Challenges and Opportunities of Robotic Startups

ZEXIANG LI
SONGSHAN LAKE XBOT PARK, CHINA
ROBOTICS INSTITUTE, HKUST

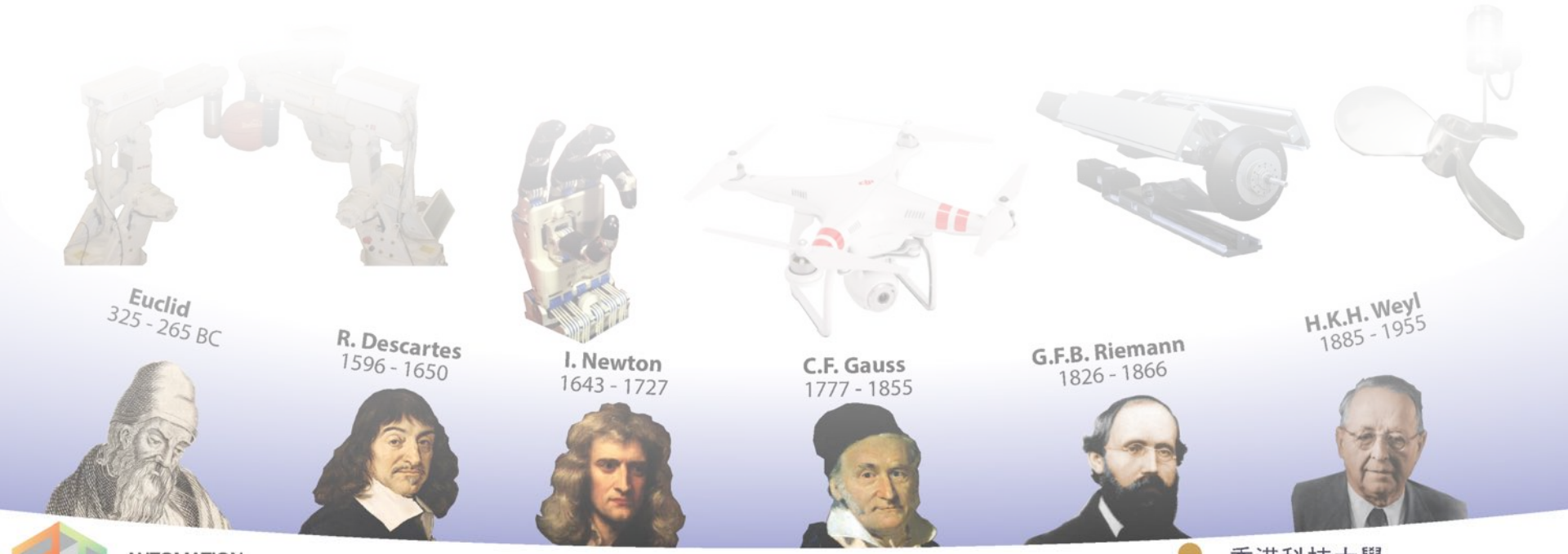




Table of Contents

1. Challenges of Robotic Startups
2. Lessons from HKUST Robotic Startups
3. The Songshan Lake Robotic Startup Facility
4. Conclusion

1. Challenges of Robotic Startups

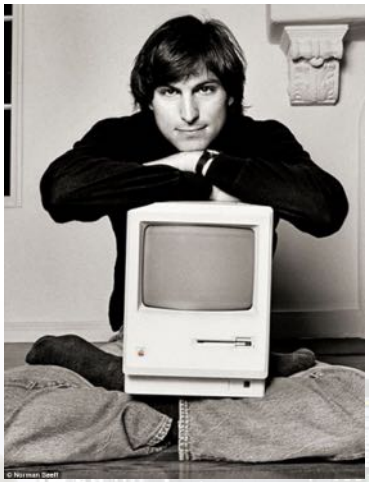


A. Want to Do a Robotic Startup?

Who am I?

- Received excellent education in robotics and/or related field
- Conducted excellent research in robotics

What's next?



B. Challenges of Startups

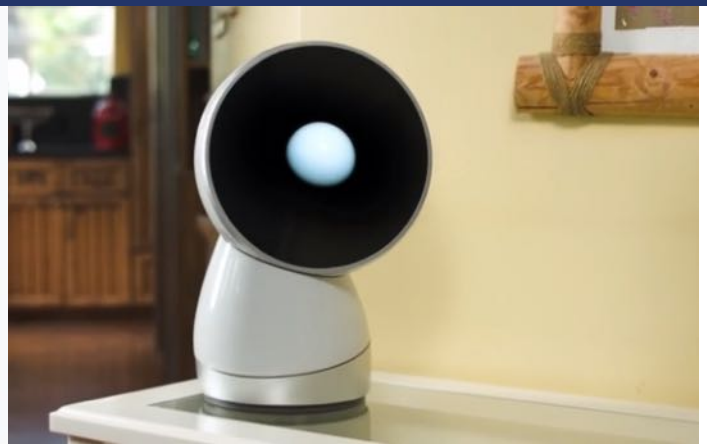
Y Combinator

- 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

	ZhenFund 真格基金	创新工场 SINOVATION VENTURES
# of Investment	375	345
Hardware	28 (7.47%)	17 (4.94%)
Investment Size RMB 1M-9M	58.9%	46.9%
Investment Size RMB 10M-90M	33.3%	35.7%
Unicorn (>1B RMB Valuation)	7.83%	18.56%
IPO	4 (1.07%)	1 (0.29%)
IPO (Hardware)	0	0

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.

in the Household Hub

- Cleaning Robots
- Robot Lawn Mowers
- Personal Robots
- Robot Appliances

VS

C. Challenges of Robotic Startups: The Lily Case

Antoine Balaresque

CEO, Co-Founder

Henry Bradlow

CTO, Co-Founder

VS

DJI

C. Challenges of Robotic Startups: 3DR vs DJI

Home › Investing › MarketWatch First Take

GET EMAIL ALERTS

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

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

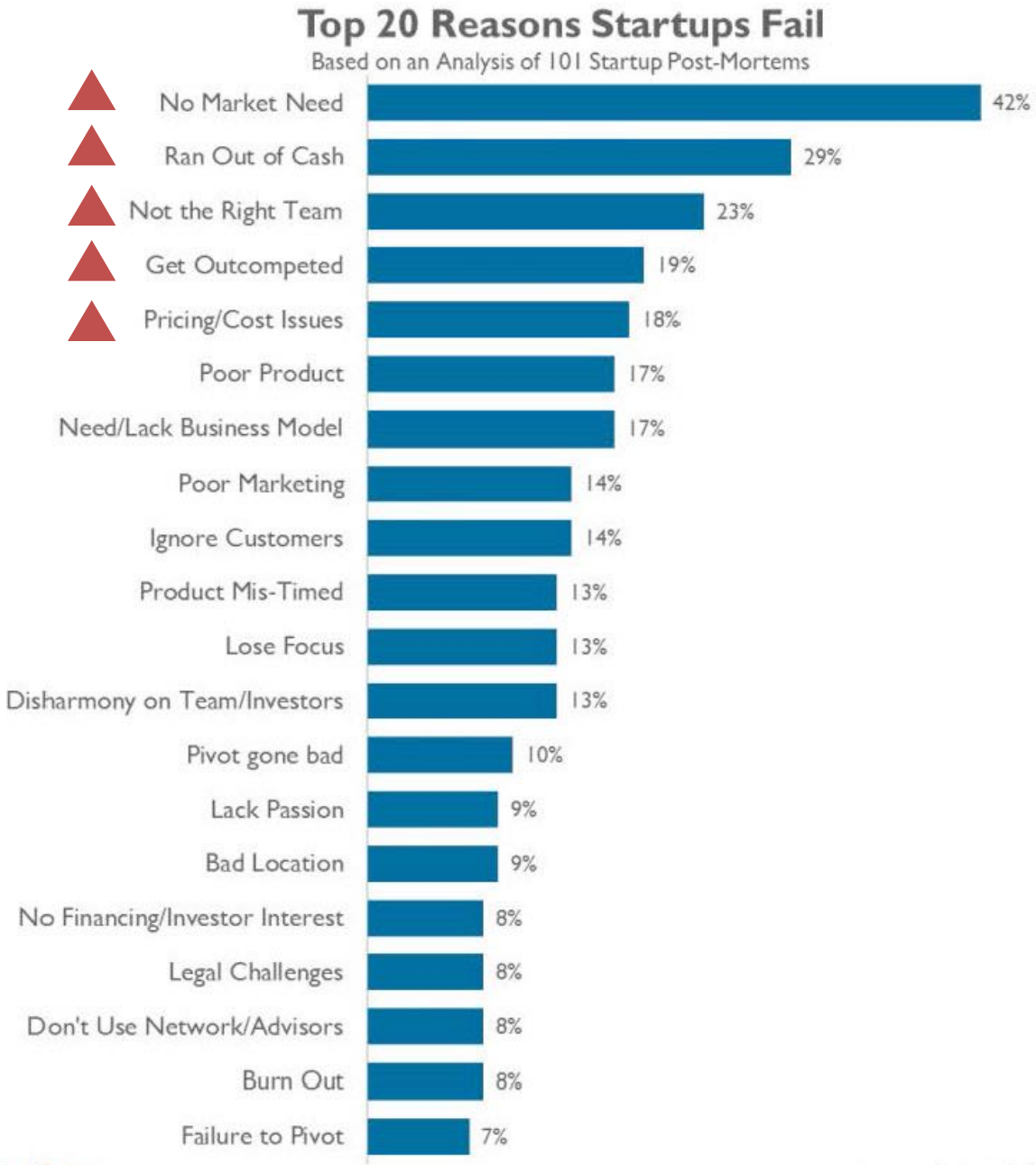
15

Aa

Shifts focus from cutthroat consumer arena to get higher margins

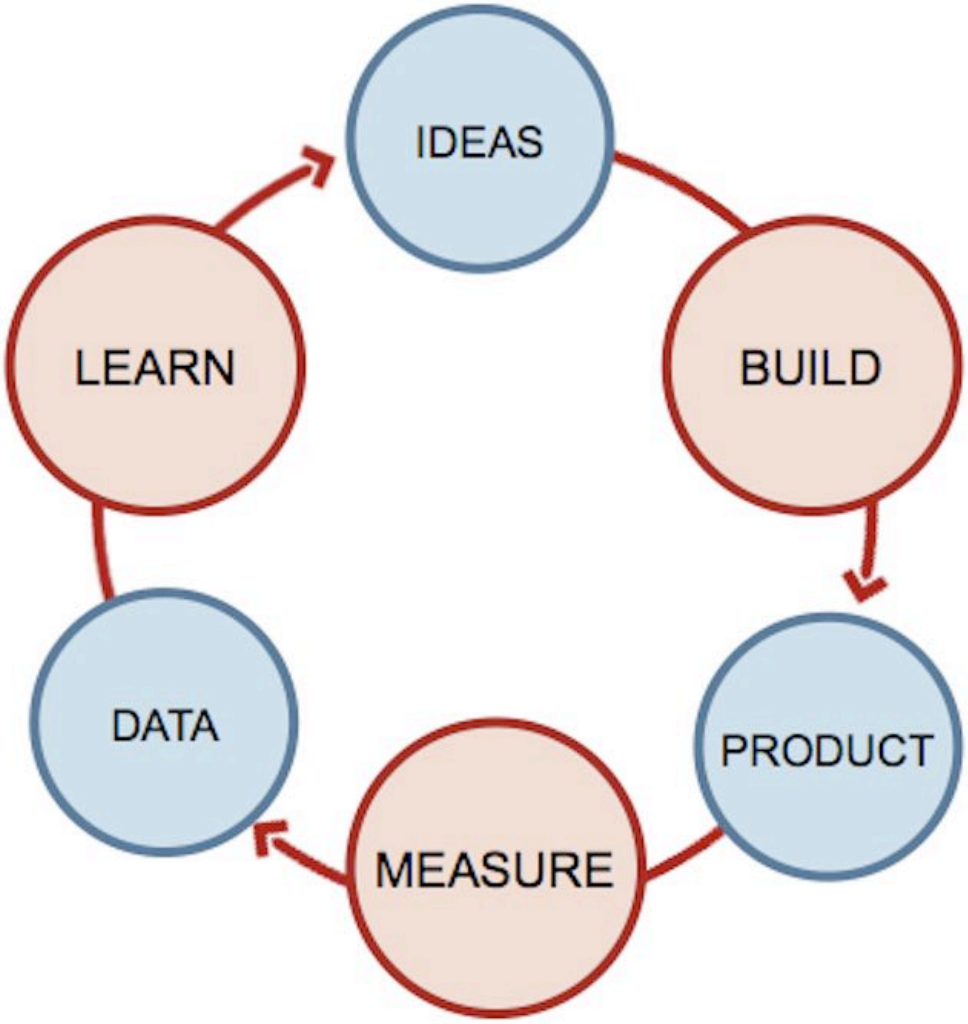
By
THERESE POLETTI
COLUMNIST

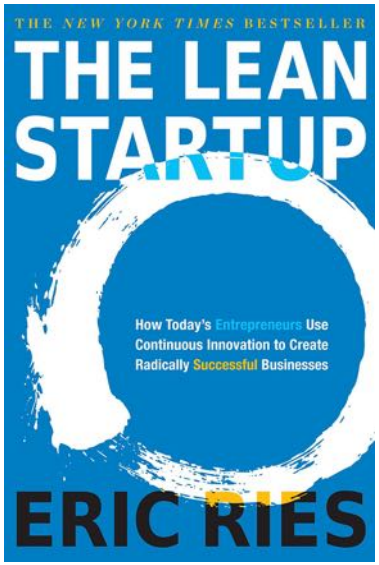
3DR's Solo drone



	By FAST Company
1	The team doesn't have what takes to succeed
2	The idea is not serving the market
3	Running out of cash too fast
4	Not being able to support growth
5	Poor allocation of resources and money
6	Not realizing competition in the market
7	Ignoring customers

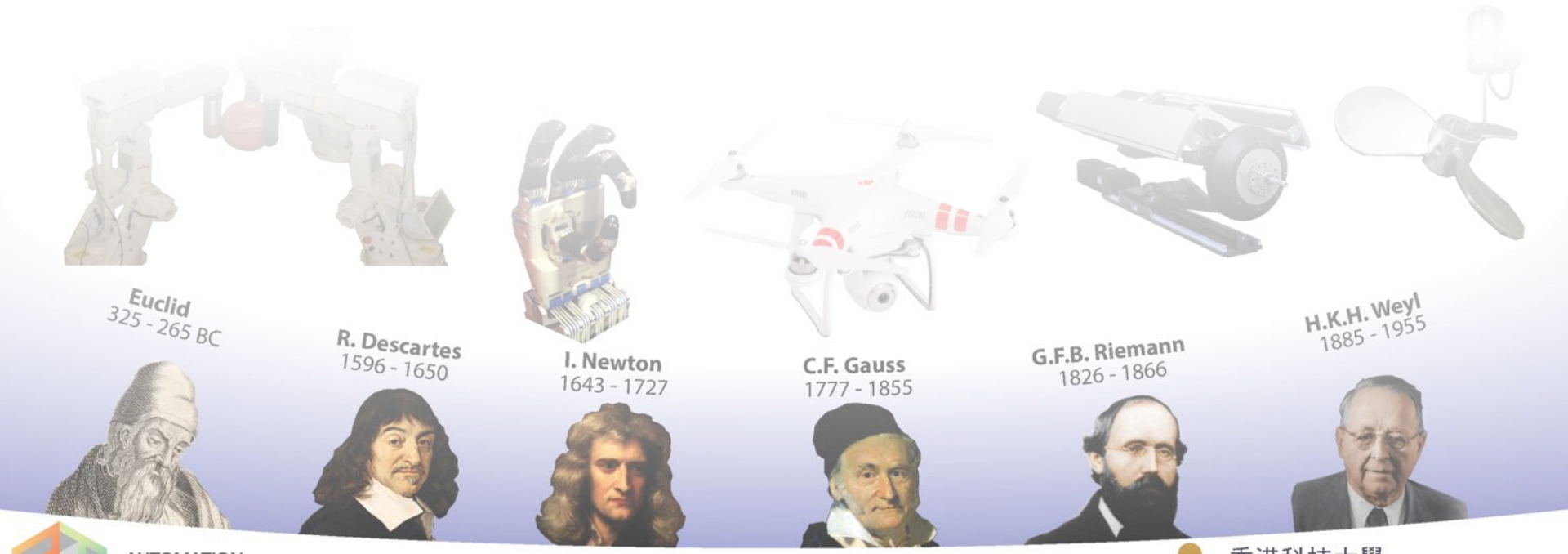
D. The Lean Startup





Eric Reis- "The Lean Startup"

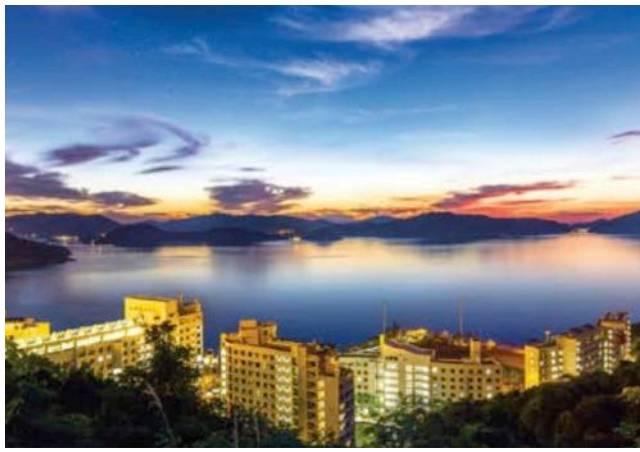
2. Lessons from HKUST Robotic Startups



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:

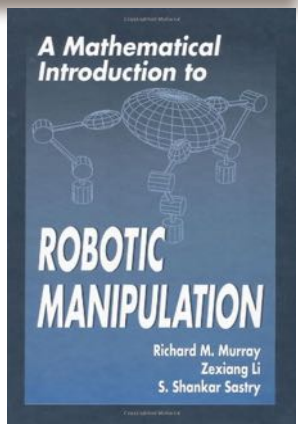
- China's motion control industry
- China's robot industry
- China's semiconductor equip. industry
- UAV industry

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 Product Family

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

Googol HK, 1999

Googol SZ,1999

Googol Institute, 2007

- *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 robo ts 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

-2004 ~ 2005-

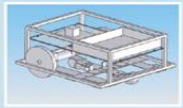
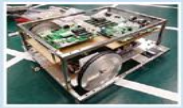
Media Report

Design presentation



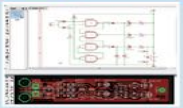
- Use of tools
- presentation skills
- Communication skills
- Training (Electrical & Mechanical tools)

Mechanical subsystem

Electronic subsystem


Software subsystem

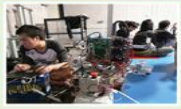
- System software
- Parts manufactory
- System design
- Assembly, testing

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**
  HK 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



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.

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.Shen, 2008 Team leader Phd, U.Penn

My Robocon experience allowed me to identify, define and solve a true 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.

DJI and Beyond

Yixi CHEN, ***Bull-B***
Jinbo SHI, ***QKM Tech***

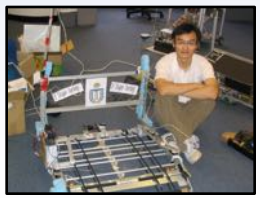
Zhe LIANG, ***YIZHI Tech***
Prof. Shaojie SHEN, ***HKUST***

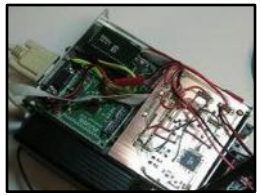
CY Leung 为2005年香港冠军队颁奖

Mingyu WANG,
YUZHOU Tech

Frank WANG, ***DJI***

DJI and Beyond

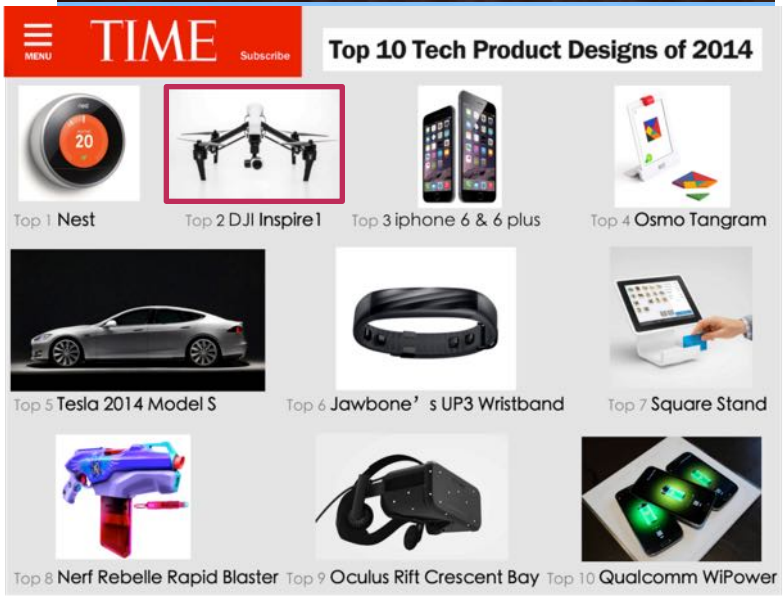


DJI Founded in 2006

Milestone product 2008

The Phantom Revolution



The Family

Phantom 4

Inspire 1

S1000+

Zenmuse Gimbal Z15

OSMO

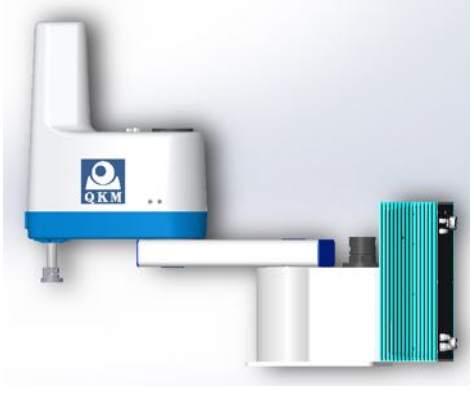
Ronin-M

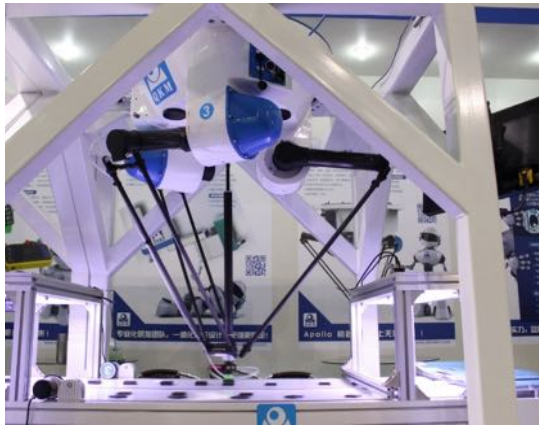
Mavic

QKM Tech

- **Founded in 2011**
- **Mission:**

  A global leader in C^3 automation solution
- **Main Products:**
  - 小型轻量工业机器人 Smart & reconfigurable robots
  - 机器人应用软件 Intelligent system integration software
  - 机器人辅件 Robot accessories



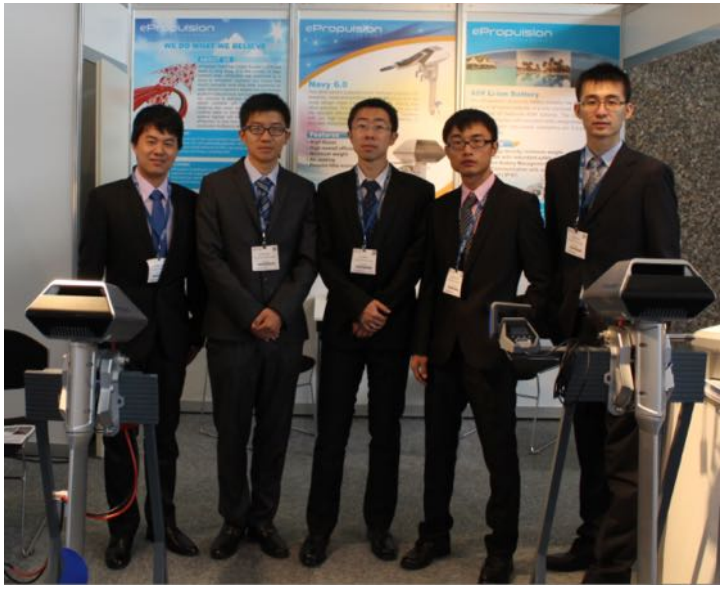


ePropulsion

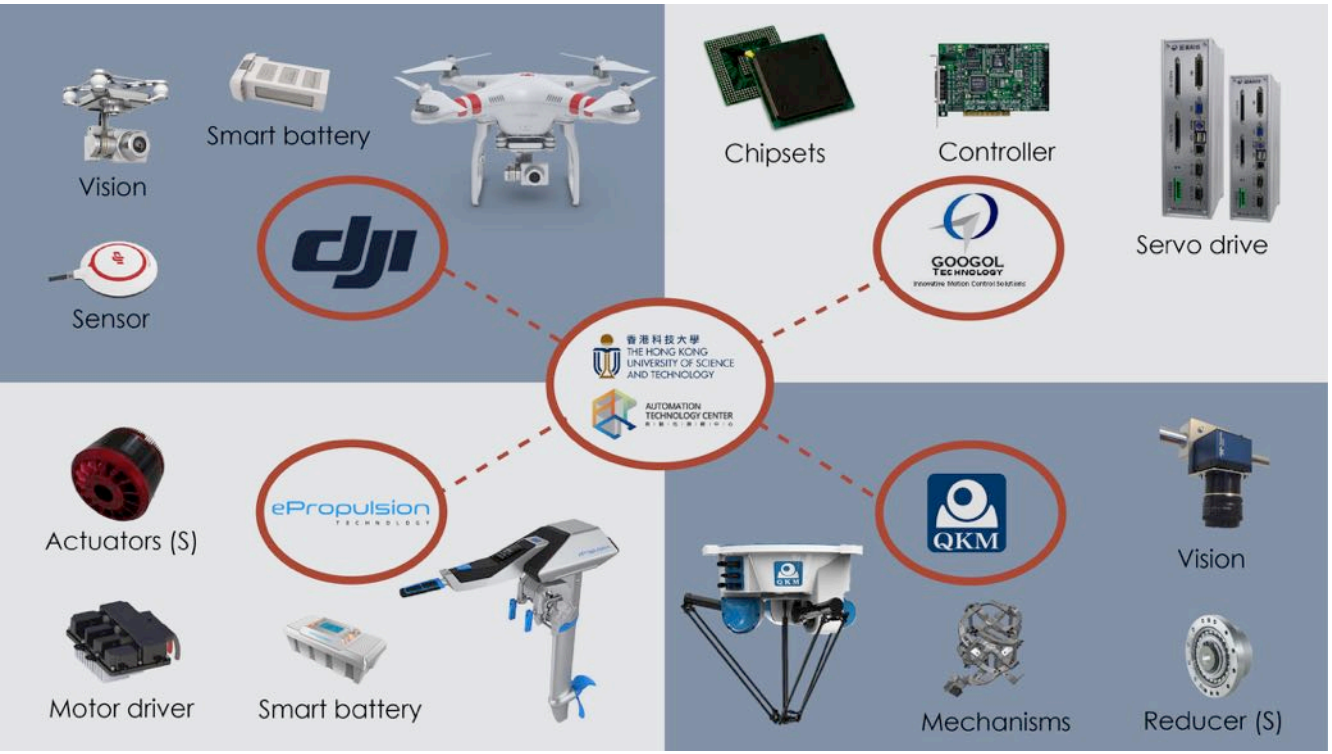
- **Founded in 2012**
- **Mission:**

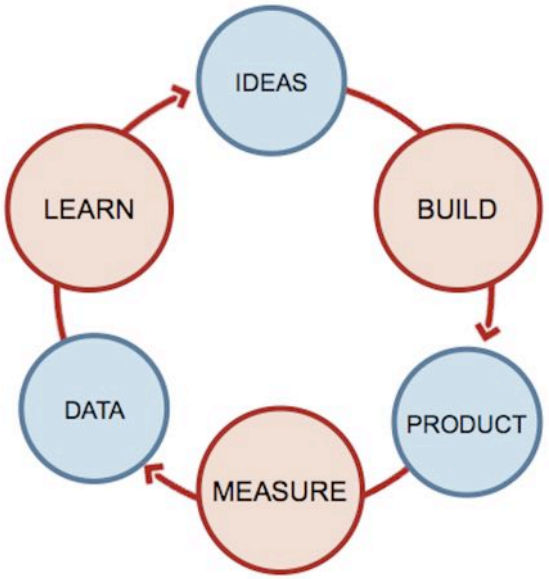
  Environment-friendly electrical outboard systems for better user experience
- **Main Products:**

  - Navy 6.0T - Navy 6.0R



ATC Spinoffs



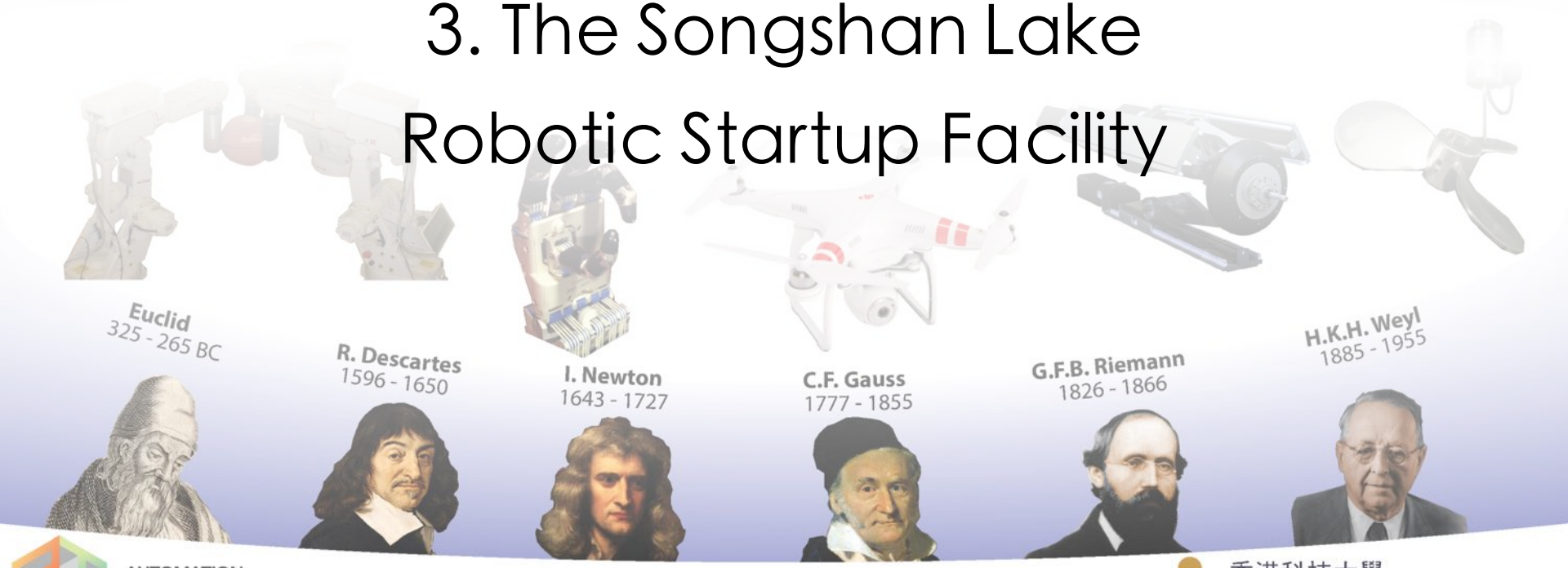


The Hollywood of Makers

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

Robotic Startup Facilities

RTM

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

HK Teams

International Teams

Domestic Teams

- *Project teams*
- *Projects*

Supply Chains

S²L TechX Institute

Angel Fund

Startup Teams

Robotic Incubation Center

1. Robot Machines

2. Industrial Robots

System Integration

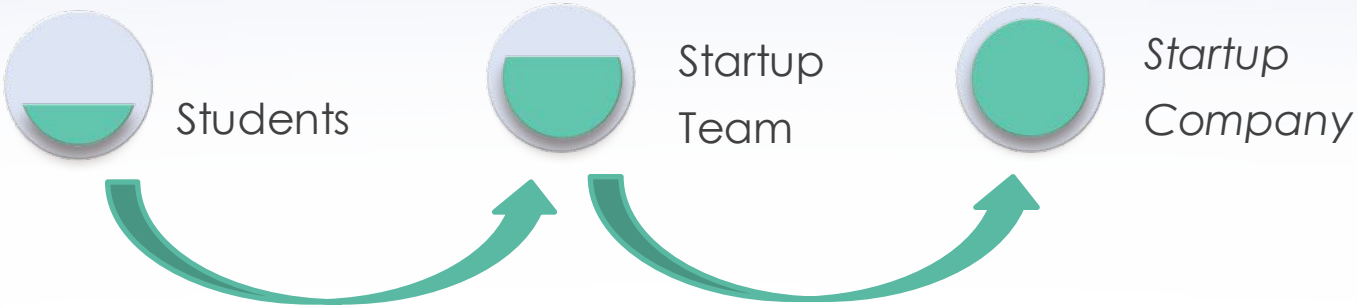
3. Medical / Healthcare Robotics

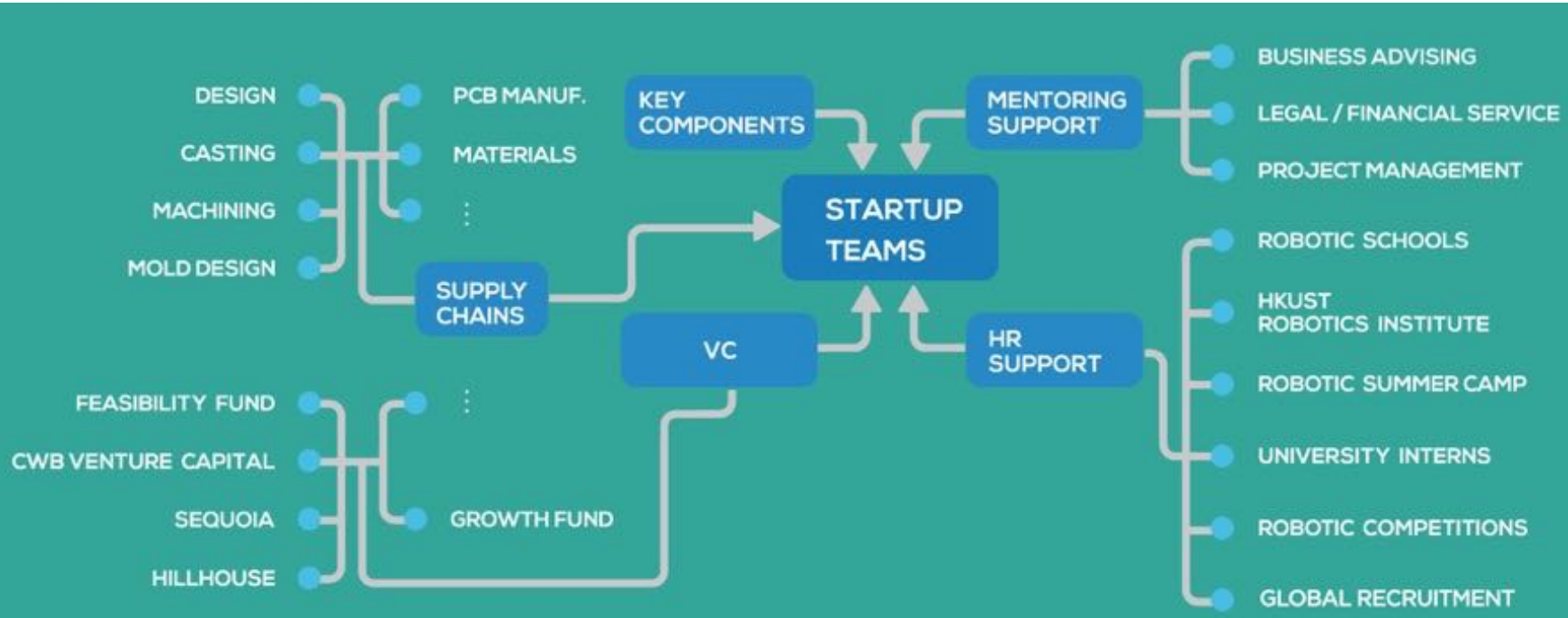
4. Autonomous Systems

5. Consumer Robotics


XBOT PARK
松山湖机器人产业基地
SONGSHAN LAKE XBOT PARK
A
在水一方
南部餐厅
大岭山镇
台湾高科技园
松山湖
梦幻百花洲
松山湖图书馆
松山湖学术交流中心
善赛特
万科生活广场
松山湖创新科技园
广东医学院（东莞校区）
控股大厦
万科松山湖1号花园
广医附属医院
奇莲公寓
松山湖高新区管委会
光大锦绣山河
松湖广场
奇石园
东莞中学松山湖学校
东莞理工学院
湿地公园
松山湖国艺博览中心
东莞市职业技术学院
逸王食府
阳光沙滩
滨湖派出所
东莞银行会所
松湖花海

From 0 to 1:


Students
Startup Team
Startup Company


DESIGN
CASTING
MACHINING
MOLD DESIGN
PCB MANUF.
MATERIALS
SUPPLY CHAINS
KEY COMPONENTS
STARTUP TEAMS
VC
MENTORING SUPPORT
HR SUPPORT
BUSINESS ADVISING
LEGAL / FINANCIAL SERVICE
PROJECT MANAGEMENT
ROBOTIC SCHOOLS
HKUST ROBOTICS INSTITUTE
ROBOTIC SUMMER CAMP
UNIVERSITY INTERNS
ROBOTIC COMPETITIONS
GLOBAL RECRUITMENT
FEASIBILITY FUND
CWB VENTURE CAPITAL
SEQUOIA
HILLHOUSE
GROWTH FUND

Supply Chains


Critical Components Partners



Local Manufacturing Supply Chains

Scale Up

Xbot Park Recruitment Talk

Connection with Leading Reaserch Labs

HR Support:

- Connections with Top Universities
- Summer Schools
- Robotic Schools with GDUT, DGPU, HNU…

Business Advising:

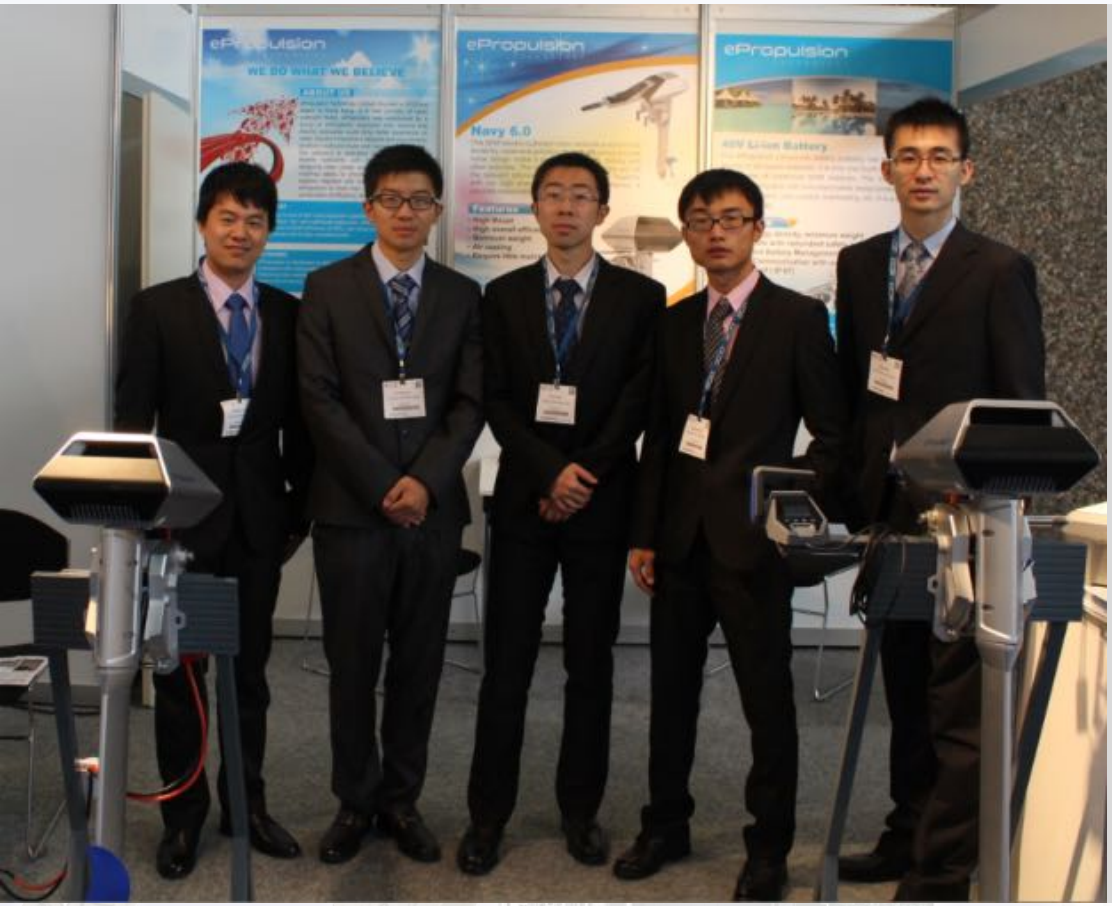
- Accounting, Tax, IP
- Cooperate Governance
- Company Structure
- …

WALNUT

Sands Hall G 50516, CES, Las Vegas

Jan. 5-8, 2017

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 the June of 2014

- **Environment-friendly**
- **User-friendly**
  - Quiet
  - Clean

The ePropulsion Example: The Second Product

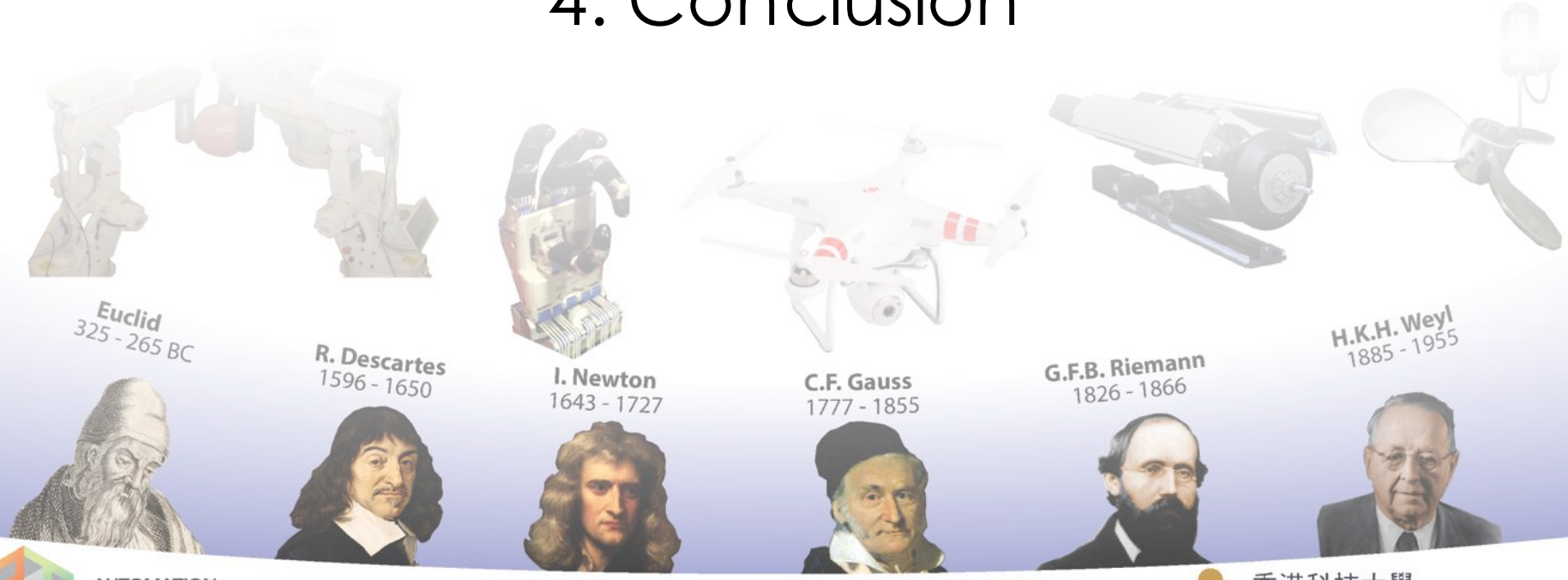
- Second product: 1kW clean outboard motor with more accurate market positioning
- First batch of products shipped to Europe in the March of 2015

- **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

XBOT PARK

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