Penn Engineering

ESE

Lecture #25 – Intellectual Property 2

ESE150 Spring 2022

Slides 2018--2022 DeHon

ESE 150 – Digital Audio Basics

1

1

Outline

- Setup Need / Opportunity – What is IP
- Where are we
- Rationale for IP Protection – Why Protect
- **How protect?**
  - Patents (review and preclass)
  - Copyrights (review and preclass)
  - Licensing
  - Open Source
  - NDA
  - Patent Ownership

2

2

Review

3

3

Intellectual Property Creators

- **As Engineers**
  - Program, develop algorithms, design circuits
- **Almost everything we create will have this property**
  - Value added is intellectual
  - Can be represented digitally in bits
  - Can (increasingly) be copied/reproduced cheaply
- **Easy to have impact**
  - Our solutions can reach millions, billions
  - Decreasing physical barriers to propagation of solutions
- **Challenge to protect and reward IP creators**

4

4

Mechanisms (To support)

- **Patents**
  - Cover inventions
  - E.g., Flying Machine (US 821,393), ENIAC (US 3,120,606),
- **Copyrights**
  - Creative expression
  - E.g., novel, song, movie
- **Article 1, Section 8, Clause 8:**
  - To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries

5

5

Patent

- **Inventions**
- **Non-obvious to one "ordinary skill in art"**
- **Reduced to practice**
- **Cannot patent**
  - Abstract ideas
  - Laws of nature
- **US: First to file**
  - (prior to 2013 was first to invent)
- **Exclusive rights 20 years from filing**
  - (previously 17 years from issue)

6

6

XILINX FPGA US 4,870,302

[57] **ABSTRACT**

A configurable logic array comprises a plurality of configurable logic elements variably interconnected in response to control signals to perform a selected logic function. Each configurable logic element in the array is in itself capable of performing any one of a plurality of logic functions depending upon the control information placed in the configurable logic element. Each configurable logic element can have its function varied even after it is installed in a system by changing the control information placed in that element. Structure is provided for storing control information and providing access to the stored control information to allow each configurable logic element to be properly configured prior to the initiation of operation of the system of which the array is a part. Novel interconnection structures are provided to facilitate the configuring of each logic element.

I claim:

1. An interconnect structure for programmably interconnecting lines within an integrated circuit comprising:

at least three sets of interconnect line including a first set, a second set, and a third set;

programmable means, not including said sets of interconnect lines, for connecting at least one of said lines in said first set to at least one of said lines in said second set, for connecting at least one of said lines in said first set to at least one of said lines in said third set, and for connecting at least one of said lines in said second set to at least one of said lines in said third set.

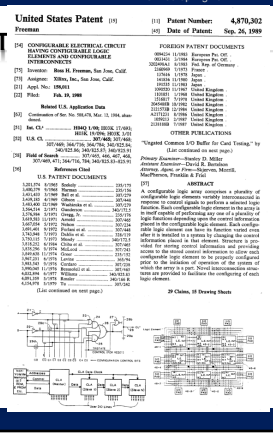
2. An array of interconnect structures, each said interconnect structure as in claim 1, and each interconnect structure in said array having its own selected number of interconnect lines and its own programmable means for connecting interconnect lines in its own first, second and third sets.

https://patents.google.com/patent/US4870302A/en?oq=us+4870302

7

XILINX FPGA PATENT

- When expire?


United States Patent [19]
Freeman

[54] CONFIGURABLE ELECTRICAL CIRCUIT HAVING CONFIGURABLE LOGIC ELEMENTS AND CONFIGURABLE INTERCONNECTS

[11] Patent Number: 4,870,302
[45] Date of Patent: Sep. 26, 1989

8

PATENTS

- Who owns patent on GIF?
- When did/will it expire?

9

COPYRIGHT

10

COPYRIGHT

- **Cover particular, original expression**
  - Including software
- **Technically don't need to register**
  - But should…
  - Must register before sue for infringement
  - $45
    - https://www.copyright.gov/about/fees.html
  - No review, just registration
- **Life of author + 70 years**
- **Work for hire: 95 years from publication**

11

COPYRIGHT TERMS

- **Why are there so many Sherlock Holmes related movies and series these days?**
  - Sherlock (BBC), Elementary, Irregulars
  - Enola Holmes
  - Sherlock Holmes movies (w/ Robert Downey Jr.)
- **When does Mickey Mouse copyright expire?**

12

TEASER

South Park: Human CenitPad

https://southpark.cc.com/clips/382781/business-casual-g-men

13

LICENSING

14

LICENSE

- **Where have you seen licenses?**

15

LICENSES

- **How get right to use**
  - Something patented, copyrighted by someone else
- **Between companies**
  - Get IP need to build a product
- **To consumers**
  - Technically, most software is licensed, not sold
  - …shrink-wrap/click-through licensing agreements…
- **Define terms of use**
  - What you are paying for (one copy, many, resale…)
  - What uses (dis)allowed

16

DIRECT LICENSING/SALES

17

PAST

- **Selling a product require huge infrastructure and up-front capital costs**
  - Manufacture (physical things)
  - Marketing
  - Distribution
  - Sales
- **Demand large business to support infrastructure**
- **Not easy for individual**

18

TODAY (EMERGING)

- **Eliminate infrastructure needs with ubiquitous networking, IP products, service businesses**
  - Manufacture (physical things) → not issue for IP
    - …or licensed manufacturing
  - Marketing → still need to get the word out
    - …can use web at low cost
  - Distribution → not an issue for IP
    - …leverage common carriers
  - Sales
    - Handle online, eBusiness support
- **Becomes possible for individuals/small businesses to sell IP directly to consumers**

19

DIRECT IP BUSINESSES TODAY

- **Examples?**

20

DIRECT IP BUSINESSES TODAY

- **Kindle Direct Publishing**
- **App Store / Google Play**
- **AWS Marketplace**
- **Café Press**
- **Shapeways**

21

Part 2

OPEN SOURCE / CREATIVE COMMONS

22

SHARING

- **Sometimes we want to share**
  - Isn't it great doesn't cost us anything to give away digital products?
  - Isn't it great can build on work of others without necessary cost?
  - Cooperation on standards create opportunities for everyone, for an industry

23

CHALLENGE

- **Patents cost money**
- **Business (people making money) will spend money to patent things**
  - …and typically incentivized to patent everything they can
- **Company (individual) could patent something and grant free license**
- **How does individual, non-profit, etc.**
  - Create something and protect right to share?
- **Variety of Open-Source/Public Domain licenses**

24

CREATIVE COMMONS

- **Framework and set of licenses for clearly expressing intent**
- **Issues**
  - Attribution
  - Share-Alike
  - (Non-)commercial
  - (No)Derivatives
- **Apps to choose, logos to show, legal backing to define precisely**
- **https://creativecommons.org/share-your-work/licensing-types-examples/**

25

NON-DISCLOSURE AGREEMENT (NDA)

26

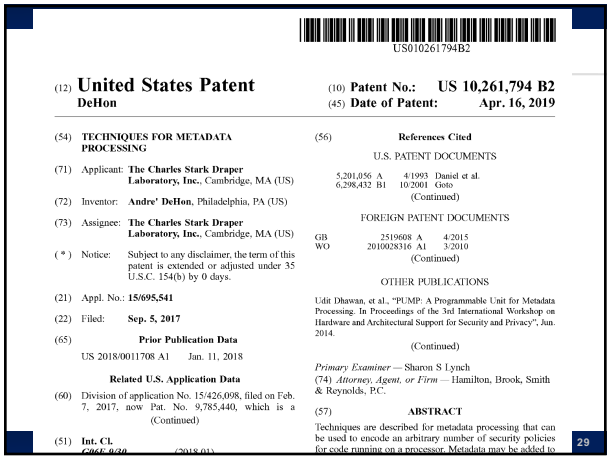
NDA

- **Tool for protecting IP**
- **Legal agreement that you won't disclose information shared with you**
  - Prevent loss of IP
- **Typical for collaborating companies**
- **Typical for employers**
- **In part to make sure sharing with you doesn't count as "disclosure" to preclude patents**
- **Define scope of disclosure**

27

WHO OWNS IP?

28



US010261794B2

(12) **United States Patent**
DeHon

(10) **Patent No.: US 10,261,794 B2**
(45) **Date of Patent: Apr. 16, 2019**

(54) **TECHNIQUES FOR METADATA PROCESSING**

(71) Applicant: **The Charles Stark Draper Laboratory, Inc.**, Cambridge, MA (US)

(72) Inventor: **Andre' DeHon**, Philadelphia, PA (US)

(73) Assignee: **The Charles Stark Draper Laboratory, Inc.**, Cambridge, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **15/695,541**

(22) Filed: **Sep. 5, 2017**

(65) **Prior Publication Data**

US 2018/0011708 A1 Jan. 11, 2018

Related U.S. Application Data

(60) Division of application No. 15/426,098, filed on Feb. 7, 2017, now Pat. No. 9,785,440, which is a (Continued)

(51) **Int. Cl.**

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,201,056 A 4/1993 Daniel et al.
6,298,432 B1 10/2001 Goto
(Continued)

FOREIGN PATENT DOCUMENTS

GB 2519608 A 4/2015
WO 2010028316 A1 3/2010
(Continued)

OTHER PUBLICATIONS

Udit Dhawan, et al., "PUMP: A Programmable Unit for Metadata Processing. In Proceedings of the 3rd International Workshop on Hardware and Architectural Support for Security and Privacy", Jun. 2014.

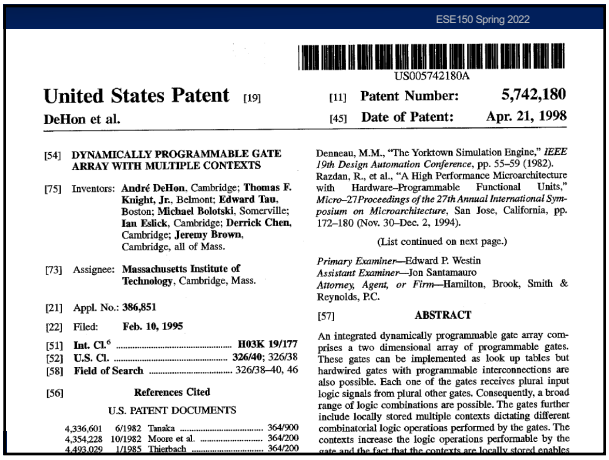
(Continued)

Primary Examiner — Sharon S Lynch
(74) *Attorney, Agent, or Firm* — Hamilton, Brook, Smith & Reynolds, P.C.

(57) **ABSTRACT**

Techniques are described for metadata processing that can be used to encode an arbitrary number of security policies for code running on a processor. Metadata may be added to

29



US005742180A

United States Patent [19]
DeHon et al.

[11] **Patent Number: 5,742,180**
[45] **Date of Patent: Apr. 21, 1998**

[54] **DYNAMICALLY PROGRAMMABLE GATE ARRAY WITH MULTIPLE CONTEXTS**

[75] Inventors: **André DeHon**, Cambridge; **Thomas F. Knight, Jr.**, Belmont; **Edward Tau**, Boston; **Michael Bolotski**, Somerville; **Ian Eslick**, Cambridge; **Derrick Chen**, Cambridge; **Jeremy Brown**, Cambridge, all of Mass.

[73] Assignee: **Massachusetts Institute of Technology**, Cambridge, Mass.

[21] Appl. No.: **386,851**

[22] Filed: **Feb. 10, 1995**

[51] **Int. Cl.**[6] **H03K 19/177**
[52] **U.S. Cl.** **326/40**; 326/38
[58] **Field of Search** 326/38–40, 46

[56] **References Cited**

U.S. PATENT DOCUMENTS

4,336,601 6/1982 Tanaka 364/900
4,354,228 10/1982 Moore et al. 364/200
4,493,029 1/1985 Thierbach 364/200

Denneau, M.M., "The Yorktown Simulation Engine," *IEEE 19th Design Automation Conference*, pp. 55–59 (1982).
Razdan, R., et al., "A High Performance Microarchitecture with Hardware–Programmable Functional Units," *Micro–27Proceedings of the 27th Annual International Symposium on Microarchitecture*, San Jose, California, pp. 172–180 (Nov. 30–Dec. 2, 1994).

(List continued on next page.)

Primary Examiner—Edward P. Westin
Assistant Examiner—Jon Santamauro
Attorney, Agent, or Firm—Hamilton, Brook, Smith & Reynolds, P.C.

[57] **ABSTRACT**

An integrated dynamically programmable gate array comprises a two dimensional array of programmable gates. These gates can be implemented as look up tables but hardwired gates with programmable interconnections are also possible. Each one of the gates receives plural input logic signals from plural other gates. Consequently, a broad range of logic combinations are possible. The gates further include locally stored multiple contexts dictating different combinatorial logic operations performed by the gates. The contexts increase the logic operations performable by the gate and the fact that the contexts are locally stored enables

30

Work Scenarios

- **Hired/paid by company to invent**
  - Belongs to company
- **Invent on side on free time**
  - …may depend on employment agreement
  - …whether or not subject matter overlaps with company
- **Consultant**
  - By default yours, but consulting agreement may define

31

University

- **Based on grant funds and resources**
  - Typically goes to university and funding source
  - Right of first refusal…won't always pursue
- **Undergraduate**
  - Invent in class, senior-design → yours
- **Graduate students paid RA from grant**
  - Typically funded by grant and go to University
- **Undergraduate paid research (employee)**
  - Typically funded by grant and go to University
- **Graduate students in class, using class resources**
  - Goes to University

32

Big Ideas

- **We (engineers…particularly in computing space) are knowledge workers, producing IP**
- **IP carries great value**
  - That is less and less tied to physical objects
- **Need to equitably reward and encourage IP creation**
- **Patents, Copyrights, Licenses …**
  - Attempts to provide framework for IP ownership, sharing, monetization
  - …probably not the final answer, particularly as technology landscape continues to evolve.

33

Learn More

- **EAS 507 – IP and Business Law for Engineers**
- **EAS 545 – Engineering Entrepreneurship**
  - Has sections on IP

34

Remember

- **Feedback**
- **Lab 12 today**

35