1. The "real" Inventors of Arcade Videogames?

As more and more of the early history of videogames comes to light, perceptions of who did what and when keep changing. For example:

In a recent paper written by Professor Henry Lowood (Curator for History of Science & Technology Collections; Germanic Collections; Film & Media Collections, Stanford University) entitled "Meditations about Pong from different perspectives", he reminds us of the story of the summer project of a "recently" (1970) graduated SAIL (Stanford University) student, Bill Pitts, and his friend, Hugh Tuck, as follows:

" The Galaxy Game was a coin-operated computer game for the newly released PDP 11/20, DEC's first 16-bit computer. DEC had fit the PDP 11 into a relatively small box and listed it for a mere $20,000, hoping thereby to open "new markets and new applications." Pitts and Tuck formed a company called Computer Recreations, bought the low-end version of the PDP-11 for only $13,000 and converted the PDP-10 version Spacewar! for this machine, including a Hewlett-Packard vector display, wooden cabinet, and other parts, their expenses came to roughly $20,000. In September 1971, they installed it in Stanford's student union, where a later version that supported up to four monitors (eight players) could be found until 1979. The **Galaxy** Game was faithful not only to Spacewar!, but also to the player community (university students and computer engineers) and technical configuration (software code, vector displays, timesharing, etc.) that produced it"

Is this not still another story describing the invention of the arcade videogame?

So who was really "first"...as if it mattered if they did it independently. In 1979, about the time that Pittts starts to work on Galaxy, Nolan Bushnell gets Ampex co-worker Ted Dabney, to straighten him out on the feasibility of using a computer, any low-end computer, for a time sharing arcade game business and failing that idea, has Ted do the beginnings of a TTL design that might just work. It takes Nutting Associates engineering skill to make their design into something producible, **Computer Space**. 1500 are shipped but they fail as a product because they were too hard to play by ordinary folks. So...Bushnell had the idea of ;putting a coin box on Spacewar...a creative idea which eventually resulted inn the launch of the arcade videogame industry. Did he invent anything...I'll just let that hang out there.

Then Bushnell plays ping-pong on the **Odyssey** home game in May of 1972, starts a company – first **Sizigy, then Atari** – with Ted Dabney. Ted actually starts to design a pinball machine and Bushnell gets Alan Alcorn on-board to build the **Pong** arcade–game. Ted Dabney spends seven thousand bucks of his own money to procure 50 Hitachi monitors after they made twelve Pong units more or less by hand and decided to go for fifty more. Bushnell, in turn, shows what a great salesman he is by bringing in more orders than they know what to do with. Business takes off like a rocket and Bushnell

promptly gets into so much cash flow trouble that he enlists his neighbor, Joe Keenan to take over as President. Keenan is an unqualified success.

Meanwhile, Atari's engineers want to do a home version of Pong. Bushnell doesn't initially support the work of the engineering guys, which include Alan Alcorn; they recognize that the semiconductor art is at a point where single-chip state machines (combining many TTL circuits on one chip) have become economically practical. The guys go ahead anyway and set about designing a **Pong-type home videogame** whose major circuit functions take place on a single, relatively low-cost chip, a design that is ten years ahead of the by then 10 years-old **Magnavox Odyssey's** design. Several semiconductor firms are also busy doing the same thing: General Instrument produces the AY-3-8500 chip which goes in to tens of millions of videogames, first into Coleco's Telstar – a great success – and then mostly into game consoles produced in Asia (and all of them licensees of the Baer/Rusch/Harrison patents (making money for Magnavox and Sanders Associates)).

Bushnell, the great salesman, gets a huge order (250,000 pieces) for the home type game from Sears for the Xmas season 1975 and as far as he is concerned, he has now invented home videogames. The fact that 350,000 Odysseys were out there by that time didn't get in his way.

But back to the true story of the invention of the arcade videogame:

How about three cheers for Pits and Tuck?! – the "real" inventors of arcade videogames?

2. Another Pitts & Tuck Story:

The Galaxy Game

This machine was displayed on the 5th floor of Gates Computer Science, between late 1997 and summer 2000 and was normally operational every day from about 5:30pm to 8:00 pm as part of the Computer History Exhibits. It has now been moved to the Computer Museum History Center in Mountain View, CA.

Bill Pitts & Hugh Tuck, 1971

The Galaxy Game was the first commercial video game. Installed in Tresidder Union in September 1971, the game was quickly and enthusiastically embraced by the Stanford community, with players often waiting for over an hour for their next turn.

Galaxy Game is a reprogrammed version of Spacewar!, which was conceived in 1961 by Martin Graetz, Stephen Russell, and Wayne Wiitanen and first realized on the PDP-1 at M.I.T. in 1962 by Stephen Russell, Peter Samson, Dan Edwards, and Martin Graetz,

together with Alan Kotok, Steve Piner, and Robert A. Saunders using PDP-1 assembly language. It very became popular at most Artificial Intelligence (AI) research centers, for instance at Stanford's former AI laboratory, running on the SAIL DEC PDP-6 and the I3 vector display. It is now also available in a simulated version on the web: http://lcs.www.media.mit.edu/groups/el/projects/spacewar/.

Spacewar was a magical game that captivated everyone that played it. However, since time on the mainframe computers required to support Spacewar was billed to users at rates of several hundred dollars per hour, Spacewar was usually played only by system programmers when the mainframe was idle; times like 2am!

In late 1970, Digital Equipment Corporation introduced the PDP-11 minicomputer. Finally, there was an affordable computer with the power to run Spacewar!. So, **Bill Pitts (a recent Stanford grad and AI alumn) and his high school buddy Hugh Tuck formed Computer Recreations, Inc. in June of 1971** to build coin operated Spacewar machines.

Bill, a computer hacker, did the programming and electrical stuff, and Hugh, a mechanical engineer, designed the enclosures. After three and a half months of labor, Spacewar was about to be delivered to the masses. However, at this time (1971), the concept of "war" was a very bad thing on campus. Astute marketeers that they were, Bill and Hugh decided to change the name to Galaxy Game.

The first version of Galaxy Game, packaged in a walnut veneered enclosure, incorporated a PDP-11/20 computer, a simple point plotting display interface, and a Hewlett Packard 1300A Electrostatic Display. The PDP-11/20 (with 8K bytes of core memory and an optional hardware multiply/divide unit) cost $14,000 and the display cost $3,000. Coin acceptors and packaging brought the total cost to approximately $20,000. Playing of the Galaxy Game was priced at 10 cents per game or 25 cents for 3 games. If at the end of the game your ship still survived and had some fuel left, you got a free game. Given the investment, perhaps Bill and Hugh were not the most astute of businessmen.

A second version of Galaxy Game, with a more powerful display interface enabling the PDP-11 to drive four to eight consoles, was developed to amortize the cost of the computer over several consoles. This version was installed in the Coffee House at Tresidder Union in June 1972, where it remained in operation until May 1979. Throughout its tenure at Tresidder, Galaxy Game was heavily used. Ten to twenty people gathered around the machines most Friday and Saturday nights when school was in session.

After removing Galaxy Game from Tresidder because the display processor had become very unreliable, the machine was disassembled. The computer and displays were stored in an office and the fiberglass cases were stored outdoors for the next eighteen years. Sometime in April 1997, Les Earnest (the former Director of the Stanford AI Lab) received a phone call from Bill Pitts. Bill was about to throw away some old PDP-11

stuff, and he was wondering if Les might know of a good home for old computers. Les mentioned that the new Computer History Exhibits at Stanford might be interested.

So, Bill fired off a couple of emails in the direction of Stanford and then finally, a reply! Yes, the Computer History Exhibits would like Galaxy Game as an operating exhibit.

To get Galaxy Game operating again was no small feat. The call for help went out. The biggest job was to build a new display processor using the original design schematics. Ted Panofsky, who had designed and built the display processor way back when, soon received a call from Bill. Could Ted please take complete responsibility for building and delivering a fully functional display processor in eight weeks? For free, of course. Ted said he'd been waiting 25 years for just such an opportunity! Yes, he would love to!

So, with Ted's generous contribution of time, energy, and smarts, and help from Doug Brentlinger, Paul Mancuso, and Victor Scheinman, the Galaxy Game is back. By the way, the original display processor's poor reliability resulted from using early vintage Texas Instruments wire wrap IC sockets. Ted was not the one that selected them.

In December 1997 the refurbished Galaxy games (two two-player consoles driven bu a single PDP-11) were installed on the fifth floor of the Stanford Computer Science department's Gates building and made available for free use by students. Problems of space and maintenance at Stanford for operational equipment could not be satisfactorily resolved however, and after nearly two years of operation the Galaxy Game was moved to the Computer History Center at Ames.

Both versions of Galaxy Game were based on the the Stanford AI Lab's PDP-10 version of Spacewar. Galaxy Game is a faithful PDP-11 re-implementation of the AI Lab's PDP-10 Spacewar. Except, I don't seem to recall any coin acceptors on the PDP-10.

Bill Pitts, October 29, 1997

Spacewar was the topic of a December 7, 1972 article in the Rolling Stones magazine by Stewart Brand.

The installation was sponsored by the Computer History Exhibits (email to: Gio Wiederhold <gio@cs.stanford.edu>).

More early computer games.

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