Challenges and Opportunities of Robotic Startups

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1. Challenges of Robotic Startups
A. Want to Do a Robotic Startup?

Who am I?
- Received excellent education in robotics and/or related field
- Conducted excellent research in robotics

What’s next?
B. Challenges of Startups

- Founded in 2005
- Successful Alumni: Dropbox, Airbnb, Reddit, etc.
- Acceptance rate: 3.25% → Out of 500,
- 93% eventually fails → 1/200 applied to YC will succeed.
## B. Challenges of Startups

<table>
<thead>
<tr>
<th>Category</th>
<th>ZhenFund</th>
<th>SinoVation Ventures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong># of Investment</strong></td>
<td>375</td>
<td>345</td>
</tr>
<tr>
<td>Hardware</td>
<td>28 (7.47%)</td>
<td>17 (4.94%)</td>
</tr>
<tr>
<td>Investment Size RMB 1M-9M</td>
<td>58.9%</td>
<td>46.9%</td>
</tr>
<tr>
<td>Investment Size RMB 10M-90M</td>
<td>33.3%</td>
<td>35.7%</td>
</tr>
<tr>
<td>Unicorn (&gt;1B RMB Valuation)</td>
<td>7.83%</td>
<td>18.56%</td>
</tr>
<tr>
<td>IPO</td>
<td>4 (1.07%)</td>
<td>1 (0.29%)</td>
</tr>
<tr>
<td>IPO (Hardware)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
C. Challenges of Robotic Startups: The Jibo

Jibo Delayed Until October 2016 Timeframe
Jibo has been delayed again until the October 2016 timeframe. The social robot's hardware and system software is mature and reaching its final state, but it needs more time for practicing its skills and getting better at talking with users.
C. Challenges of Robotic Startups: The Lily Case

Antoine Balaresque
CEO, Co-Founder

Henry Bradlow
CTO, Co-Founder

VS

DJI

LILY
C. Challenges of Robotic Startups: 3DR vs DJI

Drone-maker 3D Robotics cuts jobs, refocuses on corporate market

Published: Mar 23, 2016 11:09 p.m. ET

*Shifts focus from cutthroat consumer arena to get higher margins*

By THERESPOLETTI
COLUMNIST
The team doesn’t have what takes to succeed

The idea is not serving the market

Running out of cash too fast

Not being able to support growth

Poor allocation of resources and money

Not realizing competition in the market

Ignoring customers
D. The Lean Startup

Eric Reis - "The Lean Startup"
2. Lessons from HKUST Robotic Startups
HKUST

**FACTS**

- Founded in 1991
- 4 Schools: Sci., Eng., Bus., H&SS
- Academic Faculty: 450
- Students: 11,000 (7,000 UGs+4,000 PGs)
- SENG: 150 Faculty, 4300 Students
  - ECE, CSE, MAE, IELM, CBE, CEE
- #33 (QS Ranking), #1 in Asia (QS, 2011-2013)
- ECE #17, EMBA #1, MBA #10
Automation Technology Center (1992.9- Present)

**Research Areas:**
- Robotic Hands
- Nonholonomic motion planning
- Workpiece localization
- Motion control and CNC systems
- Parallel robots
- UAV

**Industry Impact:**
- China’s motion control industry
- China’s robot industry
- China’s semiconductor equip. industry
- UAV industry

**Academic Impact:**
- IEEE Fellow
- IEEE TRA/TAC AE
- National Natural Science Award (1997)
- Pioneer in NMP Research
- One of the Most Cited Textbooks in Robotics
- NSFC Distinguished Young Scholar (Class B)
- Changjiang Scholar, MOE
- General Chair, ICRA 2011

**Education Impact:**
- New collaboration model with local industries
- Project-based courses in the new curriculum
- Curriculum reform with NUDT, SJT & HIT
- Entrepreneurship program at UG & PG level
- Students became leaders in academia & industry
First Startup: Googol Tech.

- Controller for HKUST hand, 1996
- First industry application, 1997
- Googol HK, 1999
- Googol SZ, 1999
- Googol Institute, 2007

Googol Product Family

- PC-based motion controllers
- Imbedded motion controllers
- Drive integrated controllers
- Smart drives & vision systems

- Leading motion control company in China, >50% market share
- One of the largest motion control research institutes, >120 engineers
Engg395X Engineering Project Design: Robocon

A unique course in which a group of talented students working together to design, manufacture, and debug a team of robots to accomplish a single mission: Robocon (Robot Contest sponsored by ABU)

Who should take it?
Engineering & science students of all grades, interested in a serious and rewarding robot design experience.

Understand game rules
- Problem definition
- Brainstorming
- Team formation

Design presentation
- Use of tools
- Presentation skills
- Communication skills
- Training (Electrical & Mechanical tools)

Mechanical subsystem
Electronic subsystem
Software subsystem

Team Achievement
HK Robocon 2005
- Champion
- 2nd Runner-Up
- Best Engineering Award
- Best Artistic Design Award

Robocon International 2005
- 2nd Runner-Up

HK Robocon 2007
- 2nd Runner-Up
- Best Engineering Award

HK Robocon 2008
- Champion
- 2nd Runner-Up
- Best Team Spirit Award

System integration
- Subsystem evaluation
- Software debugging
- Parameters turning
- Project coordinator

Test! Test! Test!

Competition

System software
- Parts manufacture
- System design
- Assembly, testing

X.Y.Li, 2008 Team leader, Analyst, Goldman Sachs
The most valuable lessons I learned in Robocon is the importance of effective communication, group management as well as the ability to analyze and solve complex engineering problems.

Z.D. Ma, 2005 co-leader Mphil, Oxford
Robocon is the most valuable experience in my college life. I learned from it how to deal with extreme challenges in life.

Wang Tao, 2005 Team leader, CEO, iFlight Tech.
Of the many things I learned from Robocon, teamwork & project management are most important for me to start my own company.

S.J.Sher, 2008 Team leader Phd, U Penn
My Robocon experience allowed me to identify, define and solve a true engineering problems.
DJl and Beyond

Yixi CHEN, Bull-B
Jinbo SHI, QKM Tech

Zhe LIANG, YIZHI Tech
Prof. Shaojie SHEN, HKUST

Mingyu WANG, YUZHOU Tech

Frank WANG, DJI

CY Leung 为2005年香港冠军队颁奖
From Geometry to Startups

DJI and Beyond

DJI Founded in 2006

Milestone product 2008
The Phantom Revolution

Top 10 Tech Product Designs of 2014

1. Nest
2. DJI Inspire 1
3. iPhone 6 & 6 Plus
4. Osmo Tangram
5. Tesla 2014 Model S
6. Jawbone UP3 Wristband
7. Square Stand
8. Nerf Rebelle Rapid Blaster
9. Oculus Rift Crescent Bay
10. Qualcomm WiPower

Top 10s of 2014

1. Apple Watch
2. SmartThings Starter Kit
3. DJI Phantom Vision+
4. Oculus Rift Development Kit 2
5. iPhone 6 Plus
6. HERO4 GoPro
7. Mophie Space Pack
8. Jawbone UP3
9. iPad Air 2
10. The Ring Video Doorbell
The Family

Phantom 4

Inspire 1

S1000+

Zenmuse Gimbal Z15

OSMO

Reimagine movement

OSMO

Ronin-M

Mavic
QKM Tech

- Founded in 2011
- **Mission:**
  A global leader in C³ automation solution
- **Main Products:**
  - Smart & reconfigurable robots
  - Intelligent system integration software
  - Robot accessories
ePropulsion

• Founded in 2012

• Mission:
  Environment-friendly electrical outboard systems for better user experience

• Main Products:
  - Navy 6.0T
  - Navy 6.0R
ATC Spinoffs

- Vision
- Sensor
- Smart battery
- Chipsets
- Controller
- Servo drive
- Actuators (S)
- Motor driver
- Smart battery
- ePropulsion Technology
- QKM
- Mechanisms
- Reducer (S)

Diagram:

1. IDEAS
2. BUILD
3. DATA
4. MEASURE
5. LEARN

From Geometry to Startups
The Hollywood of Makers

Dongguan
- THE SSL RTP
- GOOGOL
- DJI
- Parallax Precision

Shenzhen
- HKUST SZ IER

Hong Kong
- HKUST

Hollywood of Makers
- Design Co.s (Visualization of ideas)
- Shops & factories for prototypes & small batch prod.
- Factories for large scale prod. (Apple, Samsung, Microsoft, ...)
- Components suppliers
- Logistics components
- Experienced workers & managers for your own factory
3. The Songshan Lake Robotic Startup Facility
The Hollywood of Makers

Dongguan
SONGSHAN LAKE
Shenzhen
Hong Kong

CHINA
Robotic Startup Facilities

HK Teams
International Teams
Domestic Teams

- Project teams
- Projects

S^2L TechX Institute

Startup Teams

Robotic Incubation Center

RTM

1. Actuators
2. Transm.
3. Control
4. Sensing
5. Vision
6. Software
7. Comm.
8. SOC
10. Power

1. Robot Machines
2. Industrial Robots
3. Medical / Healthcare Robotics
4. Autonomous Systems
5. Consumer Robotics

Supply Chains
Angel Fund

1. Robot Machines
2. Industrial Robots
3. Medical / Healthcare Robotics
4. Autonomous Systems
5. Consumer Robotics
方案对比

ADVANTAGES
• 分期开发弹性大
• 结构与工艺容易, 功能调整弹性大
• 与景观融合度强

DISADVANTAGES
• 功能相对分散

ADVANTAGES
• 功能高度复合集中, 效率高
• 交流互动容易, 聚集感强
• 可达到更高的标识性

DISADVANTAGES
• 分期开发弹性低, 结构工艺要求高
From 0 to 1:

- Students
- Startup Team
- Startup Company
Supply Chains

Critical Components Partners

Local Manufacturing Supply Chains
Scale Up

Xbot Park Recruitment Talk

HR Support:
- Connections with Top Universities
- Summer Schools
- Robotic Schools with GDUT, DGPU, HNU...

Connection with Leading Research Labs

Business Advising:
- Accounting, Tax, IP
- Cooperate Governance
- Company Structure
- …
The ePropulsion Example:

- Founded in 2012
- Four year-1 master students in HKUST
- Master thesis → Startup
The ePropulsion Example: The First Product

- **First prototype and product**: 6kW clean outboard motor
- **First batch of products shipped to US** in June of 2014

**NAVY 6.0**
Shape your lifestyle

- Environment-friendly
- User-friendly
  - Quiet
  - Clean
The ePropulsion Example: The Second Product

- **Second product**: 1kW clean outboard motor with more accurate market positioning
- First batch of products shipped to Europe in the March of 2015

- **Environment-friendly**
- **User-friendly**
  - Quiet
  - Clean
  - Portable
The ePropulsion Example: The Third Product

- Further growth in 2017
- Expected to rank #1 globally in outboard motor market
- Spin-off: under-water robot start-up team
- Exploring new applications: from transportation to recreation
- Building an ecosystem with full-suite of above-water and under-water products
4. Conclusion
Conclusion

• Startups especially robotic startups are challenging and difficult.

• The Songshan Lake Robotic Startup Facility can help you to improve significantly your odds of success in your robotic startup endeavor.

• Fail quick and learn fast.

• Just do it!
ESSENTIAL INGREDIENTS OF BUILDING A SUCCESSFUL ROBOTIC STARTUP

IEEE RAS Startup Boot Camp Organised Jointly with Xbot Park at the Hollywood of Makers, Dongguan, China.

Events
- Company visit
- Supply chain exploration
- Keynotes: Prof. Zexiang Li, Dr. Yanliang Zhang ...
- Idea Pitch @ Camp

*Free to participate (limited to 20 seats)

March 31, 2017: Submission of CVs to StartX@xbotpark.com

June 4, 2017 to June 11, 2017 (Just After ICRA’2017). Extended stay can be requested and arranged. Songshan Lake TechX Institute, Dongguan (0.5hr drive to Shenzhen, 1.5 hr drive to Hong Kong. Attendees can fly to Hong Kong or Guangzhou or Shenzhen airport)
Thank You!

Euclid
325 - 265 BC

R. Descartes
1596 - 1650

I. Newton
1643 - 1727

C.F. Gauss
1777 - 1855

G.F.B. Riemann
1826 - 1866

H.K.H. Weyl
1885 - 1955