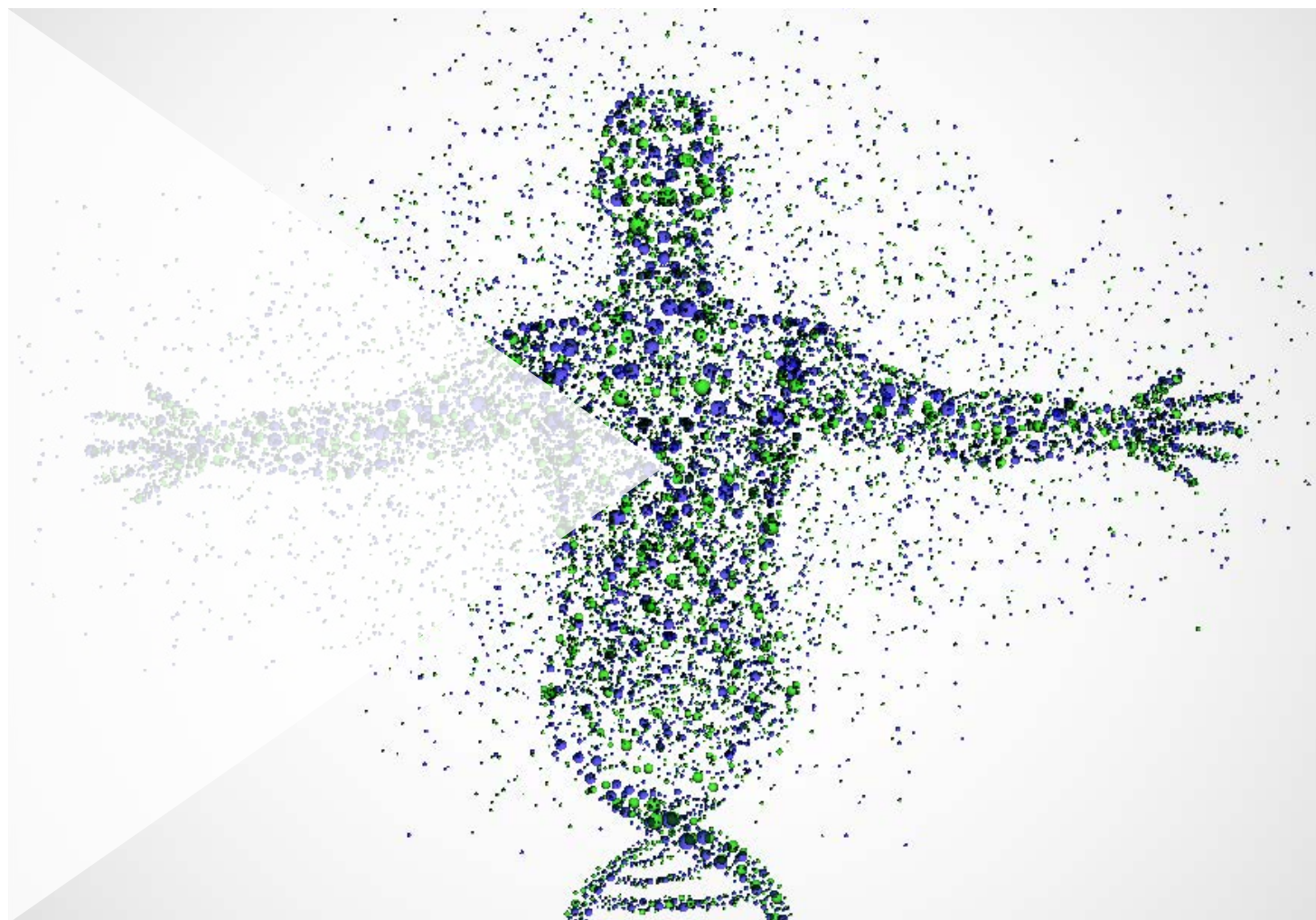


Technology Pioneers 2014

August 2013



Published by World Economic Forum,
Geneva, Switzerland, 2013

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, or otherwise without the prior permission of the World Economic Forum.

World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel.: +41 (0) 22 869 1212
Fax: +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org

Contents

- 3 Foreword
- 4 Index
- 5 Introduction
- 7 Company Profiles
- 44 Selection Committee 2014
- 46 Acknowledgements

Foreword



David Aikman
Managing Director and
Head of New
Champions



Silvia Von Gunten
Director, Head of
Technology Pioneers
Programme and North
America Membership,
World Economic
Forum USA

New technologies and innovations are constantly changing and improving the way we do things and approach problems. Processes, institutions and industries that have been around and unchanged for decades are now being rethought and redesigned with the aid of technology. Many of these adaptations and approaches are not being developed by large, established industry leaders but rather by their smaller, early-stage counterparts. As World Economic Forum “New Champions”, Technology Pioneer companies carry opportunities for growth, generate innovative technologies and solutions for unresolved or longstanding problems and, ultimately, help redefine new possibility frontiers.

This year, the World Economic Forum is pleased to present 36 leading start-ups selected as Technology Pioneers 2014. The class is particularly diverse, providing new solutions to a number of challenges, including technologies for a greener and more sustainable planet; the deployment of precise and targeted therapies in the treatment of cancer and other diseases; the rethinking and redesign of how we deliver education; a robotics renaissance; the creation of a more personalized Internet experience; and the initiation of a “sharing” economy, to name a few.

These companies have been evaluated by a committee of world-renowned experts and selected due to their demonstrative vision and leadership, potential for growth and innovative ideas, as well as their impact on society and business. The World Economic Forum would like to thank its Partners and the members of the selection committee for their contribution in this process. Their knowledge and diligence make it possible to identify and reward the most truly innovative start-ups from around the world.

Congratulations to the Technology Pioneers 2014!

Index

Energy and Environment

Advantix Systems
Alphabet Energy Inc.
Bug Agentes Biológicos
EcoNation
Kebony AS
Nest Labs Inc.
Oasys Water Inc.
OMC Power
SunPartner
WiTricity Corporation

Information Technologies and New Media

Adtelligence GmbH
Airbnb
AppNexus Inc.
Codecademy
Coursera Inc.
Data4
Dnevnik.ru
GitHub
Jana
Kaggle Inc.
Koemei SA
Lenddo
LiveU Ltd.
Rethink Robotics
TruTag Technologies Inc.
Viki Inc.

Life Sciences and Health

Agios Pharmaceuticals Inc.
BIND Therapeutics Inc.
bluebird bio
Cyberdyne Inc.
D-Rev: Design Revolution
Foundation Medicine Inc.
Natera
Second Sight Medical Products Inc.
Selecta Biosciences Inc.
SynTouch LLC

Thirty-six companies have been selected as the World Economic Forum's Technology Pioneers 2014. They are designing, developing and deploying innovative products, creative processes or new business models.

Candidate companies are nominated by Members, constituents and collaborators of the World Economic Forum, as well as by the larger public. A selection committee, comprised of top technology and innovation experts from around the world, reviews all candidate companies and makes a recommendation to the World Economic Forum, which then makes the final decision. Technology Pioneers are chosen on the basis of the following criteria:

1. Innovation: The company must be truly innovative. A new version or repackaging of an already well-accepted technological solution does not qualify as an innovation. The innovation and commercialization should be recent. The company should invest significantly in R&D.
2. Potential impact: The company must have the potential for substantial long-term impact on business and/or society.
3. Growth and sustainability: The company should demonstrate the potential to be a long-term market leader and should have well-formulated plans for future development and growth.
4. Proof of concept: The company must have a product on the market or have proven practical applications of the technology. Companies in "stealth" mode and with untested ideas or models do not qualify.
5. Leadership: The company must have visionary leadership that plays a critical role in driving the company towards reaching its goals.
6. Finally, the company must not currently be a Member of the World Economic Forum. This criterion applies to the parent company; thus, wholly owned subsidiaries of large firms are not eligible.

Introduction

Technology Pioneers in previous years have proved a strong indicator of upcoming trends, and this year's selection of 36 is likewise expected to point the way towards products and services that will gain prominence in the coming years. The broad trends identified below reflect not only the final selection of winners but also the much larger pool of nominees.

Greener tomorrow

Many of this year's Technology Pioneers are developing products that make both environmental and economic sense: **Alphabet Energy** can generate power from waste heat in chimneys and exhausts; **Oasys Water** can desalinate water at energy-saving low temperatures; air conditioners by **Advantix Systems** cool and dehumidify air more efficiently in humid climates; and **EcoNation**'s new-generation skylights enable electric lights to be switched off.

Transparent photovoltaic cells developed by **SunPartner** will soon enable windows, billboards and device screens generate electricity, while **Nest Labs**' thermostat is helping consumers to cut their heating and cooling bills. **Kebony** can make softwood into a replacement for tropical hardwood by treating it with natural biowaste, and **Bug Agentes** is reducing the need for pesticides in Brazil through mass production of parasitic wasps which target pests that prey on crops.

Precise and targeted therapies

Technology Pioneers from the health sector are making breakthroughs in nanomedicine and genetics that promise to revolutionize the treatment of cancer and other diseases. **BIND Therapeutics** can target drugs to diseased cells; nanoparticles designed by **Selecta Biosciences** can heighten or dampen immune system response; **bluebird bio** is tackling genetic diseases by using a virus to rewrite patients' DNA; and **Agios** is targeting enzymes to starve diseased cells of the nutrients they need.

Foundation Medicine and **Natera** have pioneered technologies to make diagnostic testing more precise – respectively, helping cancer patients to identify the most promising treatments, and giving prospective parents the best chance of a healthy, viable pregnancy.

Smarter products and services

Some products and services promise a quantum leap towards new and smarter ways of doing things. Wireless electricity, being developed by **WiTricity**, will mean everything from mobile phones to floor lamps and electric cars can operate without needing to be plugged in. **TruTag** is developing tiny, edible tags that can be embedded in products to identify them, promising to assure supply chains and undermine trade in counterfeit goods.

The “sharing economy” is another potentially revolutionary trend: from broadband connections to do-it-yourself equipment to their own time and skills, many people own things they don't use all the time. The Internet is making it possible to monetize such spare capacity. This trend is represented this year by **Airbnb**, which is transforming the travel sector by enabling people to rent out rooms in their homes or entire properties.

Enabling greater access

Emerging and developing countries are increasingly important marketplaces, and several Technology Pioneer companies are focused on widening access to products and services taken for granted by many on higher incomes: **D-Rev** is pioneering affordable prosthetics and other medical devices for those living on under US\$ 4 a day; **OMC Power** is scaling solar-powered electricity for off-grid Indian villages; and **Lenddo** is using social media profiles to build credit ratings that enable the emerging middle classes to access loans and other financial services.

Jana is pioneering a new way for companies to engage with emerging market consumers by offering rewards in the form of prepaid mobile airtime. **LiveU**'s technology allows outside broadcasting from handheld cameras over cellular networks, with no need for satellite vans.

Robotics renaissance

This year's Technology Pioneers herald a new age of robotics. **Rethink Robotics** has developed an easily trainable robot that can work alongside humans in warehouses and on factory production lines, while **SynTouch** has invented a robot finger with the sensitivity of human touch, promising to make robots much more dexterous and versatile.

Cyberdyne has developed a robot suit that helps the elderly and disabled to walk, and can assist workers with heavy lifting. Also using technology to remedy a disability, **Second Sight** has developed a type of "bionic eye" – retinal implants that can help some blind people to see again.

A more personalized approach

Internet users increasingly witness a personalized online experience – from search results to shopping recommendations to social media, many expect websites to greet them based on knowledge of how they have interacted with sites before. Two of this year's Technology Pioneers are at the forefront of making online advertising more relevant even to anonymous Internet traffic by using machine learning to inform statistical prediction. **AppNexus**'s real-time auction technology helps match adverts more effectively to content, while **Adtelligence** allows companies to create entire websites on the fly, targeted at users' likely profiles.

A more collaborative approach

Problems yield solutions more readily with more minds applied to them – but coordinating work is a challenge. Two of this year's Technology Pioneer companies, **GitHub** and **Viki**, owe their success to creating user-friendly tools which people can use to collaborate online – respectively, to develop software and to generate subtitles for entertainment in foreign languages.

Koemei's automated transcription software, used to make educational videos searchable, also has a tool for collaborative correcting of transcripts. **Data4**'s activities to promote civic engagement and responsive government include encouraging hackers, journalists and governments to collaborate. **Kaggle** is also tapping the power of crowds, by enabling data scientists to compete to improve the algorithms companies use to create value from their data.

Redesigning education delivery

The Internet is revolutionizing the education sector, with three of the Technology Pioneers at the forefront. **Coursera** is leading the way with massive open online courses that give everyone access to elite universities. **Codecademy**'s collaborative approach to code learning, in which users create courses and learners help each other, promises to be more widely applicable. **Dnevnik.ru** has developed comprehensive software for educational institutions to manage learning.

Company Profiles



Michael Altendorf,
Chief Executive Officer
and Co-Founder

Location: Mannheim, Germany
Number of employees: 50+
Year founded: 2009

Adtelligence GmbH
Werderstrasse 23-25
68165 Mannheim
Germany

Website: www.adtelligence.de

Imagine walking into a store and always finding the items you are interested in arranged front-and-centre on the first set of shelves. This is the kind of online experience Adtelligence is pioneering. Its Convert+ platform allows a website to be constructed on the fly, based on information about the person who has just clicked through to it.

Suppose, for example, that a sportswear retailer's website is simultaneously visited by two people. One is a female, 18-year-old swimming enthusiast who has clicked on a Facebook ad targeted at her demographic. The other lives in a retirement town and just Googled terms related to golf. Convert+ instantly and seamlessly constructs different websites for each visitor – different messages, images, design, product selection, and so on.

Adtelligence improves on the traditional approach of creating bespoke landing pages for each campaign and keyword in two ways. Firstly, it automates the process, optimizing for the “long tail” of relatively rare keywords. Secondly, it makes it easier to experiment with different site designs, and – through the power of big data and machine learning – automatically identify what works and optimize accordingly.

Convert+ customers have increased their revenue by converting more website visits into sales. More broadly, Adtelligence envisions leading the way towards an “ultra-personalized” Internet, where it becomes normal for websites to improve their service by choosing what to show visitors based on who they are, and – especially important with the growth of mobile platforms – where they are.

Advantix Systems



Hannah Choi Granade,
President

Location: Florida, USA
Number of employees: 140
Year founded: 2006

Advantix Systems

13800 NW 2nd Street, Suite 100
Sunrise, FL 33325
USA

Website: www.advantixsystems.com

In humid climates, air conditioning systems need to not only cool the air, but also dry it. Conventionally, they do this by overcooling the air until the moisture condenses, then reheating it to the desired temperature. This wastes a lot of energy; it would be more efficient if air could be dehumidified at higher temperatures.

It has been known since the 1930s that passing air through a salt solution dehumidifies it. But air conditioning systems based on such “liquid desiccants” have, until now, been prohibitively complex.

Advantix has pioneered a liquid desiccant air conditioning system that is easy to install and operate. It uses materials that do not deteriorate through contact with the solution of lithium chloride, and technology that uses heat generated by the system in the drying process. In the future, lithium chloride-based systems can also potentially store energy, enabling the system to go off-grid at peak times.

The system’s upfront costs are comparable to conventional systems, and in humid climates, it saves 30-50% on running costs. It also produces cleaner and healthier air than conventional systems, as the lithium chloride solution naturally cleanses air of particulates, microorganisms and odours, and the system has no parts that can become breeding grounds for mould and bacteria.

Advantix is initially targeting commercial and industrial settings in humid climates, which cover 75% of the world, including emerging markets such as China and India where demand for air conditioning is growing quickly.

Agios Pharmaceuticals Inc.



David Schenkein,
Chief Executive Officer

Location: Massachusetts, USA
Number of employees: 82
Year founded: 2008

Agios Pharmaceuticals Inc.

38 Sidney Street, 2nd Floor
Cambridge, MA 02139
USA

Website: www.agios.com

All cells require nutrients, which they process using metabolic enzymes. Cancer cells not only consume more nutrients than other cells, they also process them differently. Agios is using this insight to pioneer an entirely new way of treating cancer.

In effect, some cancer cells become “addicted” to a specific metabolic enzyme. If you could take a pill that blocks that enzyme, then the cancer cells would not be able to metabolize the nutrients they need to survive, while normal cells would be spared.

The next step is to identify the specific patients whose cancer depends on that enzyme, based on the tumour’s genetic and metabolic profile, allowing Agios to target the drug’s development. For example, Agios’s most advanced treatments promise to tackle acute myelogenous leukaemia in about 25% of patients.

Agios believes there could be 50 to 100 metabolic enzymes on which various cancers depend for their survival, from which a new wave of cancer therapies could emerge. Agios is initially working on developing treatments for eight of those enzymes.

Agios is also working on treatments for rare genetic diseases that prevent the body from being able to produce a specific enzyme from birth. There are around 600 of these diseases, known as “inborn errors of metabolism”. Most appear early in childhood, have no treatment and can be fatal or severely compromise quality of life.

Agios believes that targeting disease-causing alterations in cellular metabolism is a disruptive technology that could lead to the development of potentially transformative new medicines.



Brian Chesky,
Chief Executive Officer and Co-Founder

Location: California, USA
Number of employees: 600
Year founded: 2008

Airbnb

99 Rhode Island Street
San Francisco, CA 94103
USA

Website: www.airbnb.com

Airbnb connects travellers with people who can accommodate them. Some hosts offer a room in their own home, though the majority of the 300,000 properties listed on the site are self-contained, ranging from studio apartments to villas. On any given night, around 140,000 people are staying in Airbnb properties, which span 34,000 cities in 192 countries.

Hosts list their properties for free. Guests pay via the website, which takes a fee and passes the money on to the hosts after the first night of the stay. Both travellers and hosts can subsequently rate each other on Airbnb, building trust and enabling hosts to decide whether or not to accept a booking request from any particular guest.

Airbnb sees itself as providing not just accommodation, but also travel experiences. For some guests and hosts – and many Airbnb users are both – socializing is central. Even for the majority who stay in private accommodation, 70% of Airbnb's properties are in districts with relatively few hotels, meaning travellers get to experience restaurants and bars they would not otherwise encounter. For cities, the economic boost of tourism gets spread beyond the usual tourist areas.

More broadly, Airbnb sees itself as epitomizing a world-changing shift towards the "sharing economy". What makes Airbnb's model possible – individuals' capacity to build a trusted reputation through mutual ratings – can enable people to monetize anything from space in their homes to ride-sharing on commutes, their possessions, and their time and skills.

Alphabet Energy Inc.



Matthew L. Scullin,
Chief Executive Officer and Founder

Location: California, USA
Number of employees: 20
Year founded: 2009

Alphabet Energy Inc.

26225 Eden Landing Road, Suite D
Hayward, CA 94545
USA

Website: www.alphabetenergy.com

Alphabet Energy has developed technology that generates electricity from heat, in the same way that solar panels generate electricity from light. From factory chimneys to car exhausts, much of the waste heat produced could potentially be harnessed as a source of power.

Alphabet's platform thermoelectric chips are solid-state semiconductors, initially based on breakthrough silicon nanotechnology but capable of using other materials. They generate electricity cleanly, using few or no moving parts. At the heart of the technology is a material that can withstand extremely high temperatures to generate electricity.

Alphabet's first product – scheduled for launch within a year – will generate electricity from the waste heat produced by diesel generators that power extractive operations in remote locations, and by furnaces in heavy industries such as refining, smelting and ceramics. It promises to enable wells, mines and industrial plants to use significantly less fuel.

Alphabet is also working with partners in a variety of sectors to use its technology as a platform for delivering greater efficiency. In the automotive industry, for example, early simulations suggest that electricity generated from the heat that escapes through exhausts could enable cars to use around 10% less fuel. Efficiency savings are also likely in aerospace, maritime and any other sector that produces waste heat.

Thermoelectrics could even be embedded in clothing to generate power from the heat produced by a human body. This offers the possibility, for example, to keep a mobile telephone charged through the heat a person generates while hiking in the wilderness.

AppNexus Inc.



Brian O'Kelley,
Chief Executive Officer and Co-Founder

Location: New York, USA
Number of employees: 498
Year founded: 2007

AppNexus Inc.

28 West 23rd Street, 4th Floor
New York, NY 10010
USA

Website: www.appnexus.com

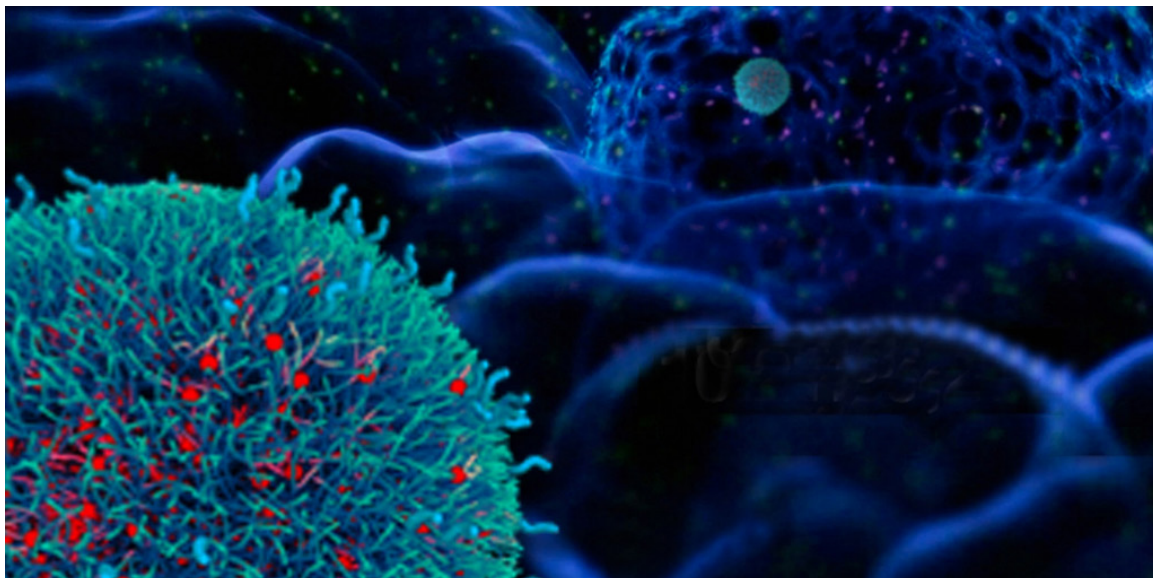
Most consumers of online content expect it to be provided for free, meaning its creators must rely on advertising to get paid. AppNexus's technology powers the advertising that powers the Internet by enabling advertisers and publishers to transact more efficiently, creating value for everyone: customers see more relevant adverts, advertisers reach more targeted audiences, and content creators get more money for their advertising space.

AppNexus sells an open, customizable platform through which its partners enable real-time bidding on advertising space: in the milliseconds between clicking on a Web page and it loading on the screen, an auction is held to determine which adverts the person will see on that page. Every day, AppNexus-powered auctions place around 16 billion online ads.

By serving such a high volume of ads, the software learns which type does best with which kind of content, and also at what time of day – for example, pizza ads might do better in the evening than in the morning. To be effective, this statistical approach to predictive advertising needs no individual information about users: cookies are needed only for reasons such as checking which ads a user has seen recently. Advertisers can target their ads in myriad ways, or simply pay by results.

With a leadership team that includes the founders of the Web's original ad exchanges and offices around the world, AppNexus powered US\$ 700 million worth of advertising in 2012. By making the online advertising system work more effectively, AppNexus sees itself as building a better Internet for everyone.

BIND Therapeutics Inc.



Scott Minick,
President and Chief Executive Officer

Location: Massachusetts, USA
Number of employees: 46
Year founded: 2006

BIND Therapeutics Inc.

325 Vassar Street
Cambridge, MA 02139
USA

Website: www.bindtherapeutics.com

BIND's nanomedicine platform has a game-changing ability to target therapeutics to the site of disease, which could transform the treatment of cancer and other diseases.

Drugs that kill cancer cells are generally toxic to healthy cells as well, and to get these drugs to the diseased cells, you have to treat the whole body. This leads to serious side effects that limit the ability to treat the cancer effectively. Targeting drugs directly to diseased cells while bypassing the healthy ones could result in far more effective and safer therapies.

BIND's specifically-designed nanoparticles, called Accurins, are programmed to pass through openings in blood vessels at disease sites and bind to specific types of cells and tissues, such as cancer cells, while avoiding detection and attacks by the immune system. They can incorporate different kinds of therapeutic payloads, such as cancer-treating drugs. The Accurins accumulate at the site of disease, where the therapeutic payload is released at an optimal, pre-programmed rate, resulting in more of the therapeutic payload treating the diseased cells.

BIND's most advanced treatment contains the chemotherapy drug docetaxel, and binds to a protein that is present in many cancers but is largely absent in healthy tissue. It is currently in Phase II clinical trials to treat different types of lung and prostate cancers.

There is potential for Accurins to treat diseases other than cancer, such as inflammation and cardiovascular disorders.



Nick Leschly,
Chief bluebird

Location: Massachusetts, USA
Number of employees: 52
Year founded: 1993

bluebird bio

840 Memorial Drive
Cambridge, MA 02139
USA

Website: www.bluebirdbio.com

Gene therapy holds the promise of transforming the way we treat many life-threatening diseases. bluebird bio is pioneering a way to correct aberrant sections of DNA that cause disease and are passed from generation to generation.

The company has identified a way to harness the natural ability of the human immunodeficiency virus (HIV), a lentivirus, to insert a modified gene into a patient's own cells. bluebird uses its lentiviral vectors to transfer functional genes into a patient's own stem cells, which are capable of changing into multiple cell types, providing the company with the opportunity of treating a wide range of genetic diseases.

bluebird is currently developing gene therapy products to treat three hereditary diseases where the genetic abnormality is known and found in a single gene: childhood cerebral adrenoleukodystrophy, a rare and often fatal neurological disorder affecting young boys; and beta-thalassemia major and severe sickle cell disease, which are blood disorders that often lead to severe anaemia and other potentially life-threatening symptoms.

In partnership with Celgene Corporation and Baylor University, bluebird is also working on using its lentiviral approach to modify a patient's own T cells – a type of white blood cell – to fight their cancer.

If bluebird's first gene therapy products successfully demonstrate clinical benefit with a positive safety profile, there is potential to apply the approach to a wide variety of diseases that have a genetic origin. Rather than addressing symptoms of a disease, this approach promises a one-time, transformational treatment of the underlying cause.

Bug Agentes Biológicos



Diogo Carvalho,
Chief Executive Officer

Location: Charqueada, Brazil
Number of employees: 47
Year founded: 2002

Bug Agentes Biológicos

858 Via Vicente Verdi, Distrito Industrial 3
Charqueada, Sao Paulo
Brazil

Website: <http://bugbrasil.com.br>

Clearing large areas of rainforest or savannah to plant crops can lead to economically-damaging infestations of pests previously kept in check by natural predators. Brazil's US\$ 7 billion market for chemical pesticides is, consequently, among the world's largest.

A more environmentally-friendly alternative strategy uses biotechnology to restore the natural equilibrium between pest and natural predator. This is the approach of Bug Agentes Biológicos, part of a Silicon Valley-like innovation cluster around agribusiness in Brazil.

When Bug starts work with a new client, the first step is a field visit. Suppose the crops are being damaged by the sugarcane borer, a moth that feeds on sugarcane and corn when in its larval stage. Bug will scour the local area for remaining populations of parasite wasp that naturally parasitize the sugarcane borer's eggs.

Bug takes the wasp back to the laboratory and mass produces it through a trade-secret, automated procedure. It ships the wasps, in egg form, in a patented delivery mechanism, ready to hatch after several days in transit. The newly-hatched wasps seek out the eggs of the sugarcane borer and lay their eggs inside them, killing the sugarcane borer's eggs before they can develop into crop-destroying larvae. As the sugarcane borer population dwindles, the wasps are unable to breed and also die out. More batches of wasp can be shipped to the client whenever the pest population expands again.

Bug sees this approach as an important third pillar, alongside chemical pesticides and genetically modified seeds, in guaranteeing global food safety through increased productivity.

Codecademy



Zachary Sims,
Chief Executive Officer and Co-Founder

Location: New York, USA
Number of employees: 17
Year founded: 2011

Codecademy

49 West 27th Street, 4th Floor
New York, NY 10001
USA

Website: www.codecademy.com

While the Internet has revolutionized other areas of life, Codecademy believes it has barely scratched the surface of what is possible in education. Codecademy sees itself as pioneering a wholly new approach to education, based on the principles of democratization, interactivity, peer support and learning by doing.

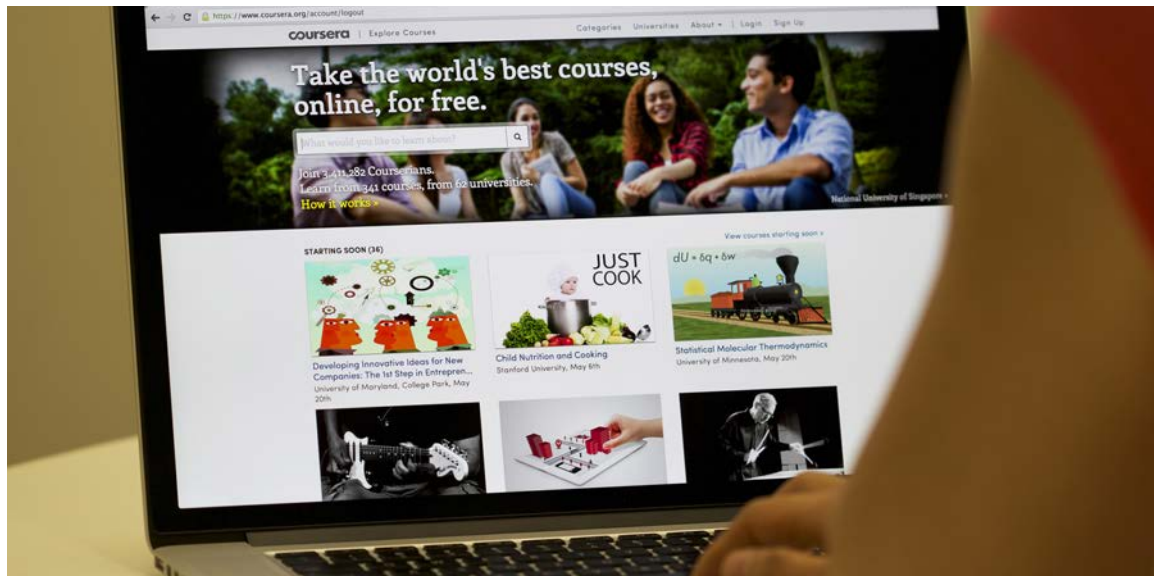
The company aims to be at the forefront of a transition that will see learning increasingly taking place in environments that resemble online social networks more than traditional classrooms.

Codecademy offers free online courses in coding languages such as HTML, JavaScript and Python. The ability to code – to create websites, apps and games – is fast becoming as important as literacy and numeracy in the modern economy. Coding skills are increasingly in demand by employers, and open up new avenues for creativity and entrepreneurship.

Learners study coding interactively, as part of a community in which they can encourage and help each other. The courses they follow are also created by members of the community: so far, over 100,000 people have created their own lessons. More than 70% of Codecademy's millions of learners are located outside the United States, and learners have held meet-ups in over 360 cities.

While believing it is still too early to think about monetization, Codecademy is working on ideas such as bringing its approach to learning into schools and matching learners with employment opportunities.

Coursera Inc.



Daphne Koller,
Co-Chief Executive Officer
and Co-Founder

Location: California, USA
Number of employees: 45
Year founded: 2012

Coursera Inc.

1975 West El Camino Real, Suite 202
Mountain View, CA 94040
USA

Website: www.coursera.org

Coursera makes university curriculum available online for free. Over 4 million people worldwide have signed up to follow one of over 400 courses provided by elite universities including Duke, Princeton, Stanford and the University of Pennsylvania.

These “massive open online courses”, or MOOCs, are dramatically expanding access to education and transforming lives, especially of students in the developing world. Anyone with an Internet connection is now able to follow a course from a top university for free.

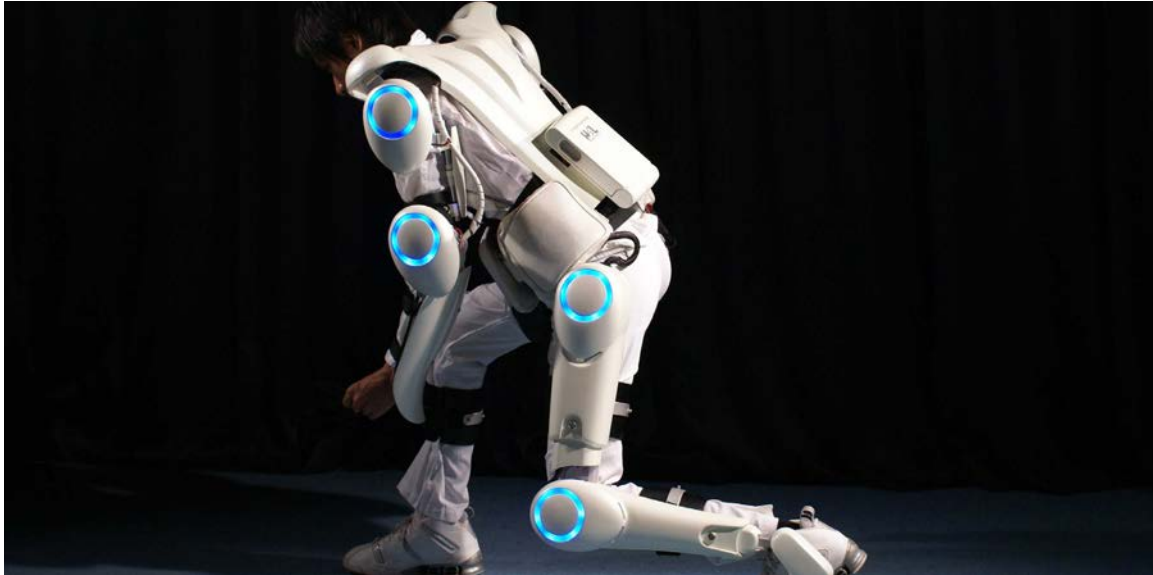
Coursera generates revenue by enabling students to opt into earning a verified certificate of course completion, an option that also helps to encourage students to complete courses. In the future, more revenue is expected to come from allowing one university to license courses from another via the Coursera platform.

Coursera envisages that this will revolutionize the experience of students on campus. Availability of high-quality materials will liberate lecturers from having to develop and deliver their own content. This will enable them to spend more time on in-depth discussion with small groups of students, focusing on nurturing their thinking and learning skills.

For the universities that make their courses available for free, Coursera represents both a marketing showcase and the opportunity to put them at the forefront of an evolving discussion about how technology should change the delivery of higher education.

By analysing how students follow their courses, Coursera also intends to turn the study of human learning into a data science, increasing understanding about how people learn and how to design courses that help them learn more effectively.

Cyberdyne Inc.



Yoshiyuki Sankai,
Chief Executive Officer

Location: Tsukuba, Japan
Number of employees: 80
Year founded: 2004

Cyberdyne Inc.

D25-1 Gakuen-Minami
Tsukuba, 305-0818 Ibaraki
Japan

Website: www.cyberdyne.jp

In hospitals and nursing homes in Japan, disabled people are learning to walk again by wearing a robot suit. HAL, the Hybrid Assistive Limb, is strapped to one or both legs.

In “Cybernic Voluntary mode”, HAL picks up bio-electrical signals from the skin that are generated whenever the brain tries to move muscles, interprets what its user is trying to achieve, and moves its joints in support. If muscular or central nervous system problems mean that no signals reach the skin, HAL can be used in “Cybernic Autonomous mode”, drawing from a database of coordinated everyday movements such as standing up, sitting, walking and climbing stairs.

HAL's potential applications include use as a neuro-rehabilitation device for patients who are recovering from a stroke or who have a disease of the brain or nervous system, and helping the elderly and disabled to regain or maintain autonomy in their daily activities. Beyond the medical field, a version of HAL which also includes the upper body is capable of supporting heavy lifting, and Cyberdyne envisages that it could be used by workers in factories, rescue operations and even care workers lifting patients.

Until recently HAL was only available for hospitals and nursing facilities in Japan, but is now entering mass production ahead of being rolled out worldwide. Cyberdyne is developing more compact versions of the technology to use with only one joint, and envisages a future in which it becomes routine to wear robot exoskeletons to help with daily tasks.

D-Rev: Design Revolution



Krista Donaldson,
Chief Executive Officer

Location: California, USA/India
Number of employees: 11
Year founded: 2008

D-Rev: Design Revolution

695 Minnesota Street
San Francisco, CA 94107
USA

Website: <http://d-rev.org>

D-Rev designs medical devices for the 4 billion people who live on less than US\$ 4 a day. This means understanding the needs of users and fundamentally rethinking devices that were designed for more affluent markets.

For example, high-quality prosthetic knees are typically made from titanium and cost thousands of dollars. Most of the world's amputees instead have to rely on cheaper and cruder devices that typically do not cope well with kneeling, squatting or keeping balance on uneven terrain.

D-Rev's ReMotion knee, made from injection-moulded plastic, offers vastly better performance at less than one-tenth the cost of high-end devices. Around 5,000 knees have been fitted, and the latest version of the knee is set to enter mass production in the coming months.

D-Rev is also scaling Brilliance, a blue-light phototherapy unit for treating severe jaundice – the top reason why new-borns are readmitted to hospitals worldwide, and which can be fatal if untreated. By using LED instead of fluorescent lights, Brilliance nearly eliminates operating and maintenance costs. It is also designed to manage voltage surges characteristic of developing countries, and variable treatment surfaces common in busy hospitals.

Although D-Rev sells its devices for profit, it is incorporated as a non-profit and uses grants for research and development; several new products are in the pipeline. Non-profit status allows D-Rev to make an impact on its bottom line: each Brilliance device, for example, counts how many babies have been treated, data that can feed into improving the design. Selling instead of donating guarantees that people genuinely value – and ideally use – D-Rev's products.



Jorge Soto,
Founder

Location: Mexico City, Mexico
Number of employees: 12
Year founded: 2011

Data4

Frontera 111-403, Colonia Roma Norte,
Delegacion Cuauhtemoc
06700 Mexico City
Mexico

Website: www.data4.mx

Data becomes useful only when it is analysed, distilled and presented in an easily understandable way that enables informed action. Data4 provides functional, data-driven solutions for governance, transparency and media – harnessing the power of data to engage citizens and make governments more open and responsive.

Through its citizen reporting tool, Data4 gives decision-makers a real-time overview mapping what citizens are complaining about – for example, if residents in the same area begin tweeting about faulty street lights or sewer overflows. The analysis encompasses official online platforms, existing data and conversations on social media.

Data4's platform has been used in countries including Egypt, Benin, Tunisia, Yemen, Ukraine, Mexico, Dominican Republic, Colombia and Venezuela, for purposes from election tracking, citizen security, public services problems and power outages to crowdsourcing a draft new constitution.

Merely informing governments about problems is not enough – citizens also need to be motivated to demand action. So, Data4 is working with media organizations on data analysis to connect disparate facts and present compelling visual stories about causes of social issues.

Data4 also promotes civic engagement within the civic-hacker community. For example, when the Mexican government proposed to spend 10 million dollars on developing an app to collate official information, Data4 organized the crowdsourcing of an open-source app with the same functionality within a week; the government agreed to cancel the contract.

Believing that technology has the potential to transform how communities and institutions interact, Data4 sees itself not just as a company but as a leading social movement.



Gabriel Levi,
Chief Executive Officer and Founder

Location: Saint-Petersburg, Russia
Number of employees: 150
Year founded: 2009

Dnevnik.ru

Petrogradskaya emb.
197101 Saint-Petersburg
Russia

Website: <http://dnevnik.ru>

Dnevnik.ru provides a comprehensive “one-stop shop” software system for schools. It is the only educational software system in Russia that combines the functions of school management, learning management and social networking.

All within the same system, school administrators can track and analyse students’ attendance and grades, and send notifications to parents and official reports to authorities; teachers can plan lessons, share ideas and access a library of online resources; students can interact with their friends in a safe online space and collaborate on homework projects; and parents can keep track of how their kids are doing. Students can also take their university entrance exams online using Dnevnik.ru.

The system is now used by 28,000 schools in Russia – more than 80% of those which have some kind of automated management system – and 10,000 schools in Ukraine. In total, around 8 million teachers, parents, students and administrators are using the system.

The company operates a “freemium” model, in which basic functionality is supplied and supported free of charge; premium accounts include additional services such as SMS updates for parents about their children’s attendance and performance. Dnevnik.ru also raises revenue through advertising, as well as licensing to regional governments that wish to customize the software.

Dnevnik.ru is currently targeting international expansion, including China and the United States, and aims to become the world’s largest educational platform.



Maarten Michielssens,
Chief Executive Officer

Location: Gentbrugge, Belgium
Number of employees: 10
Year founded: 2009

EcoNation

Kerkstraat 108
9050 Gentbrugge
Belgium

Website: www.econation.be/en

EcoNation produces the LightCatcher, a revolutionary design of domed skylight. The LightCatcher has a solar-powered sensor system that tracks the lightest point in the sky and controls a mirror that optimizes the amount of daylight coming in. The LightCatcher also diffuses light and reflects heat, avoiding the traditional disadvantages of skylights – excessive heat and blinding light on sunny days.

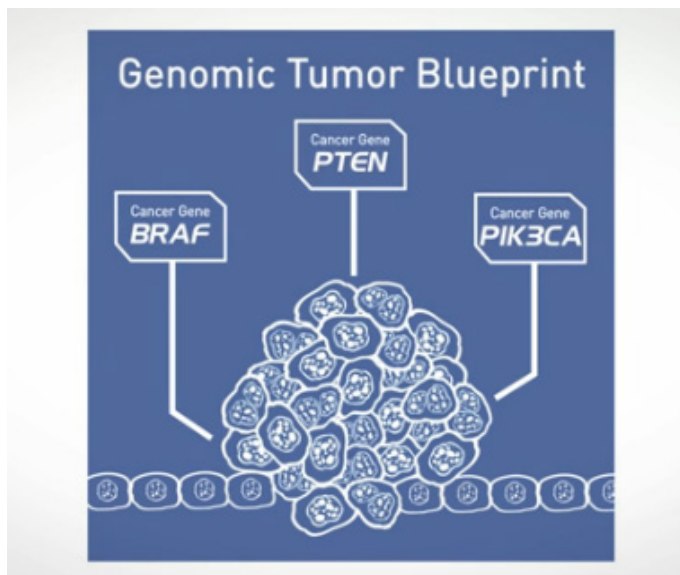
Customers face no upfront cost, and start saving immediately: EcoNation funds the installation of LightCatchers on customers' premises, and charges for them in monthly instalments that are guaranteed to be lower than the customers' previous electricity bills.

This is made possible by technology that enables EcoNation to automatically monitor light levels in its customers' premises, and remotely switch off artificial lights when enough light is coming in through the LightCatchers. Energy cost savings typically range from 50% to 70%.

LightCatchers have been installed in factories, airports and nuclear power stations. Other places include sport halls, where traditional skylights are unsuitable as players can be blinded by the sun when they look up; and chicken farms, where the combination of safer, indoor rearing with natural daylight rather than artificial light is reported to have resulted in fewer illnesses and greater productivity.

EcoNation is expanding internationally, with offices in China and Morocco and installations in 12 countries. Profits are reinvested into research and development, with potential applications for residential use and multi-storey buildings in the pipeline.

Foundation Medicine Inc.



Michael J. Pellini,
President and Chief Executive Officer

Location: Massachusetts, USA
Number of employees: 110
Year founded: 2009

Foundation Medicine Inc.

One Kendall Square, Suite B3501
Cambridge, MA 02139
USA

Website: www.foundationmedicine.com

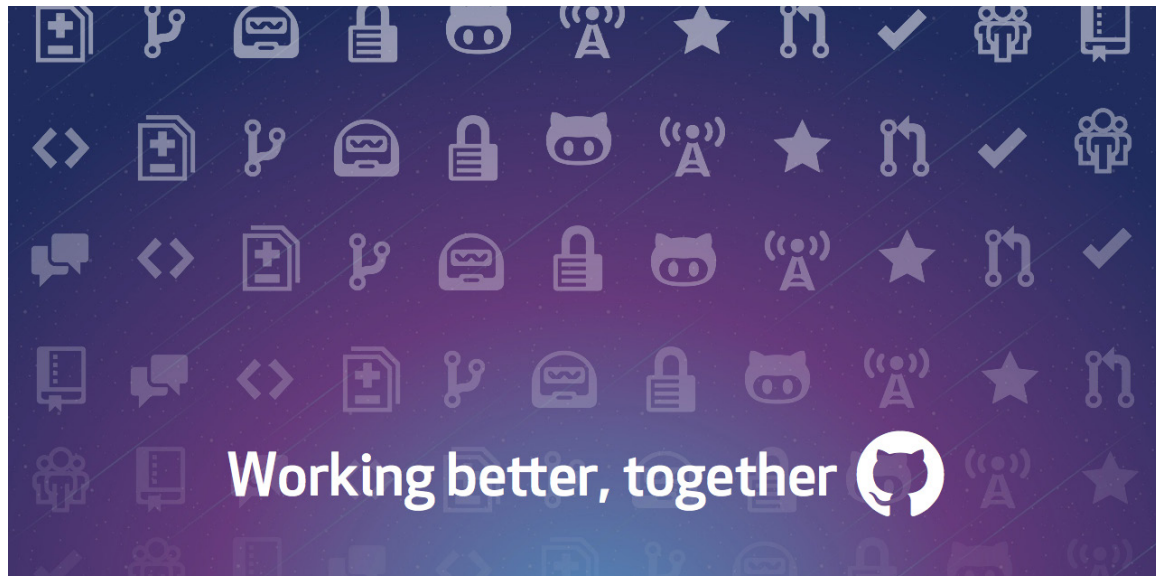
Cancer treatment is becoming increasingly individualised. Pharmaceutical companies are developing highly-specific treatments that work extremely well for some patients and not at all for others, depending on the underlying alterations in DNA that are driving the growth of the cancer. Patients therefore will benefit from a single, comprehensive test that analyses the genomic profile of their cancer and informs physicians about the specific therapies that might prove effective.

Foundation Medicine believes it has developed that test, which has the potential to fundamentally change the way cancer patients are treated. Called FoundationOne™, the test currently assesses 236 cancer genes and suggests therapies that are either commercially available or in clinical trials. Since FoundationOne launched commercially, patients were pointed towards a specific, targeted therapy or clinical trial in 82% of cases analysed by the company.

Foundation Medicine is also working with 18 pharmaceutical companies which have further therapies in the pipeline. These partnerships help the companies to develop their products more quickly and effectively, and help Foundation Medicine incorporate relevant genes into FoundationOne in readiness for the therapies reaching the clinical trial stage.

More than 1,500 physicians from 25 countries have ordered FoundationOne since its launch in June 2012. The test, which has a list price of \$5,800, analyses routinely-collected biopsy samples. It is aimed not only at physicians in large academic centers but also community-based practices, where an estimated 85% of United States cancer patients are treated.

FoundationOne currently analyses solid tumors. A second test for blood-based cancers is expected to launch by early 2014.



Tom Preston-Werner,
Chief Executive Officer and Co-Founder

Location: California, USA
Number of employees: 160
Year founded: 2008

GitHub

548 4th Street
San Francisco, CA 94107
USA

Website: www.github.com

GitHub is a platform that makes it easy for people to collaborate on designing and building software. Initially used primarily by coders, GitHub is evolving to enable everyone in a company who has a stake in the software the company uses – from marketing to finance, media to legal – to contribute more efficiently to the development of that software.

GitHub has around 4 million users and hosts twice as many projects. It is free for open source projects, which any coder can see and work on. Companies can pay to use GitHub's platform for private projects, or opt for GitHub Enterprise to install its collaboration tools on their own servers.

The tools simplify workflows that can complicate the process of developing software when many people are working on a project simultaneously, especially across different offices and time zones. Individuals can make copies of projects, work on parts of them, and propose merging the changes back in. Team members can flag problems, discuss required changes, see who is working on what, debate whether proposed changes should be incorporated, and review how changes are working. Every change is recorded and therefore easily reversible.

While the GitHub platform can be used to collaborate on other projects –for example, books have been written on it – the company remains focused on optimizing its tools for software development, given the increasing centrality of software development to every industry.



Nathan Eagle,
Chief Executive Officer and Co-Founder

Location: Massachusetts, USA
Number of employees: 16
Year founded: 2009

Jana

883 Boylston Street
Boston, MA 02116
USA

Website: www.jana.com

In emerging markets, almost all mobile telephone users have prepaid subscriptions. Jana enables companies to put airtime on people's prepaid mobile telephones as a reward for various actions: trying a product, downloading an app, watching an advert, filling in a survey, signing a pledge, referring a friend, and so on.

For example, Danone in Indonesia offered customers 5,000 IDR (about half a US dollar) airtime as an incentive to buy a multipack of Milkkuat or Activia. The customer could then validate the purchase on Facebook and earn even more airtime by referring friends to the promotion. As a result of the campaign, multipack purchases doubled.

Jana has agreements with hundreds of mobile operators across Asia, Africa and Latin America, enabling them to instantly compensate 3.5 billion consumers in over 70 different currencies. The airtime is immediately credited to the customer's telephone and is considered by the consumer to be equivalent to cash.

Jana envisages its platform as a fundamentally disruptive technology in the advertising industry. Companies can move away from spending on billboards or mass media, and instead put money directly into the pockets of consumers who agree to engage with a product or advert – a model which promises significantly higher returns on investment.

The model also offers a fresh perspective on debates about data privacy, by making the transaction both explicit and fair: consumers understand their data is valuable to companies, and provide it willingly because the advertisers are able to pay them for it.

Kaggle Inc.



Anthony Goldbloom,
Chief Executive Officer and Founder

Location: California, USA
Number of employees: 18
Year founded: 2010

Kaggle Inc.

333 Grant Avenue, Suite 708
San Francisco, CA 94108
USA

Website: www.kaggle.com

Businesses are increasingly able to collect additional data about various aspects of their work, and analysing that data can greatly improve their performance. But analysing data is a complex task, with a variety of techniques that can be employed. There can be a big difference between interrogating a data set with a great algorithm or a merely good one.

Kaggle allows clients – including Fortune 500 companies – to tap a worldwide community of over 100,000 experts in data science through a combination of consultancies and competitions.

Competitions enable businesses to offer cash prizes to members of Kaggle's community who can improve on their existing algorithms to extract more value from their data sets. Participation can be restricted when data is sensitive. Some competitors are academics interested in testing new ideas on real-world data; others work in data science and want a challenge in their spare time.

In this way, companies can be reassured that they are squeezing maximum predictive accuracy out of their data – whether it is GE Aviation predicting arrival times more accurately, Allstate predicting who will not renew their insurance policy, or Pfizer predicting demand for drugs in different geographies.

As refining an answer first requires defining the question, Kaggle also works with businesses that have data but are not sure how it can help them, by setting up bespoke consultancy projects with community members who have ranked highly in competitions. A high Kaggle ranking has become a currency through which data scientists can demonstrate their worth.

Kebony AS



Christian Jebsen,
Chief Executive Officer

Location: Oslo, Norway
Number of employees: 60
Year founded: 1997

Kebony AS

Hoffsveien 48
0377 Oslo
Norway

Website: www.kebony.com

Kebony has developed a process that makes softwood look and act like hardwood, without the use of toxic chemicals. Kebony's technology offers a sustainable, environmentally-friendly alternative to tropical hardwood, the demand for which is one of the main drivers of rainforest destruction.

The process – called kebonization – involves impregnating softwood with furfuryl alcohol, a natural waste product of agricultural crops including sugar cane and corn. The wood is then heated, causing a chemical reaction that changes its cells permanently. The resulting product – Kebony – is nontoxic, biologically inert and exceptionally resistant to weather, wear and decay, meaning it requires no maintenance beyond normal cleaning.

Kebony is comparable in price to hardwoods of similar quality. It is more expensive than softwoods treated with traditional methods using toxic chemicals, but it will last longer without maintenance –from a life cycle perspective, it is significantly more cost-effective.

While Kebony can replace tropical hardwood in any kind of use, from boats to furniture, it is initially being marketed primarily for the high-volume applications of cladding and decking.

Kebony's factory in Norway has proved the concept of the technology with fast-growing sales primarily in Scandinavia and Western Europe. Kebony is currently in the process of licensing its technology to softwood producers around the world.

Online Learning, Reimagined



Collaborative
Learning



Editable Video
Transcripts



A Searchable
Video Database



Synchronized
Notes & More

Ternitope Ola,
Chief Executive Officer

Location: Martigny, Switzerland
Number of employees: 6
Year founded: 2010

Koemei SA

19 Rue Marconi
1920 Martigny, Valais
Switzerland

Website: www.koemei.com

Video is quickly becoming the dominant model for online learning and training, in both academia and business. However, video has some disadvantages: you cannot search for words spoken in a video in the same way as you can search for text in a webpage; you cannot copy and paste quotes to refer to, edit and refine later; you cannot watch offline; and, if you have a hearing disability, you may not be able to access the contents at all.

Koemei is solving these problems by transcribing video using innovative automated speech recognition software, developed over seven years by academics at the Idiap Research Institute. Deciphering human-to-human speech is a much more complex task than understanding the human-to-machine speech found in automated call centres.

The software can transcribe lectures and long-form discussions, distinguishing among up to 10 voices for around a 20th of the cost of manual transcriptions. While independently benchmarked as the most accurate automatic transcription service currently available, it is still not perfect; hence, Koemei adds an interface for humans to check and correct the transcription, which can be crowdsourced to learners if desired.

Koemei has recently started to offer French as well as English transcriptions, and is working on German and Mandarin. It can be customized to handle fields with specialized vocabulary, such as medicine. Koemei's API makes it possible to use it beyond the training and education sector, though its focus is firmly on making learning and knowledge accessible to all.



Jeff Stewart,
Chief Executive Officer and Founder

Location: Hong Kong, SAR
Number of employees: 50
Year founded: 2001

Lenddo

2207 China Insurance Group Building,
73 Connauld Road
Hong Kong
People's Republic of China

Website: www.lenddo.com

In emerging economies, the new middle classes typically struggle with excessively bureaucratic procedures to access bank loans for purposes such as medical expenses, home improvements, small business investments or school fees.

Meanwhile, many of the same people are highly active on social networks such as Facebook, Twitter and LinkedIn. Their behaviour on these networks provides a rich source of data about their character virtues, such as honesty and consistency.

Lenddo makes loans after using social media accounts to assess applicants' creditworthiness, with an algorithm scoring them on their online behaviour and the strength of their connections. As in the original concept of microcredit, members of a community are able to vouch for each other's character when they apply for a loan, and then exert social pressure for those loans to be repaid. Lenddo scores evolve constantly: when someone repays a loan on time, the demonstration of trustworthiness can improve the score of others in the person's network.

The typical loan is for around one month's salary, though repeat borrowers can access higher limits and lower rates. Lenddo's default rates are typical for the microcredit sector, in the low single figures, but with lower transaction costs than are typical for the sector.

Lenddo has made tens of thousands of life-improving loans in Colombia, Mexico and the Philippines, and is targeting expansion into approximately 20 countries where analysis suggests the middle class is both healthy and under-served by existing financial services, including Indonesia, Brazil, Russia and China.



Samuel Wasserman,
Chief Executive Officer

Location: New Jersey, USA
Number of employees: 120+
Year founded: 2006

LiveU Ltd
2 University Plaza Drive, Suite 505
Hackensack, NJ 07601
USA

Website: www.liveu.tv

Broadcast vans transmitting images via satellite are a common sight at sporting and news events. These vans have some obvious limitations: they are big and expensive, and need a clear line of sight to the sky. Outside broadcasters would be more agile and flexible if images were transmitted via cellular networks instead, but a single cellular connection does not offer enough bandwidth to transmit in sufficient quality.

LiveU has solved the problem by inventing technology that can “bond” multiple cellular telephone signals. Its hardware has space for up to seven SIM cards. It can combine bandwidth from different cellular networks, any available Wi-Fi and even satellite if necessary, to transmit live, high-definition video.

First used by NBC at the Beijing Olympics, LiveU units have since covered everything from the Arab Spring to Hurricane Sandy. They can be used indoors and from moving vehicles – useful in covering events such as the Tour de France – and latency can be as low as under a second, much less than satellites. In crowded areas where networks are overloaded, resiliency can be enhanced by picking up signals from more distant towers.

Beyond broadcasting, LiveU units are increasingly being used in cases such as for crowd control at demonstrations, for special forces operations, and in ambulances to transmit images of patients to the emergency room, saving time on arrival. LiveU is working with leading camera manufacturers to integrate its technology into professional-grade and consumer cameras.



Matthew Rabinowitz,
Chief Executive Officer and Founder

Location: California, USA
Number of employees: 230
Year founded: 2004

Natera Inc.

201 Industrial Road, Suite 410
San Carlos, CA 94070
USA

Website: www.natera.com

Prospective parents who are concerned about chromosomal abnormalities such as Down syndrome have historically faced an agonizing choice. The most accurate tests, amniocentesis and chorionic villus sampling (CVS), are invasive: they require taking a sample from the amniotic sac or placenta, which involves a small but significant risk of inducing miscarriage. Non-invasive tests have been much less accurate – until now.

In March 2013, Natera launched the Panorama Test, a non-invasive test with levels of accuracy comparable to amniocentesis and CVS. The test, which can be performed as early as in the ninth week of pregnancy, involves analysing the mother's blood which contains tiny fragments of free-floating foetal DNA.

Natera's technology is unique in two ways. Firstly, it can gather more detailed information from the tiny fragments of DNA – effectively, viewing the genetic picture in higher resolution by also analysing the DNA of both parents. Secondly, it has developed a highly complex and computationally-powerful algorithm to analyse that picture and, using data from the Human Genome Project, calculate the statistical probability that it represents a chromosomal disorder. Natera also offers counselling to help clinicians and parents interpret the test results.

The technology is used in other chromosomal and genetic tests developed by Natera, such as non-invasive paternity testing, which can also be done as early as in nine weeks of pregnancy; determining the cause of a miscarriage to help prevent a repeat; and selecting for implantation the IVF embryo with the highest probability of a viable pregnancy.

Natera's technology could potentially also be used to screen blood samples for cancer.

Nest Labs Inc.



Tony Fadell,
Chief Executive Officer and Founder

Location: California, USA
Number of employees: 200
Year founded: 2010

Nest Labs Inc.
900 Hansen Way
Palo Alto, CA 94304
USA

Website: www.nest.com

The Nest is a thermostat that learns how you heat and cool your house, and programmes itself to optimize your energy use. After you spend a few days manually turning the temperature up and down when desired, Nest takes over – for example, it will turn down the air conditioning or heating when you are at work or asleep. Its built-in motion sensors can tell when there is no one around.

You can adjust the Nest's schedule from a computer or smartphone, and the Nest receives software updates online. You can also see a detailed breakdown online of what you are spending on heating and cooling, showing how much you can save by making small adjustments in your target temperatures.

The Nest was designed to be sleek, beautiful and intuitive. By making a thermostat that consumers would want to play with and demonstrate to their friends, Nest hopes to spark interest in and conversations about energy saving. The Nest typically reduces a household's heating and cooling bills by around 20%.

Utility companies are now offering incentives through the Nest's ability to control temperatures automatically. For example, the "Rush Hour Rewards" initiative in Austin, Texas, more than halved air conditioning use during peak energy demand times by offering users cash back if they agreed to accept slightly higher temperatures at peak times on hotter days.

Currently available in the United States and Canada, the Nest is in the process of being rolled out to international markets.

Oasys Water Inc.



Jim Matheson,
President and Chief Executive Officer

Location: Massachusetts, USA
Number of employees: 26
Year founded: 2009

Oasys Water Inc.

21 Drydock Avenue, 7th Floor
Boston, MA 02210
USA

Website: www.oasyswater.com

The world faces severe fresh water shortages, largely from the growth in industrial and extractive processes that require – and contaminate – large amounts of water. This contaminated water is often dumped, polluting the environment. It is possible, and sometimes legally required, to treat this water for discharge or reuse; but the primary solution is boiling it, which is costly and requires the burning of fossil fuels.

Oasys Water is poised to change that. Its system uses significantly less energy to treat contaminated water, making it feasible to use renewable sources such as solar and geothermal or even waste heat generated by the processes that cause the contamination.

The system works on the principle of osmosis, whereby water flows from a state of lower to higher concentration. Oasys has produced a proprietary “draw solution” that causes water to flow across a specially-designed membrane that filters out contaminants; the draw solution is then vaporized at temperatures as low as 60-70 degrees, leaving behind clean water.

In tests with water contaminated by use in fracturing a shale gas well, Oasys’s system used as much as 60% less energy than traditional treatment methods to produce water clean enough to drink – although it is more likely that treated water will be reused in industry or to replenish aquifers.

Oasys’s system also offers a much more efficient way of desalinating seawater, as it uses less energy and can cope with much higher concentrations of salt. It can be used in new desalination plants or added as a second phase to existing desalination plants, approximately doubling their output.



Anil Raj,
Chief Executive Officer and Co-Founder

Location: Gurgaon, India
Number of employees: 80
Year founded: 2011

OMC Power

406A Centrum Plaza Golf Course
Road, 4th Floor
122 001 Gurgaon
India

Website: www.omcpower.com

In rural India, 400 million people live and work without electricity in villages which are not – and never will be – on the grid. OMC is pioneering large-scale rural electrification by building micropower plants, mostly using solar energy, in these areas.

Electricity transforms rural communities. OMC enables local entrepreneurs to rent out LED lanterns and portable PowerBoxes for lights, fans, mobile phones, and so on. While the customers are poor, they can afford it by switching their spending away from dirtier and less convenient forms of fuel such as kerosene for lighting. Sales to rural households are growing strongly and are on course to account for 80% of OMC's revenue by next year.

The rest of the revenue comes from long-term contracts with telecom companies to power their towers in rural areas, about 150,000 of which are off-grid. By enabling OMC to borrow against the upfront cost of installing the infrastructure, this guaranteed revenue stream is what makes it possible to operate micropower at an unprecedented scale.

The company currently has 11 micropower plants, with around 20,000 active customers. Over the next three years, OMC plans to roll out at least 4,000 additional plants, bringing cleaner power to more than 8 million rural Indians.

As solar is projected to become cheaper than fossil fuels in 2014, OMC envisages that its business model will epitomize a wider global shift towards distributed electricity generation. Even where grids exist, future development will increasingly focus on micropower using the renewable resources available in local communities.

Rethink Robotics



Rodney Brooks,
Chairman, Founder and Chief
Technology Officer

Location: Massachusetts, USA
Number of employees: 85
Year founded: 2008

Rethink Robotics
27 Wormwood Street
Boston, MA 02210
USA

Website: www.rethinkrobotics.com

While consumer electronics have become easier to use, robots on the factory floor have not. Partly because of how much time and engineering expertise they take to programme, it typically becomes economical to automate a task only if a robot will spend several months doing the same thing.

Rethink Robotics is now selling a two-handed robot – called Baxter – that is intuitive to operate and works right out of the box. Anyone can train Baxter to perform a task, by grabbing its hands and showing it what to do – for example, taking a part from a conveyor belt and stacking it in a crate. Baxter learns the goal, not just the sequence of events, and works safely alongside humans. Rethink aims to make Baxter cost-effective even if it changes task every couple of hours.

That means Baxter is suitable for use even in small factories, automating tasks that it has never previously been economical to automate. Rethink envisages Baxter revolutionizing the factory worker's job, from performing repetitive tasks to training and supervising robots. Baxter also reduces the economic pressure to outsource the tasks to low-cost countries. Leading by example, Rethink manufactures Baxter in the United States.

Early adopters of Baxter, which costs around US\$ 22,000, have included the molten plastics sector and third-party logistics. Rethink has recently started shipping research models of Baxter to universities, and expects to be surprised by the uses to which the robot is ultimately put.

Second Sight Medical Products Inc.



Robert Greenberg,
President and Chief Executive Officer

Location: California, USA
Number of employees: 88
Year founded: 1998

Second Sight Medical Products Inc.
12744 San Fernando Road, Building 3
Sylmar, CA 91342
USA

Website: www.2-sight.com

Second Sight has developed the first ever approved treatment to partially restore vision to blind people. The Argus II Retinal Prosthesis System is enabling some blind patients to perform visual tasks such as identifying doorways, following sidewalks and reading large-print words.

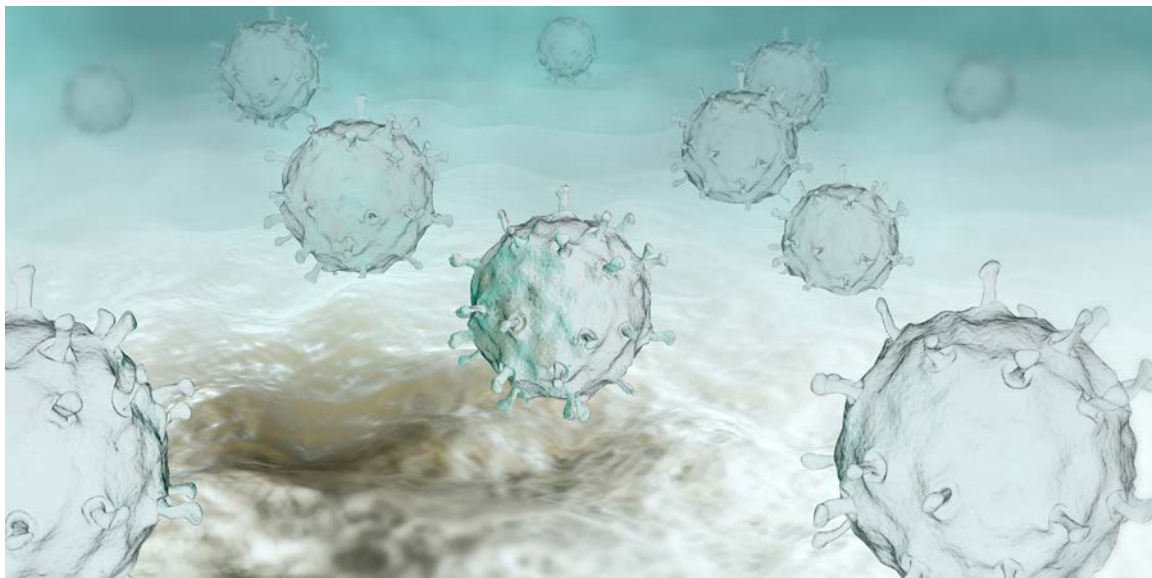
In a healthy eye, cells in the retina called photoreceptors convert light into electrochemical impulses that are sent to the brain, which processes them into images. Diseases such as retinitis pigmentosa cause blindness due to the death of those photoreceptors.

The Argus II involves an implant which is surgically inserted onto the retina. The patient wears glasses containing a camera; a small computer, worn on a belt, processes signals from the camera, and an antenna on the side of the glasses transmits them wirelessly to the implant. The implant sends electrical impulses to the brain, causing the patient to perceive patterns of light.

The system is not an exact replacement for natural vision, as patients often need to learn to interpret these patterns of light, and rates of progress vary. Second Sight is using feedback from patients to refine aspects of the image processing software, and is also working on enhancing image resolution by developing implants with more electrodes.

The Argus II is currently available in eight countries to treat blindness caused by conditions related to retinal degeneration. It could potentially also be used to treat macular degeneration. For the longer term, Second Sight is working on a cortical implant, which would enable nearly all causes of blindness to be treated.

Selecta Biosciences Inc.



Werner Cautreels,
President and Chief Executive Officer

Location: Massachusetts, USA
Number of employees: 50
Year founded: 2008

Selecta Biosciences Inc.
480 Arsenal Street, Building One
Watertown, MA 02472
USA

Website: www.selectabio.com

Selecta Biosciences has developed nanoparticles that are designed to boost the immune system's response to invaders it should be fighting, and to dampen its response to things it is fighting by mistake.

The first application, boosting the immune system's response, promises to revolutionize the efficacy and production of vaccines. Because the nanoparticles are synthetic, they can be manufactured much faster than traditional vaccines. They will also last longer and will not need to be refrigerated, making it easier to roll out vaccine programmes to areas with unreliable electricity supply.

Selecta's most advanced product, now in human trials, is a vaccine against nicotine addiction. The vaccine works by inducing antibodies to trap nicotine before it can trigger addiction; in effect, after the vaccine, smoking a cigarette should no longer lead to craving. Selecta is also at an earlier stage of working on vaccines against malaria and cancer.

Vaccines stimulate the immune system to respond to a specific trigger; the second application of Selecta's nanoparticles does the opposite, training the immune system to tolerize specific triggers. This promises a new kind of treatment for allergies and autoimmune diseases such as type 1 diabetes. It could also help in orphan diseases and with transplants, where currently the body's immune response needs to be generally suppressed for the orphan treatment to work or for the transplant not to be rejected.

While testing will take several years, Selecta believes its treatments will be quick to manufacture and roll out when efficacy is demonstrated and approval received.



Ludovic Deblois,
Chief Executive Officer

Location: Aix-en-Provence, France
Number of employees: 30
Year founded: 2008

SunPartner

Chateau de Galice, 1940 Route de
Loqui
13090 Aix-en-Provence
France

Website: www.sunpartnergroup.fr

SunPartner has developed ultra-thin, 90% transparent photovoltaic cells. Telephones and tablets, building and vehicle windows, billboards and greenhouses could soon generate electricity from any natural or artificial light source. The technology, called Wysips – “What you see is photovoltaic surface” – consists of an assembly of micro-lenses with a proprietary thin-film photovoltaic cell pattern.

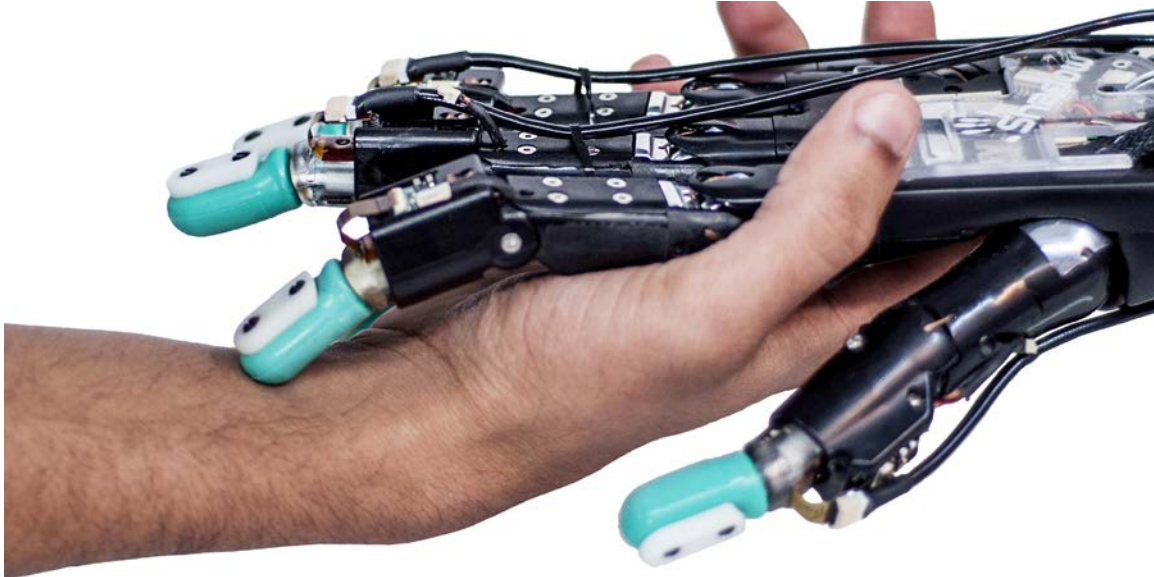
Four applications are under development. Telephones incorporating Wysips Crystal®, either above or below touchscreens, should reach the market next year. They will generate about 20% of their power requirements – enough for indefinite idle mode, emergency calls or offline functions such as playing music and showing boarding passes. The technology could make eReaders fully autonomous, eliminating the need for chargers.

Wysips Cameleon® is designed for outdoor display applications such as billboards and signs; the first energy self-sufficient scrolling billboard, developed in partnership with Prismaflex, is slated to begin production this year. Wysips Glass® will enable windows to produce energy – including aeroplane windows that can power their own opacity controls, eliminating the need for pull-down shades.

In the longer term, Wysips Textile® – a photovoltaic fibre – could be woven into the fabric of clothing and industrial textiles used in buildings, vehicles or temporary outside installations.

The company's business model is based on licensing. It has filed 30 patents during the past 18 months, and its patented transparency mechanism could also incorporate elements such as heating resistance wires, aeriels or RFID antennae, promising a wide variety of other applications. SunPartner intends to become a worldwide reference in the field of solar energy.

SynTouch LLC



Gerald E. Loeb,
Chief Executive Officer

Location: California, USA
Number of employees: 8
Year founded: 2008

SynTouch LLC

2222 South Figueroa, Suite PH2
Los Angeles, CA 90007
USA

Website: www.syntouchllc.com

SynTouch has developed the world's first robotic finger that can feel in the same way as a human finger. Until now, robots' fingers have been more like human fingers that are numb with cold.

The SynTouch BioTac is a tactile sensor that registers the three modalities that give humans sensory feedback from their fingertips – force, vibration and temperature. It offers potential for robots to become much more dexterous and better able to perform a wide range of tasks.

The research behind the BioTac was initially inspired by the quest to produce a better prosthetic hand. The technology is also being explored in various other contexts, including quality control in the production of items, such as textiles and cosmetics, where feel is important. Robots with BioTacs can classify textures in terms of their haptics – qualities which a person experiences as fuzzy, squishy, springy, grainy, and so on – more consistently than humans.

The challenge on which researchers are now working is to develop “machine touch” algorithms that can process the sensory information from the BioTac and use it to guide a robot's movements. Analogous to machine vision, it is not enough to merely equip a robot with a camera; it also needs to be programmed to use that visual feedback to accomplish a specific task. As the market for tactile sensors is new, there remains considerable uncertainty about what will ultimately prove to be the BioTac's main applications – although uses in factories, agriculture, households and surgery are all obvious possibilities.

TruTag Technologies Inc.



Hank C. K. Wuh,
Chairman

Location: Hawaii, USA
Number of employees: 10+
Year founded: 2010

TruTag Technologies Inc.

650 Iwilei Road, Suite 250
Honolulu, HI 96817
USA

Website: www.trutags.com

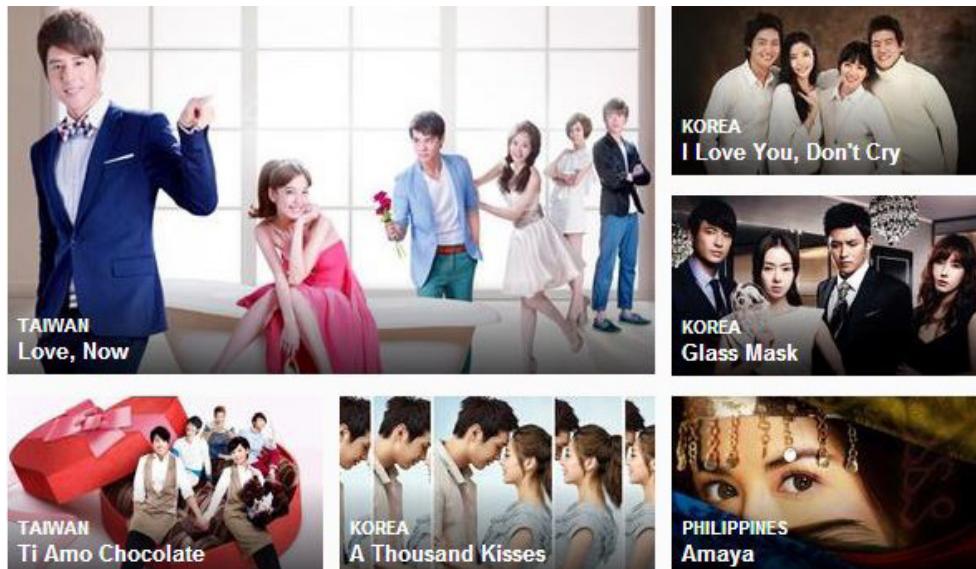
When you swallow a pill, how do you know it is genuine? Counterfeit pharmaceuticals cost an estimated US\$ 80 billion a year, in addition to the potentially dire human consequences.

Imagine every individual pill containing a tiny, edible identifier. You could scan the pill with a handheld device and immediately confirm, on your smartphone, the identity of the drug and its dosage, manufacturer, lot code and expiry date.

TruTag Technologies is working with major pharmaceutical firms to place TruTags in their products. TruTags are made of silica – a substance approved by the FDA, biologically inert and safe to eat – and use nanotechnology to embed a unique code, like a bar code, into a tag that is smaller than the width of a human hair. The codes are linked to a database that adds a time-related dimension of encryption, making the tags practically impossible to counterfeit.

Initially, TruTag envisages this technology being used within corporations to verify the origins of high-value products and components at each stage of their supply chain. In addition to pharmaceuticals, early applications of TruTags are likely to include foodstuffs, milk powders, computer chips, electronic components, and parts used in the automotive and aviation industries. TruTags can withstand temperatures up to 1,000°C.

In the longer term, TruTags will impact the US\$ 350 billion global counterfeit market. Retailers and consumers could routinely use TruTag readers to check the authenticity of the goods they purchase. Information that is now written only on packaging or labels can additionally be integrated into the fabric of the products themselves.



Razmig Hovaghimian,
Chief Executive Officer and Co-Founder

Location: Singapore
Number of employees: 47
Year founded: 2010

Viki Inc.

Pte Ltd Block 59, Mohamed Sultan
Road, 04-08/09/10
238999 Singapore

Website: www.viki.com

From Venezuelan telenovelas with Vietnamese subtitles to Japanese anime subtitled in Polish, Viki is an online video-on-demand service powered by a community of passionate fans who volunteer to translate their favourite content from around the world into different languages.

Viki sees itself as building cultural bridges across language gaps that have, until now, prevented even the most popular primetime shows in many countries from travelling far beyond home. Using the website's collaborative tools, Viki's community of translators subtitles new movies, music videos and television programmes into multiple languages within hours of them coming online. Over 400 million words have been translated into 163 languages.

Viki's content comes from deals with major broadcasters such as NBCU, the BBC and KBS. It makes its revenue from advertising, which it shares with the content creators, along with information about which territories the programmes are proving popular in – information that can help the content creators to discover potentially lucrative new markets. Korean movies, for example, have proved to be extremely popular in Saudi Arabia.

More than 20 million people watch shows on Viki every month, with a fast-growing proportion using mobile devices to view programmes and connected devices to stream to their televisions. Many are motivated by discovering new cultures and learning languages, just as Viki's community of translators are motivated by sharing their culture and, in some cases, keeping languages alive. Impressed by the speed and quality of the Viki community's subtitle translations, more and more content creators are coming on board.

WiTricity Corporation



Eric Giler,
Chief Executive Officer

Location: Massachusetts, USA
Number of employees: 49
Year founded: 2007

WiTricity Corporation
149 Grove Street
Watertown, MA 02472
USA

Website: www.witricity.com

Data has already gone wireless. Power is next. Imagine your telephone or tablet charging automatically when you toss it on the coffee table, and floor lamps that do not need trailing wires because they pick up their power from the carpet.

These are elements of the future envisioned by WiTricity, which licenses the use of a breakthrough technology developed at MIT. The technology, called highly resonant wireless power transfer, uses oscillating magnetic fields to induce currents in coils – but, unlike traditional induction, is able to transfer power efficiently over much larger distances and varying orientations. As it uses magnetic fields, which interact only weakly with biological organisms, it is not seen as posing health risks.

So you could, for example, use a laptop without a wire because it is drawing power from a wireless power source embedded in your ceiling, and charge your electric vehicle without plugging in because the power comes from a wireless source on the floor in the garage. Someday, sources in roads may even charge electric cars as they drive.

The technology also promises an end to the need for wires, and the consequent risk of infection, in implanted medical devices such as heart pumps. Built into rechargeable AA batteries, the technology provides portable power which is cheaper, more efficient and more environmentally friendly than today's disposables.

WiTricity is working with manufacturers to license and embed its technology in a variety of devices, which will be available in the coming years.

Selection Committee 2014

Family Name	First Name	Position	Organization	Country
Abraham	Linda Boland	Co-Founder, Chief Market Officer and Executive Vice-President, Global Development	comScore Inc.	USA
Afeyan	Noubar	Managing Partner	Flagship Ventures	USA
Agus	David B.	Professor of Medicine and Engineering	USC Center for Applied Molecular Medicine	USA
Alper	Howard	Chair and President	Science, Technology and Innovation Council	Canada
Andreessen	Marc	General Partner	Andreessen Horowitz	USA
Andrew	Jim	"Executive Vice-President; Chief Strategy and Innovation Officer; Chairman, Sustainability Board; Member, Executive Committee"	Royal Philips	Netherlands
Asami	Takao	Senior Vice-President, Advanced Engineering Development	Nissan Motor Co. Limited	Japan
Bastien	Remi	Vice-President, Advanced Research, Materials	Renault-Nissan Alliance	France
Battisti	Marcos	Managing Director responsible for Western Europe and Israel	Intel Capital	United Kingdom
Bazilian	Morgan	Deputy Director	Joint Institute for Strategic Energy Analysis	USA
Beckstrom	Rod A.	Adviser	Samsung Electronics	USA
Beer	Marthin de	Senior Vice-President, General Manager, Emerging Technologies Group	Cisco	USA
Behlendorf	Brian	Senior Technologist	Mithril Capital Management LLC	USA
Bingham	H. Raymond	Chairman of the Board	Flextronics International Ltd	USA
Blodget	Henry	Chief Executive Officer and Editor-in-Chief	Business Insider Inc.	USA
Bogachev	Igor	Executive Director of the IT cluster	Skolkovo Foundation	Russian Federation
Burger	Barbara	Vice-President of Lubricants Supply Chain and Base Oil	Chevron Corporation	USA
Cantamessa	Marco	Professor, Department of Management and Production Engineering (DIGEP)	Politecnico Di Torino	Italy
Chan	Tony F.	President	The Hong Kong University of Science and Technology	Hong Kong SAR
Colony	George F.	Chairman of the Board and Chief Executive Officer	Forrester Research Inc.	USA
Copeland	Michael	Business Editor	Wired Magazine	USA
Cozzens	Todd C.	Venture Partner	Sequoia Capital	USA
Crane	David W.	President and Chief Executive Officer	NRG Energy Inc.	USA
Drazen	Jeffrey M.	Editor-in-Chief	The New England Journal of Medicine	USA
Dyson	Esther	Chairman	EDventure Holdings Inc.	USA
Elisseeff	Jennifer	Professor of Biomedical Engineering	Johns Hopkins University	USA
Elton	Bob G.	Adjunct Professor	University of British Columbia	Canada
Frangos	Jean-Marc	Managing Director, External Innovation	BT Group Plc	USA
Garcia	Brian	Chief of Technology Officer of Strategic Diversification	Aetna Inc.	USA
Greer	Julia R.	Professor of Materials Science	California Institute of Technology (Caltech)	USA
Greiner	Helen	Chief Executive Officer	CyPhy Works Inc.	USA
Grob	Matthew	Executive Vice-President and Chief Technology Officer	Qualcomm	USA
Gross	Bill	Co-Founder and Chairman	Idealab	USA
Haddad	Habib	Chief Executive Officer	Wamda	United Arab Emirates
Hagel	John	Co-Chairman, Deloitte Center for Edge Innovation	Deloitte Consulting LPP	USA
Harper	Tim	Chief Executive Officer and President	Cientifica Ltd	United Kingdom
Harris	Patricia	Vice-President, Global Demand Marketing	IHS	USA
Harrison	Juan	Vice-President, Business Innovation	Takeda Pharmaceutical Company Limited	Japan
Hejka	Marcin	Managing Director, Eastern Europe, Middle East and Africa	Intel Capital	Poland
Hinrichs	Lars	Founder and Executive Geek	HackFwd GmbH & Co. KG	Germany
Hoffman	Reid	Executive Chairman and Founder	LinkedIn Corporation	USA

Howery	Ken	Co-Founder and Partner	Founders Fund	USA
Hu	Ken	Deputy Chairman	Huawei Technologies Co. Ltd	People's Republic of China
Huffington	Arianna	President and Editor-in-Chief	The Huffington Post Media Group	USA
Hull	Rob	Vice-President, Innovation Scouting	BT	USA
Kacou	Eric	Co-Founder	Entrepreneurial Solutions Partners (ESPartners)	USA
Kaltenegger	Kurt	Chief Technology Officer	ABB Technology Ventures Ltd	Switzerland
Kashyap	Nagraj	Senior Vice-President, Qualcomm Ventures	Qualcomm	USA
Koplovitz	Kay	Chairman	Liz Claiborne Inc.	USA
Langer	Robert	Institute Professor	MIT - Department of Chemical Engineering	USA
Le Meur	Loïc	Chief Executive Officer	LeWeb	USA
Leckrone	John	Head of Ventures	Adobe Systems Inc.	USA
Lee	Kai-Fu	Chairman and Chief Executive Officer	Innovation Works Management Limited	People's Republic of China
Lee	Sang Yup	Distinguished Professor, Director and Dean	Korea Advanced Institute of Science and Technology (KAIST)	Republic of Korea
Levchin	Max	Adviser	Founders Fund	USA
Lewin	Dan'l	Corporate Vice-President, Strategic and Emerging Business	Microsoft Corporation	USA
Li	Yingtao	President, Central Research & Development	Huawei Technologies Co. Ltd	People's Republic of China
Lindpainter	Klaus	Vice-President and Chief Scientific Officer	Thermo Fisher Scientific Inc.	USA
Lingjaerde	Sven	Managing Partner	Endeavour Vision	Switzerland
Matuszak	Gary	Global Chairman, Information, Communications and Entertainment	KPMG LLP	USA
Mayer	Marissa	Chief Executive Officer	Yahoo! Inc.	USA
Maynard	Andrew D.	NSF International Chair of Environmental Health Sciences and Director, Risk Science Center	University of Michigan	USA
McDonald	John	Vice-President and Chief Technology Officer	Chevron Corporation	USA
McGlashan	William E.	Founder and Managing Partner	TPG Growth	USA
Menhardt	Wido	Chief Executive Officer	Philips Innovation Campus Pvt. Ltd	India
Mohapatra	Manoranjan 'Mao'	Chief Executive Officer	Mahindra Comviva Technologies	India
Moore	Geoffrey	Chief Executive Officer	Geoffreyamoore	USA
Nadkarni	Girish V.	Managing Director and Head of Technology Ventures	ABB Ltd	Switzerland
Natsuno	Takeshi	Guest Professor	Keio University	Japan
Nicolas	Christophe	Senior Vice-President, Head of Kudelski Security	Kudelski Group	Switzerland
Nuescheler	David	Vice-President, Enterprise Technology	Adobe Systems Inc.	USA
Paget	Reed	Founder and Managing Director	One Earth Innovation	United Kingdom
Pitton	Yves	Senior Vice-President, Director and General Manager, Advanced Advertising	Nagra Kudelski Group	USA
Renard	Jean-Baptiste	Founder and Chief Executive Officer	2PR Consulting	France
Rimer	Neil	General Partner and Co-Founder	Index Ventures	Switzerland
Rios	Patricia	Global Director, KPMG Technology Innovation Center; Marketing Director, Technology Industry	KPMG LLP	USA
Rosenfield	James	Senior Vice-President	IHS	USA
Rothberg	Jonathan M.	Founder; Chief Executive Officer, Ion Torrent	Life Technologies Corp.	USA
Saffo	Paul L.	Managing Director	Discern	USA
Sagan	Paul	Executive Vice-Chairman	Akamai Technologies Inc.	USA
Sauvage	Edouard	Member of the Executive Committee and Head of Strategy	GDF SUEZ	France
Schenker	Jennifer	Founder and Editor-in-Chief	Informilo	France
Seid	Jake	President, Online and C2C Operations	Auction.com	USA
Spirit	Scott	Chief Strategy Officer	WPP Plc	People's Republic of China
Spreng	David	Founder and Managing Partner	Crescendo Ventures	USA
Sridhar	K. R.	Co-Founder and Chief Executive Officer	Bloom Energy	USA
Srivastava	Saurabh	Chairman, India and Senior Vice-President	CA Technologies (India) Private Limited	India
Tai	Bill	General Partner	CRV	USA
Tananbaum	Jim	Founder and Chief Executive Officer	Foresite Capital Management LLC	USA
Thrun	Sebastian	Research Professor of Computer Science	Stanford University	USA
Vardi	Yossi	Chairman	International Technologies Ventures Inc.	Israel
Veer	Jeroen van der	Executive Member of the Governing Board	European Institute of Innovation and Technology	Hungary
Warrior	Padmasree	Chief Technology and Strategy Officer	Cisco	USA
Winblad	Ann	Co-Founder and Managing Director	Hummer Winblad Venture Partners	USA
Wolfe	Nathan D.	Chief Executive Officer and Founder	Metabiota	USA
Wu	Changhua	Director, Greater China	The Climate Group	People's Republic of China
Yamada	Tadataka	Chief Medical and Scientific Officer, Executive Vice-President and Board Member	Takeda Pharmaceuticals International Inc.	USA

Acknowledgements

This report was prepared by the World Economic Forum, with the invaluable collaboration of Andrew Wright. The Technology Pioneers Programme is run by the World Economic Forum, with guidance from ABB, Adobe, Aetna, BT, Burda Media, CA Technologies, Chevron, Cisco, Huawei, IHS Cera, Intel, KPMG, Kudelski Group, Mahindra Satyam, Microsoft, Novartis, Omnicom, Publicis, Qualcomm, Renault-Nissan Alliance, Royal Phillips and Takeda.

The Technology Pioneers Programme of the World Economic Forum is managed by Silvia von Gunten. Special thanks to Satu Kauhanen, Tessema Tesfachew, Marjorie Buchser, Emily Richards, Simon Mills and Lisa Pang for their contribution and diligence during the Selection Process 2014 and in the production of this report. Also, special thanks to Abdel El Yahiaoui and Yves Cheneval for their technical support and management of the online evaluation platform.

Editing:

Ann Brady, Associate Director, Head of Editing, World Economic Forum

Publication, design and layout:

Kamal Kimaoui, Director, Production and Design, World Economic Forum

David Bustamante, Senior Manager, Publication and Design, World Economic Forum

Floris Landi, Senior Associate, Graphic Designer, World Economic Forum

Yoren Geromin, Designer, Kissing Kourami





COMMITTED TO
IMPROVING THE STATE
OF THE WORLD

The World Economic Forum is an independent international organization committed to improving the state of the world by engaging business, political, academic and other leaders of society to shape global, regional and industry agendas.

Incorporated as a not-for-profit foundation in 1971 and headquartered in Geneva, Switzerland, the Forum is tied to no political, partisan or national interests

World Economic Forum
91-93 route de la Capite
CH-1223 Cologny/Geneva
Switzerland

Tel +41 (0) 22 869 1212
Fax +41 (0) 22 786 2744

contact@weforum.org
www.weforum.org