Successful Entrepreneurship for Microsystems

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Course presented at UCSD CSE 190, Fall Quarter 2014
### CSE 190 Piazza Signup Survey

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>A. Have Ideas, Serious</td>
<td>6</td>
<td>28%</td>
</tr>
<tr>
<td>B. Have Ideas, Some thoughts</td>
<td>4</td>
<td>19%</td>
</tr>
<tr>
<td>C. Have Ideas, Don’t know how</td>
<td>4</td>
<td>19%</td>
</tr>
<tr>
<td>D. No Ideas, But some day</td>
<td>7</td>
<td>33%</td>
</tr>
<tr>
<td>E. No Ideas, Never</td>
<td>0</td>
<td>0%</td>
</tr>
</tbody>
</table>

Data from Fall 2014 class
Startup Success Story...You can do it, too!

https://www.youtube.com/watch?v=mHVJF9VaWfo
Ref: Stanford Graduate School of Business
Make something people **WANT** and **LOVE**!

https://www.youtube.com/watch?v=KKYkmYuk5l8

Ref: Google for Entrepreneurs

**ALEXIS OHANIAN**
Cofounder, reddit.com
HW 2 – Top 5 lessons from Video clips

Due on Thursday, October 9th.

1.
2.
3.
4.
5.
Entrepreneur Traits Checklist

- Confidence
- Self-Motivation
- Tenacity
- Understand your Limits
- Healthy disrespect for Rules
- Willingness to Fail

Ref: Jenny Q.Ta, Founder and CEO of Sqeeqee
CSE 190 Entrepreneur TEAMS

- **CEO**, Chief Executive Officer – Business, General Management, Investor engagements, ...
- **CTO**, Chief Technology Officer – Technical Idea, Implementation, …
- **CMO**, Chief Marketing and Sales Officer
- **Customer “Representative”**
- **COO**, Chief Operations Officer
Key Successful Entrepreneur Skills

- TEAM work
- Presentation Skills- Customers, Investors, Partners,…
- Motivated - Drive and Desire for YOUR Business
- LISTEN to the Customer, the Team,...
- Technical
- Knowledge Awareness in a Broad set of areas
Create product that solves a real Customer Problem…
A “must-have” for the customer…a Differentiated solution

A systematic approach to planning and execution
How DIFFERENTIATE?
...Your knowledge of Microsystems could be a key

How much do we pay for Apps?
How much Revenue for the Developer?

How many APP Developers worldwide??

USER EXPERIENCE

Sensors
SW Integration
Characteristics
Power Dissipation
Battery Life
...

Taking charge
...many Sensors

ECG SMART BANDAGES
BLOOD PRESSURE
PULSE
GLUCOMETER
PEDOMETER
SMART PILLS OR
INTERNAL SENSORS
WEIGHT
BODY COMPOSITION
ENVIRONMENTAL
SENSORS
History

Market Drivers

Industry Directions & Challenges

Opportunities

Innovation in Product Development
Integrated Co-Design
Non-LE process
3D / MtM
Fabless
Entrepreneurial
1906  Nobel prize for J.J.Thomson for the “Electron”

Early Addition Machine…Burroughs

Vacuum Tubes in the early 1900’s
1945 ENIAC
The First Electronic, Large Scale General Purpose Digital Computer
...University of Pennsylvania

1995 ENIAC on-a-Chip
...University of Pennsylvania
...Van der Spiegel, et al.
1947  Transistor Invention
1958-1959  First IC, First Planar IC

1947  
Bell labs  
Schokley, Bardeen, Brattain

1958  
First IC, Kilby

1959  
First Planar ICs, Hoerni
1970 Intel 4004 ...2.3 K Transistors
Today ...>2B Transistors
We have come a LONG way! ...yet a LONG way to go!

Quintillions
1,200

Transistors Worldwide

15X more
In the next 5 YEARS


Transistor Growth Needed to Manage, Store and Interpret Data


<table>
<thead>
<tr>
<th>Description</th>
<th>Cost 1975-2009</th>
<th>Cost 2010-2015</th>
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<tbody>
<tr>
<td>Wafer size</td>
<td>$1,000k</td>
<td>$50,000k</td>
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<tr>
<td>Technology node</td>
<td>$50,000k</td>
<td>$&gt;400,000k</td>
</tr>
<tr>
<td>Typical equipment cost</td>
<td>$1,000k</td>
<td>$50,000k</td>
</tr>
<tr>
<td>Price per transistor</td>
<td>$2,300k</td>
<td>$&gt;400,000k</td>
</tr>
<tr>
<td>Transistors</td>
<td>2,300</td>
<td>995 million</td>
</tr>
<tr>
<td>Computations per kWh (1975 to 2009)</td>
<td>$10^8</td>
<td>$10^{15}</td>
</tr>
<tr>
<td>Computations per kWh (2010-2015)</td>
<td>$10^{15}</td>
<td>$10,000,000x</td>
</tr>
</tbody>
</table>

Bill Holt, Intel ISS2012
So, if you had an idea, what should you do?

...entrepreneurship creation

Internal Development at an IDM

Software or Board level product

License IP

Fabless I.C. company

Existing

New

Standard, Technology Market
Customer Base

~1300 fabless IC companies worldwide

End-product

..but, only a very small fraction of fabless start-ups are successful!!
The “Productization / Commercialization” Lifecycle

Basic Research

Applied Research

Project “down-selection”

Lab Demo

Funding

Market

Customer

Biz Plan

... 

Model Prototype

“System”/ 

Produce-able 

Prototype

Production

Technology Release Levels, Ref. nasa.gov

1 Basic Principle

2 Concept

4

5

7

9

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HW 3 – TEAM Entrepreneurial Inventory – Presentation 1

Due on Thursday, October 16th.
Be prepared to make a 3 minute presentation…we will call on all Teams

1. Introduce your Team

2. Your Entrepreneurial IDEA?

3. What Customer problem does your idea solve?

4. Who are the potential Customers?

5. Who is your Competition? How will you DIFFERENTIATE your product?

6. Who will make it?

7. How big a company do you want to build? Revenue? # people?