The first graphical computer game - and an even earlier patent application

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Introduction

In 1958, William A. Higinbotham at the Brookhaven National Laboratoy, New York, created in a short time for a visitors day a device that is now known as the first video game.

It is a two-player game, simulating tennis on a CRT of an oscilloscope, see Weblinks below. For calculating the movements, a Donner analog computer (with tubes) was used, augmented by some extra circutry.

Ten years earlier, US patent No. 2,455,992 was granted, for a *Cathode-Ray Tube Amusement Device*, inventors Th. T. Goldsmith and E. R. Mann. This was a one-person shooting game. The player could select the shooting direction and destination of a missile, trying to reach a target glued to the scree on the outside. Nothing is yet known if this has fully been build, and if it was shown in the public, but I doubt this, as its special CRT was expensive to make (unless such a device was already used for other purposes).

Curiously enough, in 1959, shortly after Higinbotham's game creation, a patent was filed in Germany (DE1110553, *Simulator zum Nachahmen der Bewegungsvorgänge eines auf ein Ziel zu lenkenden Flugkörpers*), inventors J. Hermann and H. Senger, and later also granted as US Patent No. 3046676, *Training device for Marksman*. This was not meant to be a game, but for military training, and had much more functions. In particular, four Miller integrators were used to produce the parabolic flight trajectory.

The purpose of this note is to shortly explain the construction of the *amusement device* and to discuss options to build a physical object.

The Cathode-Ray Tube Amusement Device

The device was a CRT screen together with essentially a button to start and two knobs to set the direction and destination of the missile. It required remarkably few tubes besides the special CRT: three double triodes, one single triode, and one thyratron.

A typcial screen could look like this:

The missile track starts in the left bottom corner, has a parabolic trajectory, where the start angle is set with one potentiometer, while the other determines when the end is reached, where an explosion is simulated by defocussing the beam.

Defocussing the beam is done via a relay that switches from the normal focusing potentiometer to an alternate one, thus cannot be done with an unmodified oscilloscope.

Once the start knob is pressed, a thyratron instantly discharges a capacitor, which is then charged again, giving a voltage ramp starting a zero.

Using an antiparallel connected double potentiometer, the ramp voltage is applied to the X and Y deflection amplifiers with two triodes each, so the beam either has a high Y component and low X compenent, or vice versa.

There is no circutry to generate a parabolic curve, this is done by using a resistive coating instead of standard X deflection plates, so that the field has a gradient. Producing such a CRT nowadays would be surely out of budget.

End of flight is detected sensing the maximum of X and Y positions using two triodes with a common cathode resistor, and driving a relay with a third triode to defocus the beam. This is dubious; a second ramp generator to determine the flight time would make much more sense than detecting the position.

The missile target is glued on the screen externally, and there is no means to detect a hit electronically.

Building a Device

As mentioned above, a true rebuild is out of question, as the effort to make the special CRT with the resisitive x-deflection plates is not justified. Thus, only modified versions are feasible.

First decision would be whether to use tubes or modern semiconductor operational amplifiers.

If it were tubes, the decision might be not to build the 1947 amusement device, but the German 1959 marksman training system.

If we stick to the 1947 device, the parabolic curve could possibly be made by adding some capacitors in the y- (or x-) deflection amplifier.

Alternatively, known integrators with tubes could be chosen:

- Hermann's Miller integrator (3 tubes)
- Heathkit EC-1 operational amplifier (2 tubes)
- Donner Operational amplifier (4 tubes, Fig. 5.29c in Korn&Korn)
- Simple amplifiers (1 tube, Fig. 5.29a, or 2 tubes, Fig. 5.29b in Korn&Korn)

tubes means electrode systems, i.e. double triodes are counted twice, and gas discharge lamps are not counted.

If the choice would be semiconductors and modern operational amplifiers, a redesign would make sense, targeted to a common analog computer and crafted as one of several examples using an analog computer.

Weblinks

US Patent 2,455,992: http://pdfpiw.uspto.gov/.piw?Docid=2455992

US Patent 3,046,670: http://pdfpiw.uspto.gov/.piw?Docid=3046670

The anatomy of the first video game:http://www.nbcnews.com/id/27328345/

Celebrating *Tennis for Two*: http://www.bnl.gov/newsroom/news.php?a=2964

The First Video Game? http://www.bnl.gov/about/history/firstvideo.php