

# Wealth, Innovation, Design, & Entrepreneurship

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**Prof. Bruce Jacob**

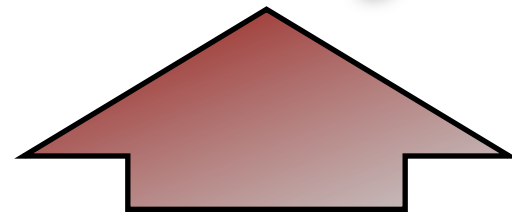
Keystone Professor & Director of Computer Engineering Program  
Electrical & Computer Engineering  
University of Maryland at College Park



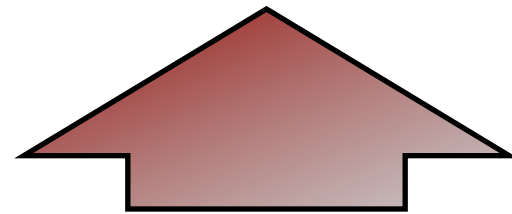
# The **WIDE** Agenda

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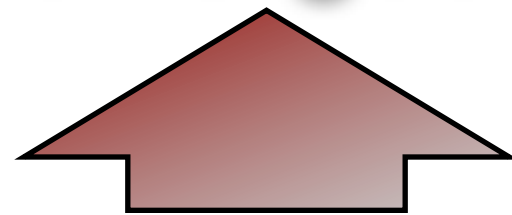
**all individuals in society become wealthier**



**economic growth of the 0->1 type**



**innovation & good design**



**entrepreneurship**

# On Wealth

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Wealth



Not Wealth



# On Wealth

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Wealth



Not Wealth



# On Wealth

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Wealth

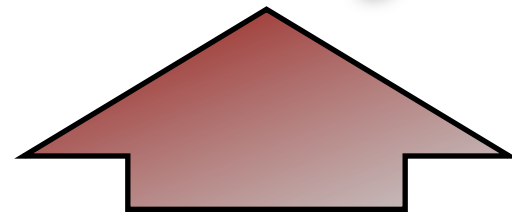


Not Wealth

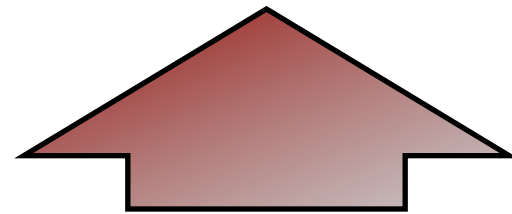
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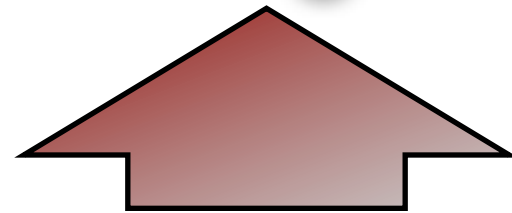
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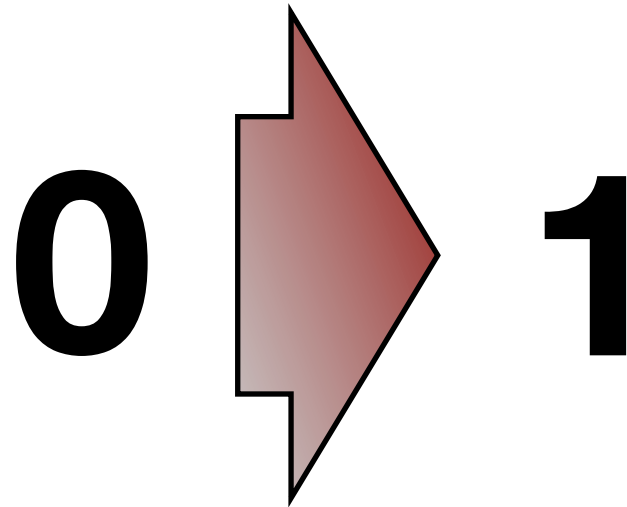
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# Economics of 0, 1, 2

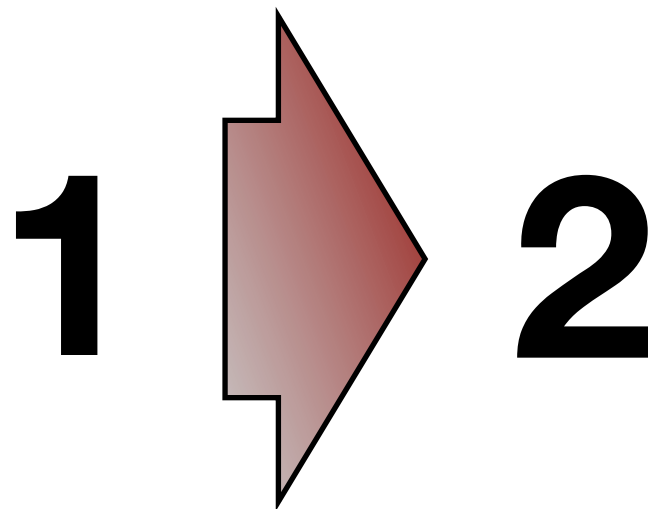
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Fundamentally, there are (*at least*) **two types** of economic growth:

1. giving people something they don't already have, and

2. giving people more of something they *do* already have

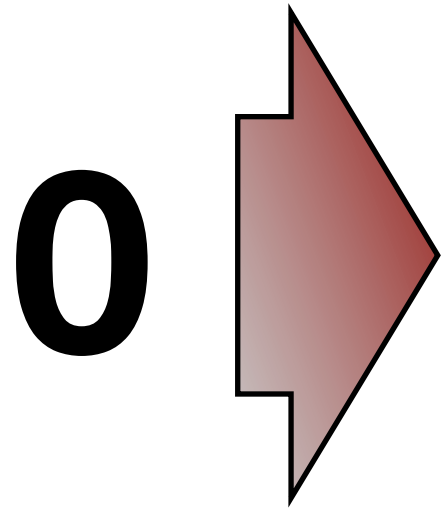


**My claim:** 0->1 is significantly more transformative than 1->2



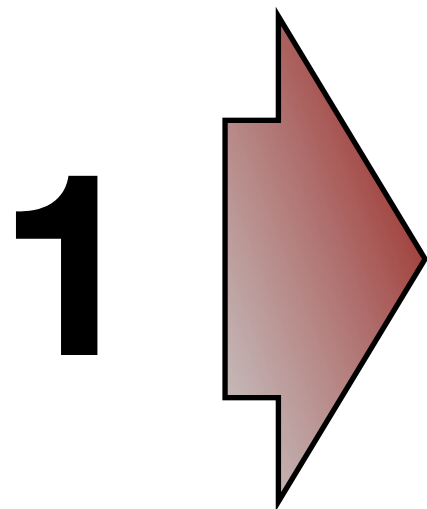
# Economics of 0, 1, 2

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**1**

Food, housing, communications,  
transportation, medical care, etc.

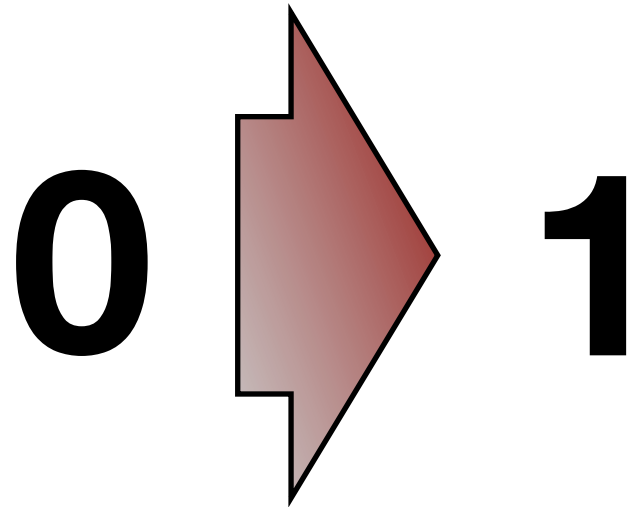


**2**

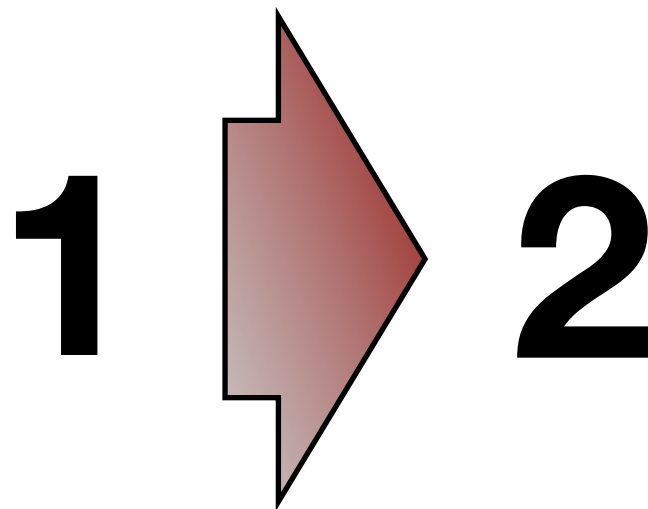
Food, housing, communications,  
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# Economics of 0, 1, 2

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***Economics of BETTER:***  
***Transformative***  
***Innovation-driven***  
***ALL in society benefit***  
***Disobeys laws of conservation***



***Economics of MORE:***  
***NOT transformative***  
***Optimization (cost)-driven***  
***Optimizers benefit, mostly***  
***Will not scale indefinitely***

# It's All About Innovation ...

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“Innovation and trade: the ultimate engines of growth.”

—*The Economist*, Oct 3, 2009

“We have to choose to do what past generations have done: shape a brighter future through hard work and innovation.”

—Barack Obama, Sep 22, 2009

(ASEE’s “Obama Touts Innovation Agenda At New York Community College”)

“In the new knowledge economy, innovation and knowledge are the most important factors driving economic growth.”

—Progressive Policy Institute: *The Innovation Economy*, Oct 2003

“Innovation is the heart of economic recovery & future prosperity.”

—*Roll Call*, Nov 20, 2008



# I Would Add

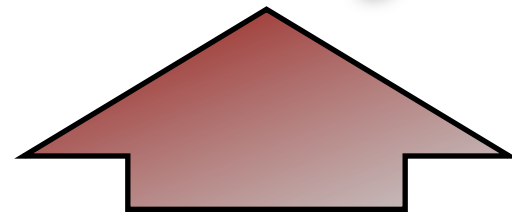
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- Everyone in the US wants to make **money**, not **stuff**  
*(manufacturing for most of our stuff happens elsewhere)*
- Can really only innovate at the **stuff** level (making new stuff, better stuff)  
*(what IS innovation at the money level, anyway?)*
- Re: **stuff** — our lack of a US manufacturing base means several things:
  - We are encouraging (and teaching) the rest of the world to innovate
  - We're not innovating any more as a society — just scattered outliers
  - “American Spirit” circa 1900 ≠ “American Spirit” circa 2000
  - Our economic growth (wealth, std. of living, etc.) is falling behind others

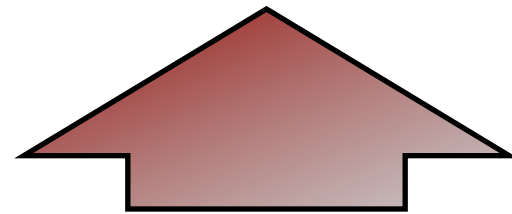
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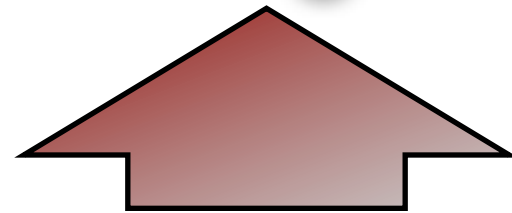
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# What is Design? What is Innovation?

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- Can't define it, but you know it when you see it ... 😊
- Close interaction with **burnout** phenomenon in start-ups
- An inability to eat, think, sleep, care for one's self, etc. while technical problem remains
- Much “innovation” is just good design (... *interesting*)
- Requires staring at one problem for extended period (much like Ph.D. in that regard)



Image search for “burnout”



# Let's think more on that last point ...

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**Innovation and design:** Requires staring at one problem for extended period

**Academia:** Attention flits from topic to topic in a scheduled, often frenetic pace.

Semester concept is both arbitrary and contrived/artificial — false sense of progress

*(innovation recognizes no schedule)*

**We're training them** to be poor designers.

# But, wait, there's more ...

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Students calculate the effort needed to get the desired (or lowest acceptable) grade.

They do the minimum work required.

**We** (unconsciously) **train them** to do this.

*(in design, anything less than full attention = failure)*

Again, **we're training them** to be poor designers.

# Put Simply

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## Design & Innovation — what it demands of you:

- Focus: 100%
- Time: an **extended** period

## The Academic Environment — what it demands of you:

- Focus  $\ll$  100% (on any given topic)
- Time  $\leq$  1 semester (typically is  $\leq$  1 week)

**Conclusion: *Education, while beneficial at the individual level, is counter-productive at the societal level?***



# It Has Been Borne Out in Reality

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- *Innovation and design requires staring at one problem for extended period*
- *Contrast that with academia (high school & college):*
  - Attention flits from topic to topic in a scheduled, often frenetic pace
  - There is neither time nor incentive to spend more than a small fraction of focus on any given topic



Larry Ellison



Bill Gates



Stephen Spielberg



Richard Branson



Michael Dell



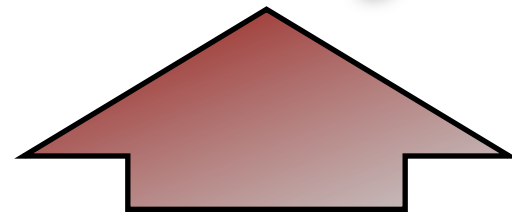
Steve Jobs

**Is it any wonder that SO MANY successful entrepreneurs/innovators dropped out of school?**

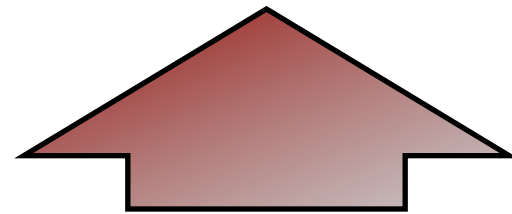
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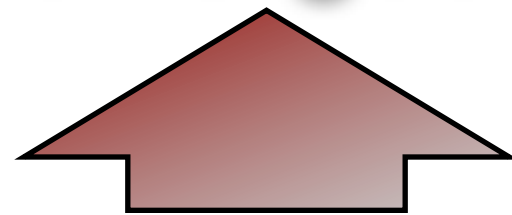
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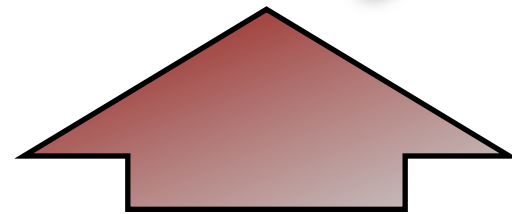
**entrepreneurship**

**(the original “American Spirit”)(NOT education)**

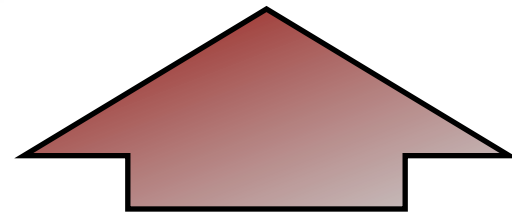
# The **WIDE** Agenda — **Your Part**

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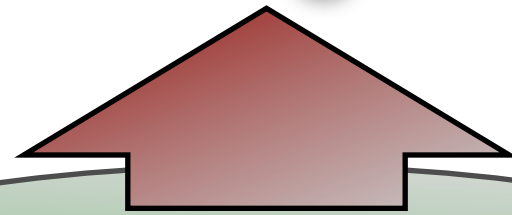
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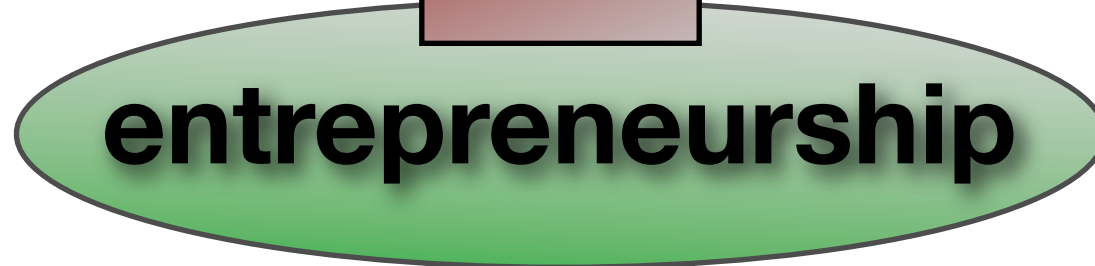
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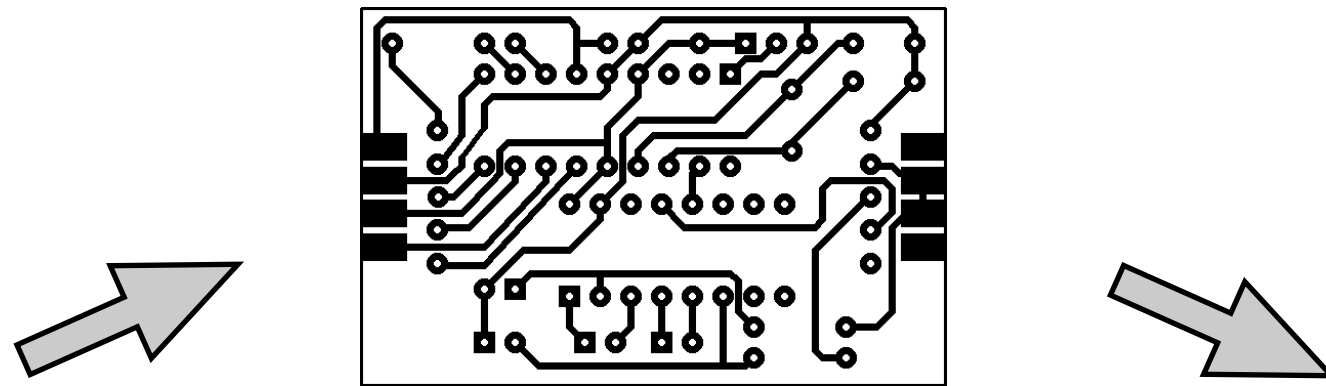


Important development in last decade:

# **Manufacturing as a Service**

# The Basic Idea

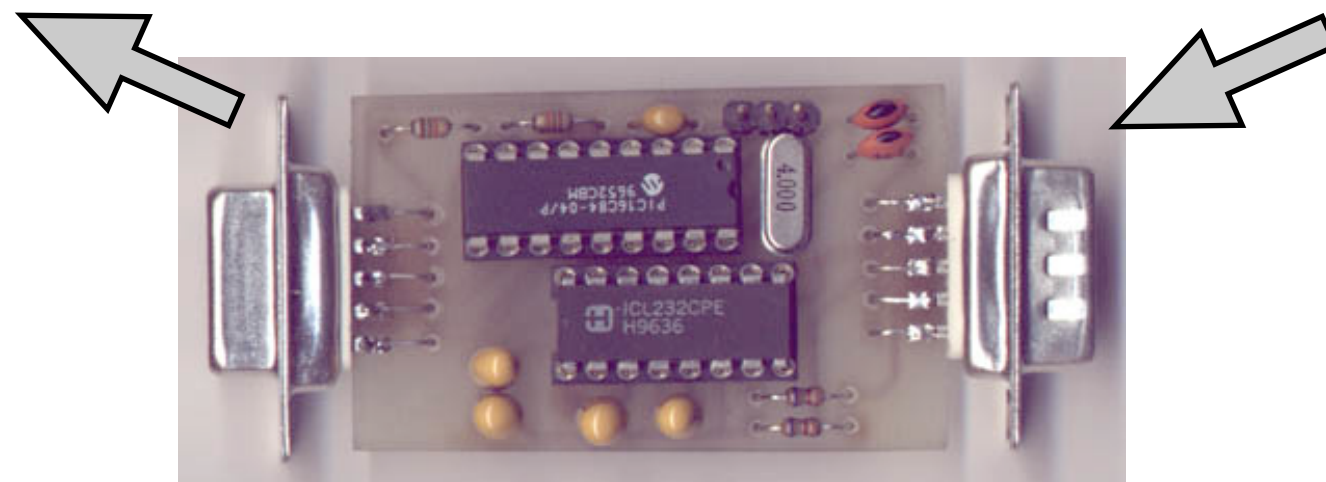
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**Design Blueprint**



**Factory**



**Manufactured Device**

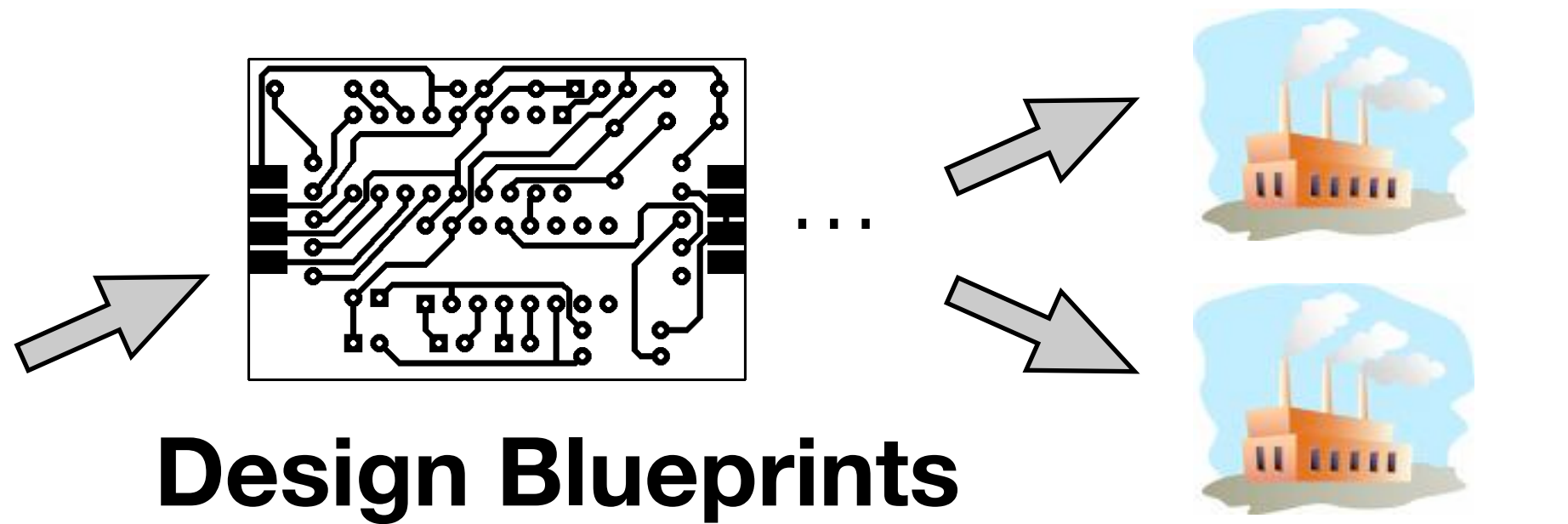


**You**



# The Basic Idea

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**You**



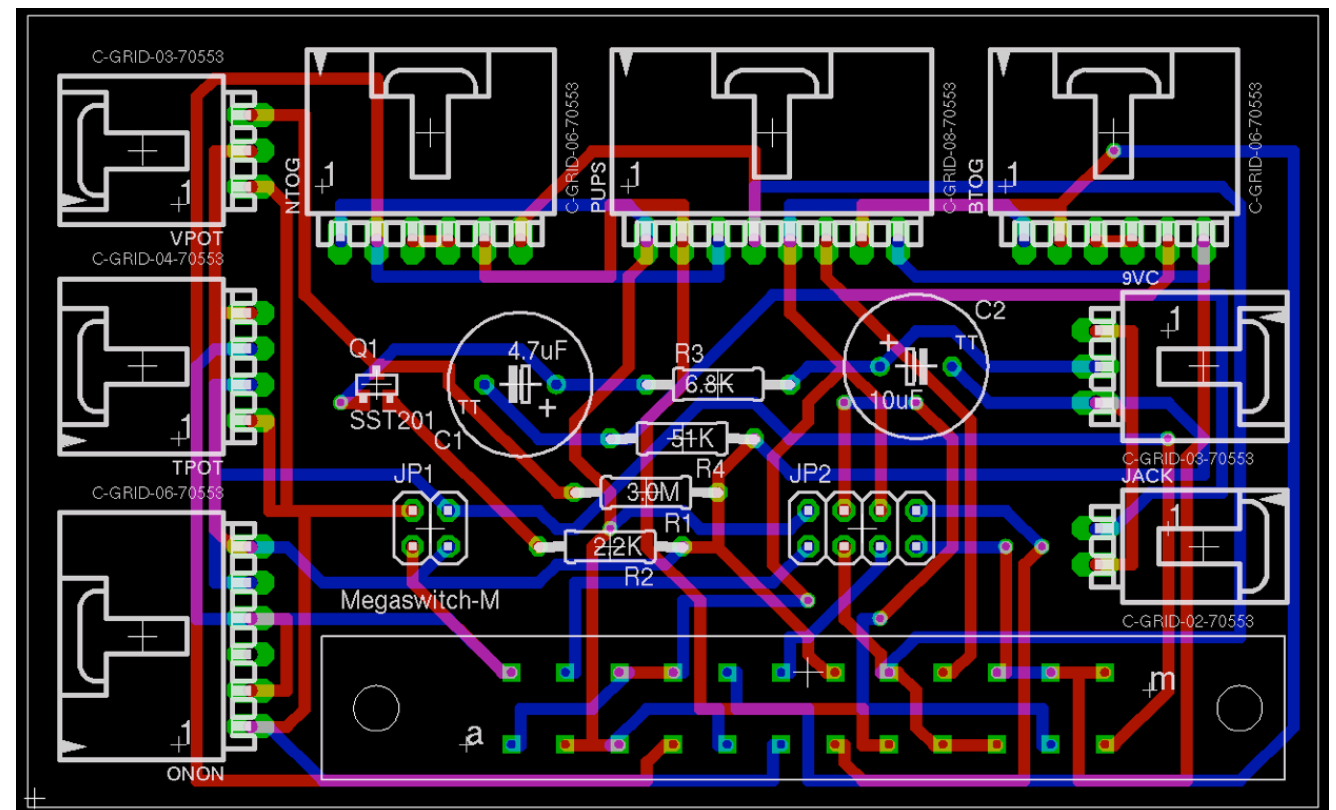
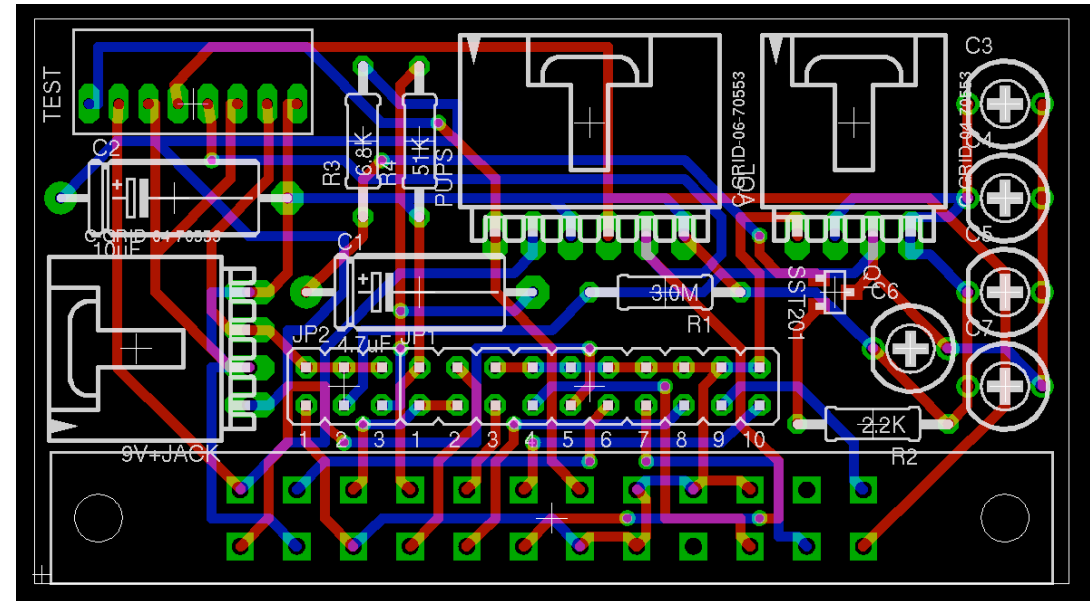
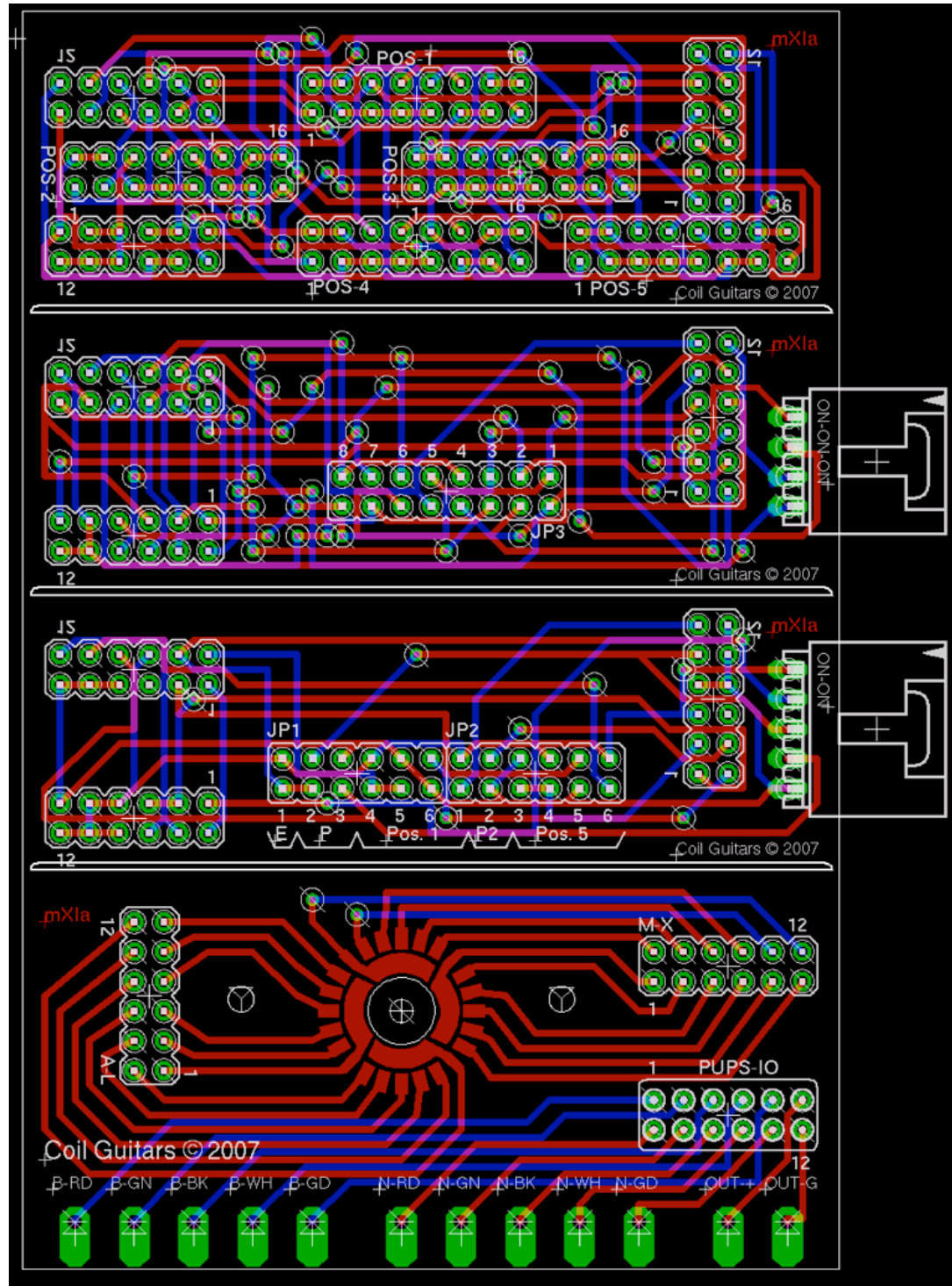
**Manufactured Device**



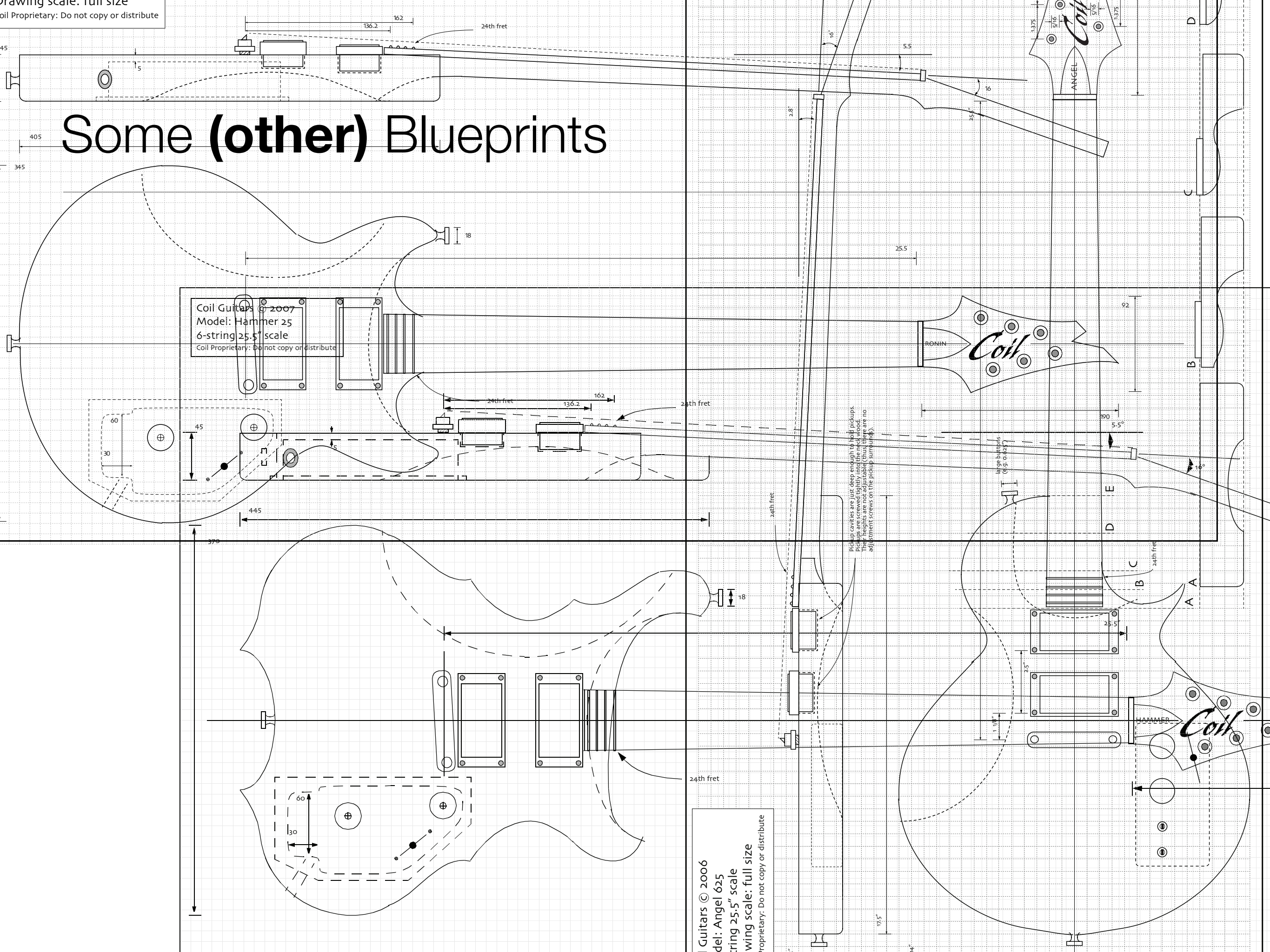
**Assembly**



# Some Blueprints



# Some (other) Blueprints



Coil Guitars © 2007  
Model: Hammer 25  
6-string 25.5" scale  
Coil Proprietary: Do not copy or distribute

Coil Guitars © 2006  
Model: Angel 625  
6-string 25.5" scale  
Drawing scale: full size  
Proprietary: Do not copy or distribute

Pickup cavities are just deep enough to hold pickups.  
Pickups are screwed tightly into the neck wood.  
Pickup heights are non-adjustable (thus there are no  
adjustment screws on the pickup humbuckers).

# Pros & Cons

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- Can't Possibly compete with big companies
- Might fail
- Can't afford it
- Window of opportunity?
- Idea already proven in marketplace (shareware, boutique electronics)
- Win/win situation (even company failure is good résumé material)
- Low risk/reward ratio
- Start soon

*Bottom line: Do it for yourself, your country, the economy, whatever ... just DO it.*

# Questions?

(thank you for your kind indulgence)

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... or just google “bruce jacob”



BACKUP SLIDES



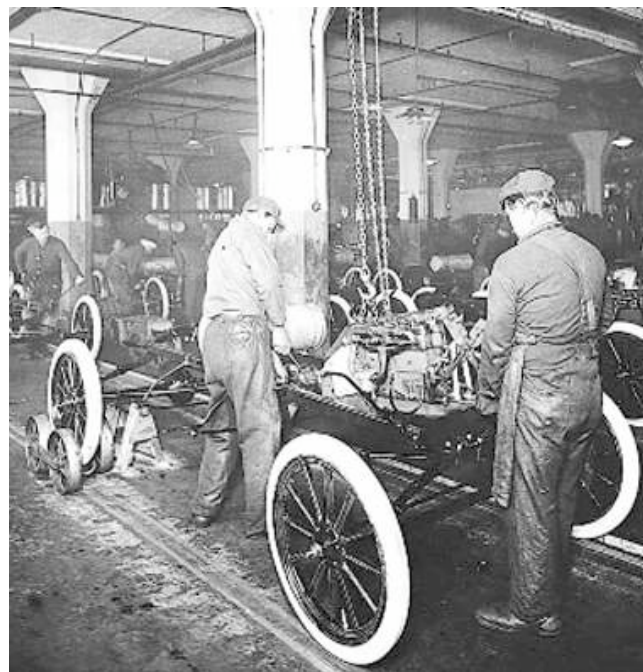
# One answer to the question How Did We Become a Country of Consumers?



Trade apprenticeship



Socratic method



Mass manufacturing



Classroom teaching

- Deep understanding
- Continuity of ideas
- Innovation & good design principles (?)

- Suppression of critical thinking
- ‘Disconnect’ btwn industry & academia
- Overeducation, contempt for trades
- End of innovation?



# Can We Teach Innovation & Design?

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## Necessary Elements:

- Look at one problem for extended period (years?)
- Personal investment in outcome (reward, pride, etc.)
- Time commitment need not be large on per-week basis
- Need to see **real examples** of both success and failure
- Must be guided by innovators (not academicians, not MBAs)
- No fear of failure — either way (grades or loss of job)



Olin College, est. 1997