Building a MAME Arcade Cabinet

Presented by
Thomas J. Munn
symgryph@yahoo.com

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- Have been interested in emulation since 1995.
- I had an extra unused PC begging to be used for something.
- I had access to woodworking tools
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Brief History of Arcade Emulators

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- Arcade emulation started in mid 90's
- Mame is the most comprehensive emulator out there covering Arcade games from 1976 to 2006
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Types of Arcade Cabinets

- Stand Up
  - Most Common
  - Can be difficult to move
  - Limited controller options
- Cocktail
  - Sit down
  - Require lots of space
  - Display 'rotating' challenging
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- Environmental
  - HUGE (the type you sit in)
  - VERY heavy (400+ lbs)
- Standalone
  - Basically a stand that holds arcade controls in front of a TV or projector setup
  - Most flexible
  - Cheapest design
  - Can easily be moved out of sight (waf factor)

Types of controls

- Joysticks
  - “Switch type”
  - 49 Way
  - Rotary
  - Optical
- Track Balls
  - 3 inch
  - 2 ¼ inch
  - Illuminated

Types of Controls

- Spinners
  - X only axis
  - Used in tempest, super breakout, and double as steering wheel in driving games.
- Flight sticks
  - Includes flight triggers, flight rudders etc
  - VERY expensive
  - Difficult to interface to PC

Types of Controls

- Driving wheels
  - Bulky and hard to mount
  - Costly
  - Not very versatile
  - Also includes pedals and shifters
- Light guns
  - Allow using display for 'targeting' games

Types of Buttons

- Concave 'plastic' buttons
  - Can have two kinds of switches
    - Microswitches
      - Cheap
      - Noisy
      - Not as sensitive
      - Big
    - Leaf switches
      - Very sensitive
      - Silent
      - Expensive
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Types of Buttons

- Clear/see through buttons
  - Illuminated
  - Cost more
  - Use same types of switches as 'concave' buttons
- Atari “Volcano” buttons
  - Really expensive ($20.00/button vs 1.20/button)
  - illuminated

To Build or to Kit?

- Build
  - Cheapest
  - Customization options endless
  - Needs LOTS of time
  - Needs good woodworking skills
- “Pre Made” kits
  - More expensive
  - Customization will cost you
  - Faster
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Software/HW Design

- Stripped down Ubuntu Server Edition
- Running NVIDIA binary drivers (best performance)
- AMD 2.4 dual core opteron(2gb ram)
- Wahcade! Front end as window manager
- “Autologin” via editing tty scripts
- Openbox WM for maintenance
- NO kde/gnome/gdm/kdm/xdm!
- WIFI RaLink RT2561/RT61 802.11g PCI
  - Is Gigabyte for $13.00

MAME
Multiple Arcade Machine Emulator

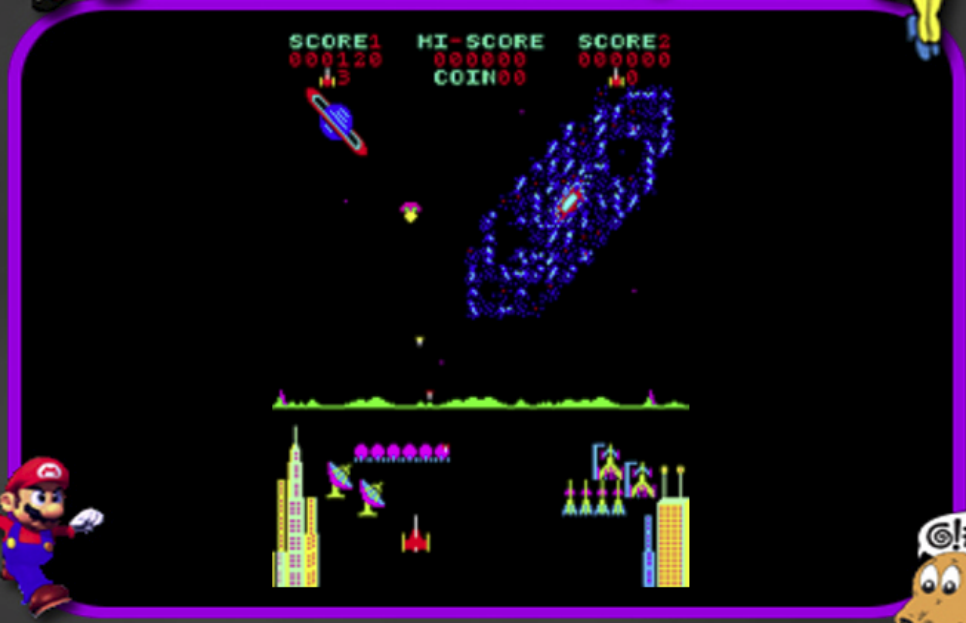
Pleiads (Tehkan)
1981 Tehkan
Status Imperfect, Color Imperfect, Sound Good

Change Me

Parallel Turn
Peggle
Pengo
Phelios
Phoenix
Phozon
Pinball Action
Pinbo
Pioneer Balloon
Pisces
Pit & Run
Pleiads
Pooyan
Pop Flamer
Popper
Porky
Port Man
Pro Baseball Skill Tryout
Progress
PuckMan
Quasar
Quester
Rack 'em Up

90 Raster

Pleiads



2-Way Joystick

Wahcade! Setup

- Downloaded Custom picture
- Need several layouts, portrait, landscape, and inverted portrait (for opposite player positions)
- Had to hack code to rotate screen (xrandr and some self modifying perl)
- LOTS of support files (this represents about 10 hours of work!)
- Supports VERY complex options on game filters (need catver.ini).

Interface Types

- HID (makes joysticks look like PC joystick)
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  - IPAC 4 contains 56 inputs simulates key-presses
  - No problem with 'ghosting'
  - usb/ps2
- Optical Encoder
  - Optipac for trackballs/spinners/rotary joystick
  - USB

Performance tweaks

- Hand tune X (the same configs that work well for Compviz REALLY speed up mame)
- Use binary drivers 32 bit
- Install minimum system, no window manager
- Solid State disks cost a lot but speed up booting

Little extras

- Soldering is the easiest way to wire up controls
- Install wireless NIC to allow for easy maintenance
- Turn OFF automatic updates
- Cut a hole for a usb hub
- Use a voltage monitoring smart strip
- Mount LCD UPSIDEDOWN if you are building cocktail

The Emulator

- I use “SDL” mame
  - Best version for linux
  - Lots of support
- Needs highly tuned X config to work its best
- Config needs to be tweaked (e.g. use opengl instead of software rendering).
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The Front End

- Getting 'flipping' to work required source code modification (python)
- Still isn't perfect
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ROMS

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Roms (continued)

- Roms are matched to each version of mame
- CLRMAMEPRO can fix most of them, alas it is windows based, but runs nicely under wine.
- Come in two types: CHD and ZIP
  - CHD is compressed Hard Disk
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Woodworking Tips

- Melamine looks nice but is very fragile
- Tape melamine when drilling button holes
- Buttons are 1 1/8 inch wide
- Make sure monitor controls are recessed ideally on SIDE if making cocktail unit
- Use “Hole” saw for making fan hole
- Use “T” molding for unfinished edges
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Final Thoughts

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- Projector is my next 'upgrade'
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- Optical controls are EXPENSIVE
- LED controller boards are Windows only.

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URL for autologin: http://tinyurl.com/ylpk4kb

Nvidia Optimizations

```
Section "Device"
    Identifier     "Device0"
    Driver         "nvidia"
    VendorName     "NVIDIA Corporation"
    Option         "RandRRotation"  "true"
EndSection

Section "Screen"
    Identifier     "Screen0"
    Device         "Device0"
    Monitor        "Monitor0"
    DefaultDepth    24
    Option         "RenderAccel" "True"
    Option         "AllowGLXWithComposite" "True"
    Option         "AddARGBGLXVisuals" "True"
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    SubSection     "Display"
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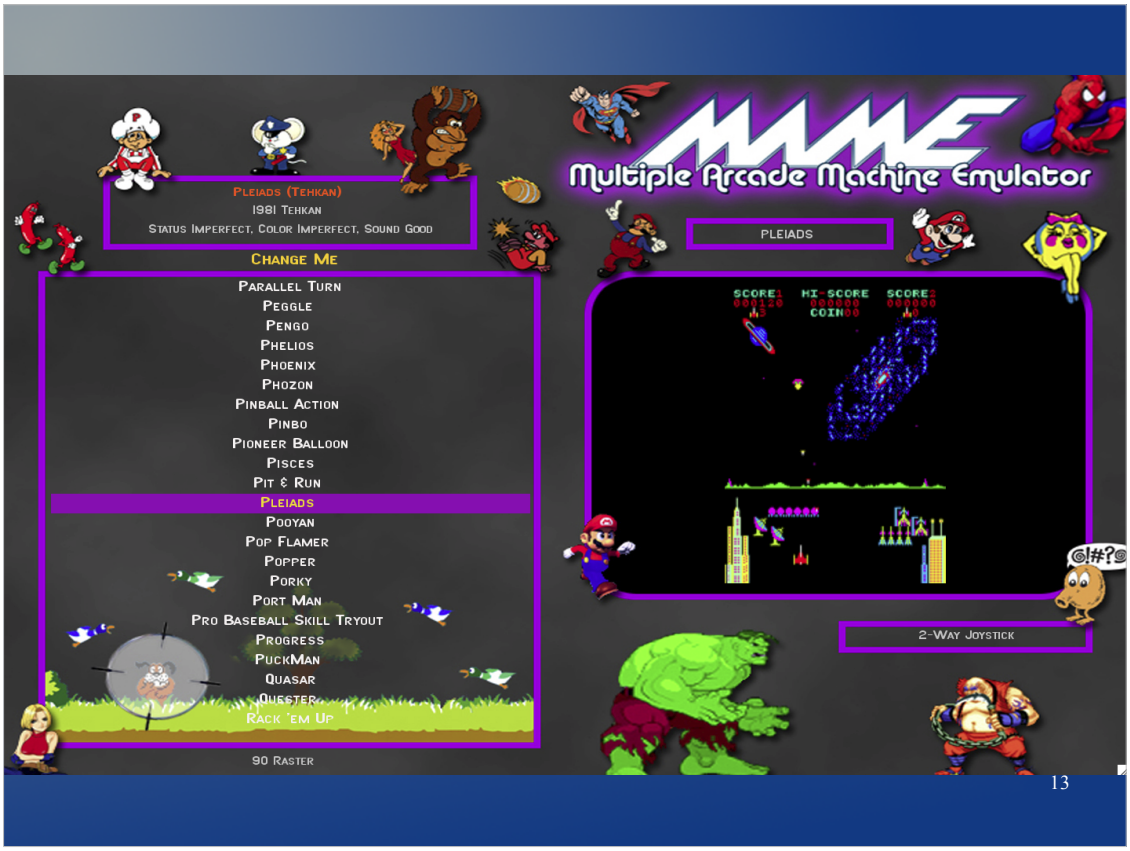
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