creating "**Bradshaw Football**" based on the 4-time winning SuperBowl quarterback Terry Bradshaw. This game was designed for **IBM-PC CD-ROM** running <u>Win'95/WinNT</u> in <u>full-screen</u> "<u>Direct-Draw</u>" mode graphics. I created my <u>own 3D texture-mapped display engine</u> for the entire game. I wrote the Design document and TDR (Technical Design), programmed the artificial-intelligence (AI) and physical-model engine to complete the entire 'core' game. I used **Visual C/C++** (v4.2) and **Watcom C/C++** (v10.6). Only one other programmer was involved in the project for the 'menu' sequences leading up to the game. Also, I spent 3 months working on the **Flight Simulator "Skies A Fire"**. I completed the flight-sim Design document & TDR and completed a display driver which included 3D texture-mapped quad-polygon models created on the SGI using Wavefront's RTG Game Export Tool software. I **programmed all of the in-house tools** (sprite-cutters, 3D polygon parsers, texture-to-poly matcher, etc.) using **Watcom C/C++** and was the **Producer** on my own projects. Created a "picture-warping" system that displayed the 360-degree picture with a texture-warping technique that simulated the optical effect of seeing what a camera would see if it was spinning around in 3D space. All of the code was co-owned. I left when Studio Arts went insolvent.

<u>Aug 1995 to Mar 1996:</u> **New Level Software** for publisher **Panasonic**

Position: Contracted Computer Programmer through New Level Software, San Diego

Worked on a conversion of the game "**Ultimate Mortal Kombat**", to be published by **Panasonic,** to the **3DO PlayStation**. The project was a conversion from code and artwork concurrently under development for the **Sony Playstation** (**PSX**) to the **3DO platform**. I used **Watcom C/C++**, **CodeWarrior C/C++**,**MPW C/C++** and **GNU C**. The project was coming-along and shown at E3 in Los Angeles in March when Panasonic decided to drop further development since they had made the corporate decision that no more new products will be marketed for the 3DO PlayStation.

<u>Feb 1995-Sep 1995:</u> **Spectacular Games for Sega of America**, Redwood City, CA

<u>(Software Developer/Publisher)</u>

Position: Contracted Computer Programmer

Worked on creating the following **Sega Saturn** CD-ROM and **Sega 32x (Mars)** high-profile Cartridge games to be published by Sega of America:

NFL Football '96   (**Sega Saturn, Sega 32x**)

NBA Basketball '96   (**Sega 32x**)

These two titles used extensive 3D graphics, texture-mapped scrolling backgrounds, 3D scaling texture-mapped software sprite drivers, etc., all of which used my pre-existing set of 3D drivers in the SH2 assembly language. Both of these 32X projects were canceled (when 70% were completed) as Sega decided to concentrate all efforts on Saturn development. I received a **Sega Saturn** development system and learned the tools and procedures for Saturn development while developing a 3D texture-mapped Football field display driver. I used GNU C for development and **Watcom C/C++** for the creation of my own tools. Sega offered me the project NFL Football '97 for the Sega Saturn which I turned down in lieu of a short-term project with Panasonic and a long-term project with Studio Arts.

Oct 1994-Jan 1995: **Western Technologies**, 5301 Beethoven St., Culver City, CA 90066 (Software & Hardware Developer/Publisher)

Position: Contracted Computer Programmer

Worked on creating a 3D graphics library system for the in-house programmers to create 3D effects on any platform using 'C' & assembly. The primary target platform was **IBM-PC CD-ROM** (using **Watcom C/C++** and Fastgraph), the secondary target was the **Sony Playstation**(**PSX**). The idea was to take the code produced & make modifications for other target systems also using ANSI 'C' (GNU C) & assembly (where needed for speed). This system used my pre-existing 3D graphics drivers. I made customized versions of all routines for each target product with co-ownership of all code in mind. The run-time library areas I wrote were: 'Doom-style' 3D projection system, texture-mapped scrolling fields (backgrounds), tile-mapped rotating textures, scaling images, 3D sprites (with tools), warped 3D-quad-textures and 3D projection & placement of scaled texture-mapped images in camera-based space where the camera has all 6 degrees of freedom of movement. All of this code is available for use on other products. Also, created several graphic driver demos on the **Sega Genesis** system to show to clients in an attempt to publish their licensed ideas, such as Disney's "Goof-troop" basketball which used a 3D rendered model of Goofy to play basketball in a rotating 3D arena. The code was produced in Watcom C and 68000 assembly language.

Apr 1994-Sept 1994: **GTE Interactive Media**, 2385 Camino Vida Roble, Carlsbad, CA 92121 (Software Developer/Publisher)

Position: Contracted Computer Programmer

Worked on creating the **Sega Genesis** Cartridge game "Blades", roller-blade street hockey. Also, I worked on co-owned 3D tools that allowed Silicon Graphics artwork or '3D Studio' art (DXF files) to be loaded & displayed in real-time 3D on the **IBM PC**. I also did some initial **Sony Playstation** (PSX) tools (pre-batching graphics), code conversion, and creation of their run-time libraries. The code was produced in Borland C, Watcom C, GNU C, and 68000 assembly languages.

<u>Jan 1994-Apr 1994:</u> **Sony Imagesoft**, 4045 Sorrento Valley Blvd., San Diego, CA 92121
<u>(Software Publisher)</u>

Position: Computer Programmer, Employee

Was involved in various code modules for the following games released by Sony:

NFL GAMEDAY (Football)   (**Sony Playstation-PSX**, my 3D drivers)

Sony ESPN NHL Hockey   (**Sony Playstation-PSX**, **Sega** Genesis)

Sony ESPN 2-on-2 NBA Basketball   (**Sega & Sega CD**, used my 3D drivers)

Sony ESPN Baseball   (**Sega** Genesis)

Worked on the football engine which eventually became the highly successful Sony
Playstation product '**NFL Gameday**. I created Sony's **3D graphics library** & 2D display
drivers, some of which are still being used today. The code produced was for **Sony PSX** in
'C' and **Sega Genesis** in 68000 assemblies and all of it is co-owned. Also worked with
Sony to iron out the bugs in the original development software/firmware for the **Sony
Playstation** (GNU 'C').

<u>1990-1993:</u> **Park Place Productions**, 5421 Avenida Encinas, Carlsbad, CA 92008
<u>(Developer)</u>

Position: Senior Computer Programmer, Employee

Created and/or assisted in creating the following games:

Muhammad Ali Boxing   (**Sega** Genesis, used my 3D drivers)

Dick Vitale NBA Basketball   (**Sega** Genesis, used my 3D drivers)

Acclaim Quarterback Club NFL Football   (**Sega** Genesis, used my 3D drivers)

Sony ESPN Monday Night Football   (**Sega** Genesis, changed to HITMEN)

Sony ESPN Baseball Tonight   (**Sega** Genesis)

Electrobrain NHL Hockey   (**Sega** Genesis)

Wings   (**Sega** Genesis, used my 3D drivers)

Offroad Racin'   (**Sega** Genesis)

3DO Football (no license)   (**3DO**, used my 3D drivers)

Jaguar Football (no license)   (**Atari Jaguar**, used my 3D drivers)

Toaster/RUSH VR Football   (proprietary **VR** platform, used my 3D drivers)

My position allowed me to work on any and all products in development. I was my own producer and project manager on several products. I designed games (Concept & Design, R&D) and did the Technical Design (TDR) for **Sega Genesis, Super Nintendo** and **IBM-PC** products. I was the only programmer that did 3D programming and was therefore responsible for the design & programming of all products that used 3D graphics. As you can see, the primary focus was <u>Sports</u>, mostly Football. **I created the first 3D football game for Sega Genesis, performing real-time 3D with a CPU running at only 8Mhz!** I did the programmer training, wrote the display drivers, and usually passed a working functional display driver (basic 'Look & Feel') with a functional physical model to another programmer. I supervised several projects at the same time and <u>worked on no less than 12 projects within that last year alone</u>. I also did Compact Disc Creation (layout & mastering) for **3DO**, **Macintosh CD** and **IBM PC-CD**. The code was produced in 'C' and 68000 assemblies and was co-owned.

<u>1989-1990: **Cinemaware**, Thousand Oaks Blvd., Westlake Village, CA 91361 (Software Publisher)</u>

Position: Programmer, Employee

Worked on creating the following Software Game Products:

Flying Construction Set   (**IBM-PC**)

WINGS   (**Amiga** computers, used 3D graphics)

WINGS was a cinematic World War I flight simulator game with arcade-style games built-in. I wrote the entire flight simulation sequence and the bombing arcade-style sequence. The code was produced in C and 68000 assembly language. WINGS turned out to be **Amiga**Computer's best-selling game of all time. One year later, WINGS made the cover of Amiga World and were still in the top 10. Unfortunately, Cinemaware had cash-flow problems and the sales of WINGS were not enough to save Cinemaware. I was laid-off due to cost-saving efforts 3 months before the company went insolvent. I was immediately hired on at Park Place.

<u>1984-1988: **Miles Computing**, Inc. 21018 Osborne St. #5, Canoga Park, CA 91304,</u>

<u>(Software Publisher)</u>

Position: V.P. Programming R&D. Senior Computer Programmer

Created the following Software Game Products, all using my 3D graphics drivers:

MacAttack!   (**Mac**)

Harrier Strike Mission –Flight Simulator   (**Mac**)

Harrier Strike Mission II –Flight Simulator   (**Mac, Atari ST**)

Mac Wars   (**Mac**)

MacRacer   (**Mac**)

ST-Wars   (**Atari ST**)

Flight Simulator Construction Set   (**Mac**)

Games took 3 to 9 months to develop and were programmed in C, 68000 assembly language, and/or Pascal. I also did layout and mastering on the 'Mac the Knife' product line, created my own sound effects, most of my own artwork, and wrote the manuals for 4 of the products listed above. <u>"MacAttack!" took only 3 months to program</u> and was the **1st 3D game out on the Macintosh** and the 2nd game on the market. I was the first employee hired and assisted the company owner, Brett Miles, in building the company. I brought some intellectual property into the company, my 3D graphics drivers, and received 130,000 shares of stock assigned to me for this and a royalty plan. Unfortunately, the company went insolvent.

<u>1976-1983:</u> **Sebree's Computing**<u>, Inc. 456 Granite Ave., Monrovia, CA 91016 (Software Publisher)</u>

Position: Programmer-Owner.

This was my own software publishing company. While going through High School and attending college, in my spare time, I programmed <u>**over 30 products**</u> on the **Atari 400/800** home computers, **TRS-80 Color Computer** (Co-Co), **TRS-80 Pocket Computer** (PC-2), and **Bally Arcade**. The media was Tape and floppy disc. This is where my 3D graphics drivers were born and have evolved and remained my property ever since. Most products were using Basic and some assembly language. This medium paid my way through college.

Here is a list of **some** of the products I programmed exclusively & published under Sebree's Computing from 1976 to 1984:

Atari 3D Graphics Package   (**Atari 400/800**)

Atari Flight Simulator   (**Atari 400/800**)

Wumpus Adventure!   (**Atari 400/800**, **Co-Co, PC-2, Bally**)

Down the Trench –Space game   (**Atari 400/800**, **TRS-80 Co-Co**)

Atari Text Editor   (**Atari 400/800**)

Tanks!   (**Atari 400/800**, **Co-Co, Bally**)

StarFire! –Space game   (**Atari 400/800, Bally Arcade**)

Trip to Jupiter –Space Adventure   (**Atari 400/800**)

Submarine Minefield!   (**Atari 400/800**, **Co-Co, Bally**)

Munch!   (**Bally Arcade**)

Hit the Alien Pedestrian!   (**Bally Arcade**)

Moon Lander   (**Bally Arcade**)

Machine Level Editor & Graphics Tutorial   (**Bally Arcade**)

Bally Sprite Editor & Tutorial   (**Bally Arcade**)

Math Routines   (**Bally Arcade**)

Basic Flight Simulator   (**Bally Arcade**)

plus others…

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Equipment & development hardware:

I own several functioning versions of Windows desktops for distributed testing, R&D, with my primary workstations running either Windows 10 x64 or 7 x64, Mac Mini server (QuadCore), Mac Mini DualCore, twelve Windows laptops & netbooks, Prototype NVIDIA Tegra tablet, Android Tegra2 Motorola Xoom tablet, non-accelerated Droid X (great for low-end testing), iPad 2, iPhone X, several HD & 4K Video cameras, Canon 1Ds Mark III D-SLR, Sony a65 and a100 DSLRs, studio green-screen with Professional lighting and XLR audiophile quality sound equipment.

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Career Product Highlights:

Designed, programmed, and/or participated in programming the following products:

TITLE	PLATFORM	COMPANY
3D Air Hockey with Lara (personal project)	iPad/iPhone/Android/Kindle Fire	Touch Play Games
Cute Kitty & Cute Kitty versus Laser Pointer	iPad/iPhone/Android/Kindle Fire	Touch Play Games
Monster Truck Offroad (unannounced)	iPad/iPhone/Android/Kindle Fire	Touch Play Games
Learn To Code – Code Camp	iPad/Android/Web	UQ, Inc.
Simulator – "Performance Simulator"	SCORM iPad/iPhone/Android	Sedlak & Partner
Red's Adventure	iPad/Android/Web	UQ, Inc.
Hard Licks Football	iPhone/iPad/Android/Web	Hard Lick Games, LLC
Mini Gas-Chromatograph Mass Spec GUI	Windows/Win Mobile	Seacoast Science (NSI)
Radioactivity Alarm System for NASA	Windows/Win Mobile	NASA/Seacoast Science (NSI)
Hazardous Chemical Alarm System	Windows/Win Mobile	ARMY/Seacoast Science (NSI)
Traveling Salesman Problem – Game	Windows	NSI
"Serenity" Tinnitus Sound Masking	Windows	NSI
My Forever Puppy	Web	Digenetics, Inc. (NSI)
Ultimate Soccer Boss	Web	Digenetics, Inc. (NSI)
MicroRNA Detection and Analysis	Linux/Windows	NSI

Title	Platform	Company
Course Of Action with Evolved COA	Linux/Windows	DOD
Evolutionary Computation & NN SDK	Windows	NSI
"Connect™" NN Tools	Windows	NSI
Chess with an Attitude!	Windows	Digenetics, Inc. (NSI)
Evolutionary Checkers starring Blondie24	Windows	Digenetics, Inc. (NSI)
"Tanks!" – EC AI platform	Windows	Digenetics, Inc. (NSI)
Job Contender Project – Unity Demo	iPad/iPhone/Android/Web	USOU.edu/ITD
BASF Training Simulator	Windows/Web 2005	USOU.edu/ITD
Sales Organization Assessment Review	Windows/Web 2002	USOU.edu/ITD
Sales Training Assessment Review (STAR)	Windows/Web 2001	USOU.edu/ITD
Handling Objections Response Training (HORT 1&2)	Windows/Web	USOU.edu/ITD
Handling Objections Strategy Training (HOST 1&2)	Windows/Web	USOU.edu/ITD
MBA – 'Organizing for Results'	PC CD-ROM	USOU.edu/ITD
MBA – 'Planning'	PC CD-ROM	USOU.edu/ITD
MBA – 'Human Resources'	PC CD-ROM	USOU.edu/ITD
'The Making of Star Trek Klingon Academy'	PC CD-ROM 1999	Paramount Pictures / Interplay
'The Making of Messiah'	PC CD-ROM	Shiny Entertainment / Interplay
'Messiah'	PC CD-ROM 1998	Shiny Entertainment

Title	Platform	Developer/Publisher
'R/C Stunt Copter'	Sony Playstation	Shiny Entertainment
MCDE (Multimedia Content Development Engine)	PC WinXX CD-ROM 2000	THConsulting
'X-Files' (4 CD-Roms)	Sony Playstation 1999	Hyperbole Studios / FOX
'Bloodlines' (Horse Racing)	PC Win'95/WinNT CD-ROM	Savvy Moon
Caveman Joe	PC Win'95/WinNT CD-ROM	Tyke Studios
Bradshaw Football '97	PC Win'95/WinNT CD-ROM	Studio Arts
'Skies A Fire' (Flight Sim)	PC Win'95/WinNT CD-ROM	Studio Arts
NFL Football '96	Sega 32X	Sega of America
NBA Basketball '96	Sega 32X	Sega of America
Disney's 'Goof-Troop' Basketball	Sega Genesis	Western Technologies
'BLADES' (Roller-Hockey)	Sega Genesis	GTE
NFL GAMEDAY '96 (Football)	Sony Playstation-PSX	Sony Imagesoft
Sony ESPN 2-on-2 NBA Basketball	Sega & Sega CD	Sony Imagesoft
Sony ESPN NHL Hockey	Sony PSX, Sega Genesis	Sony Imagesoft
Sony ESPN Baseball	Sony PSX, Sega Genesis	Sony Imagesoft
NFL Quarterback Club Football	Sega Genesis	Park Place/Acclaim
NHL Hockey '93 to '98	Sega Genesis	Electronic Arts
Muhammad Ali Heavyweight Boxing	Sega Genesis 1992	Park Place/Virgin Games
Offroad Racin'	Sega Genesis	Park Place Productions

Title	Platform	Publisher
Wings	Sega Genesis	Park Place Productions
Electrobrain NHL Hockey	Sega Genesis	Park Place Productions
Sony ESPN Baseball Tonight	Sega Genesis	Park Place Productions
Dick Vitale's Awesome Baby! College Hoops	Sega Genesis 1993	Park Place Productions
Acclaim Quarterback Club Football	Sega Genesis 1993	Park Place Productions
Sony ESPN Monday Night Football	IBM PC CD-ROM, Sega Genesis	Park Place Productions
3DO Football 1992	3DO	Park Place Productions
Atari Football	Atari Jaguar	Park Place Productions
Hasbro VR Football 1992	Toaster/RUSH VR platform	Park Place Productions
WINGS (best selling product of all time on Amiga!)	Amiga 1990	Cinemaware (Wiki)
Flying Construction Set (Flight Sim)	IBM-PC	Cinemaware
Harrier Strike Mission (Flight Sim)	Macintosh, Atari ST	Miles Computing
Harrier Strike Mission II 1988	Mac, Atari ST	Miles Computing
Flight Simulator Construction Set	Macintosh	Miles Computing
Mac Wars (Space Sim) 1985	Macintosh	Miles Computing
MacRacer (Auto Racing Sim)	Macintosh	Miles Computing
ST-Wars (Space Sim) 1986	Atari ST	Miles Computing

Title	Platform	Publisher
MacAttack! (Tank Sim, 1984)	Macintosh (2nd game on MACs)	Miles Computing
Atari 3D Graphics Package 1978	Atari 400/800	Sebree's Computing
Atari Flight Simulator 1981	Atari 400/800	Sebree's Computing
Air-Sea Watch Commander	Atari 400/800	Sebree's Computing
Balloon Pop / Pylon Racer 1981	Atari 400/800	Sebree's Computing
Program Sampler #1 1979	Atari 400/800	Sebree's Computing
Word Games	Atari 400/800	Sebree's Computing
Trip to Jupiter (Space Adventure) 1980	Atari 400/800	Sebree's Computing
Down the Trench (Star Wars space game)	Atari 800, TRS-80 Co-Co	Sebree's Computing
Wumpus Adventure! 1977	Atari 800, TRS-80 Co-Co	Sebree's Computing
3-D Red Baron Dog-Fight flight-simulator	Atari 800/400	Sebree's Computing
Atari Text Editor	Atari 400/800	Sebree's Computing
Tanks!	Atari 800, TRS-80, Bally	Sebree's Computing
StarFire! (Space game, 1974)	Atari 800, Bally Arcade	Sebree's Computing
Submarine Minefield!	Atari 800, TRS-80, Bally	Sebree's Computing
Super Wumpus	Bally Arcade	Sebree's Computing
UFO Battle	Bally Arcade	Sebree's Computing
Down the Trench	Bally Arcade	Sebree's Computing

Biorhythms	Bally Arcade	Sebree's Computing
Munch!	Bally Arcade	Sebree's Computing
Hit the Alien Pedestrian!	Bally Arcade	Sebree's Computing
Moon Lander	Bally Arcade	Sebree's Computing
Machine Level Editor & Graphics Tutorial	Bally Arcade	Sebree's Computing
Bally Sprite Editor & Tutorial	Bally Arcade	Sebree's Computing
Basic Flight Simulator	Bally Arcade	Sebree's Computing
XY Tutorial (for programmers)	Bally Arcade	Sebree's Computing
Star Fire assembler (for programmers)	Bally Arcade	Sebree's Computing
Joystick checkout utilities (1972)	Bally Arcade	Sebree's Computing

plus others…

Selected Publications:

Fogel DB, Hays TJ, Hahn SL, Quon J (2006) "*The Blondie25 Chess Program Competes Against Fritz 8.0 & a Human Chess Master*" Proceedings of 2006 IEEE Symposium on Computational Intelligence & Games, S. Louis & G. Kendall (eds.), IEEE, Reno NV, pp.230-235.

Fogel DB, Hays TJ, Johnson, DR (2006) "*A Platform for Evolving Intelligently Interactive Adversaries*" BioSystems, Vol. 85(1), pp. 72-83.

Fogel DB, Hays TJ, Hahn SL, Quon J (2005) "*Further Evolution of a Self-Learning Chess Program*" IEEE 2005 Symposium on Computational Intelligence & Games, G. Kendall and S. Lucas (eds.), Apr. 4-6 2005, Essex, UK, pp. 73-77.

Fogel DB, Hays TJ, Hahn SL, Quon J (2004) "*A Self-Learning Evolutionary Chess Program*" Proceedings of IEEE, V92(12), p1947-1954.

Fogel DB, Hays TJ, Johnson DR (2004) "*A Platform for Evolving Characters in Competitive Games*" Proceedings of 2004 IEEE Congress on Evolutionary Computation, IEEE Press, Piscataway, NJ, pp. 1420-1426.

Fogel DB, Hays T (2003) "*New Results on Evolving Strategies in Chess*" Applications and Science of Neural Networks, Fuzzy Systems, and Evolutionary Computation VI, B. Bosacchi, D.B. Fogel, and J.C. Bezdek (chairs), SPIE, Bellingham, WA, pp. 56-63.

Patents:

1: Video Game Characters have Evolved Traits

2: Method for presenting a virtual reality environment for an interaction