



ASX PRESS RELEASE

29 April 2016

VIRTUAL ROADSHOW PRESENTATION

The Directors of BrainChip Holdings Ltd (“**BrainChip**”) are pleased to release the attached Virtual Roadshow Presentation for the markets in USA and Europe. As a continued commitment to keep the US and international market abreast of the development of the BrainChip technology, its successful completion of significant milestones and its go to market /commercialization strategy BrainChip has produced the Virtual Roadshow Presentation. This presentation will be used over the coming weeks as Mr Peter van der Made CEO and Founder of BrainChip talks to interested parties in the US and on his upcoming trip to Europe.

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ASX: BRN

Investor Presentation

April 2016

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brainchip^{*}

**The Next Generation of Fast, Autonomous
Machine Learning**

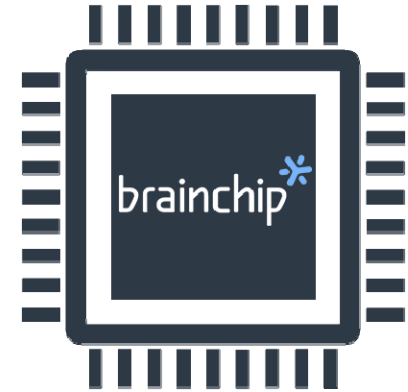
BrainChip has developed a revolutionary Spiking Neuron Adaptive Processor (SNAP) technology that learns autonomously and unsupervised, evolves and associates information just like the human brain

- ✧ SNAP technology provides rapid and autonomous learning
- ✧ The technology is fast, completely digital, and consumes very low power
- ✧ BrainChip follows a proven semiconductor industry Intellectual Property (IP) licensing model in deriving its revenue from License, Engineering and Royalty fees

ASX Code	BRN
Market Cap (April 14, 2016)	A\$127.1M
Share Price (April 14 2016)	A\$0.18
Issued Shares	706.38M
Options	29.55M
Cash (March 31, 2016)	US\$803,000

SNAP's Unique Features

- ✧ **Next generation rapid real time learning**, learns autonomously within seconds
- ✧ A revolutionary custom **digital hardware design**, no traditional processing core, no firmware, no external memory
- ✧ **Real time recognition** at very **low latency**
- ✧ **Massive parallel execution** – all neural nodes are updated at the same time, enabling a **speed thousands of times faster than peer software neural networks**
- ✧ Performs **consistently at exceptionally high speed** and does not slow down with network size
- ✧ **Significantly lower power consumption** enables large networks to be integrated into portable devices



Technology Advantages

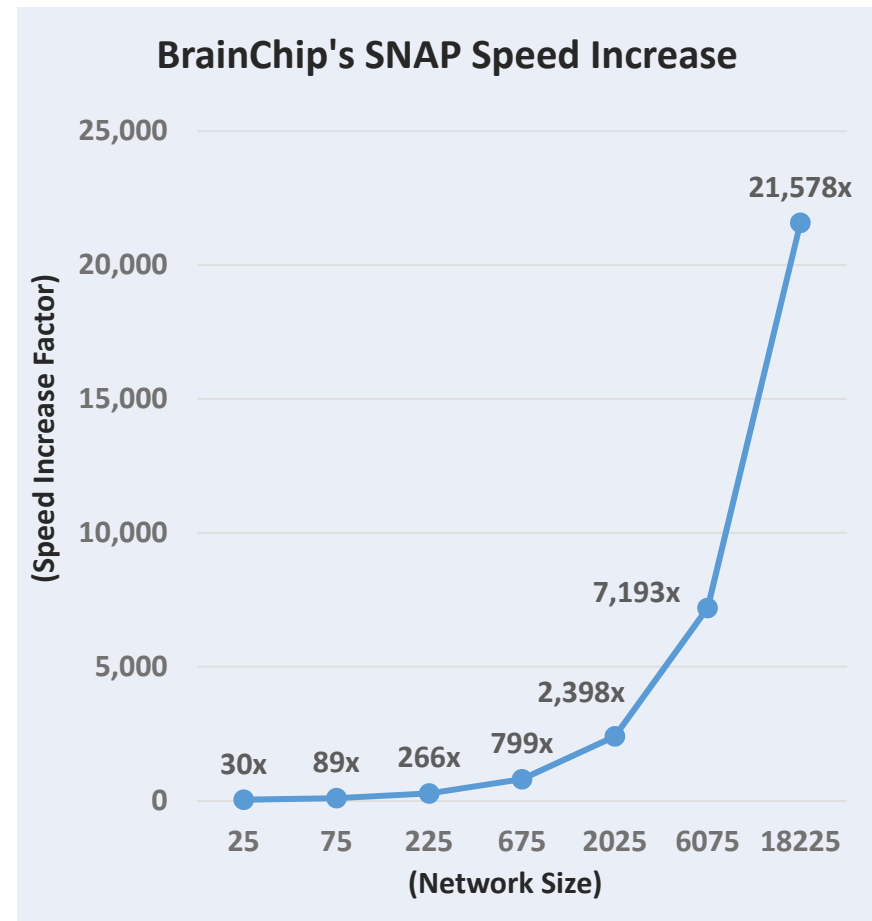
Speed (Degree of Parallelism)

Low Power

Self Learns (Autonomous)

BrainChip has a significant speed advantage in “all-at-once” processing

Neural Network Scaled Size	Software time per Update Cycle (seconds)	Hardware time per Update Cycle (seconds)	BrainChip SNAP Speed Increase
25	0.0074	0.00025	30x
75	0.0222	0.00025	89x
225	0.0666	0.00025	266x
675	0.1998	0.00025	799x
2,025	0.5994	0.00025	2,398x
6,075	1.7982	0.00025	7,193x
18,225	5.3946	0.00025	21,578x

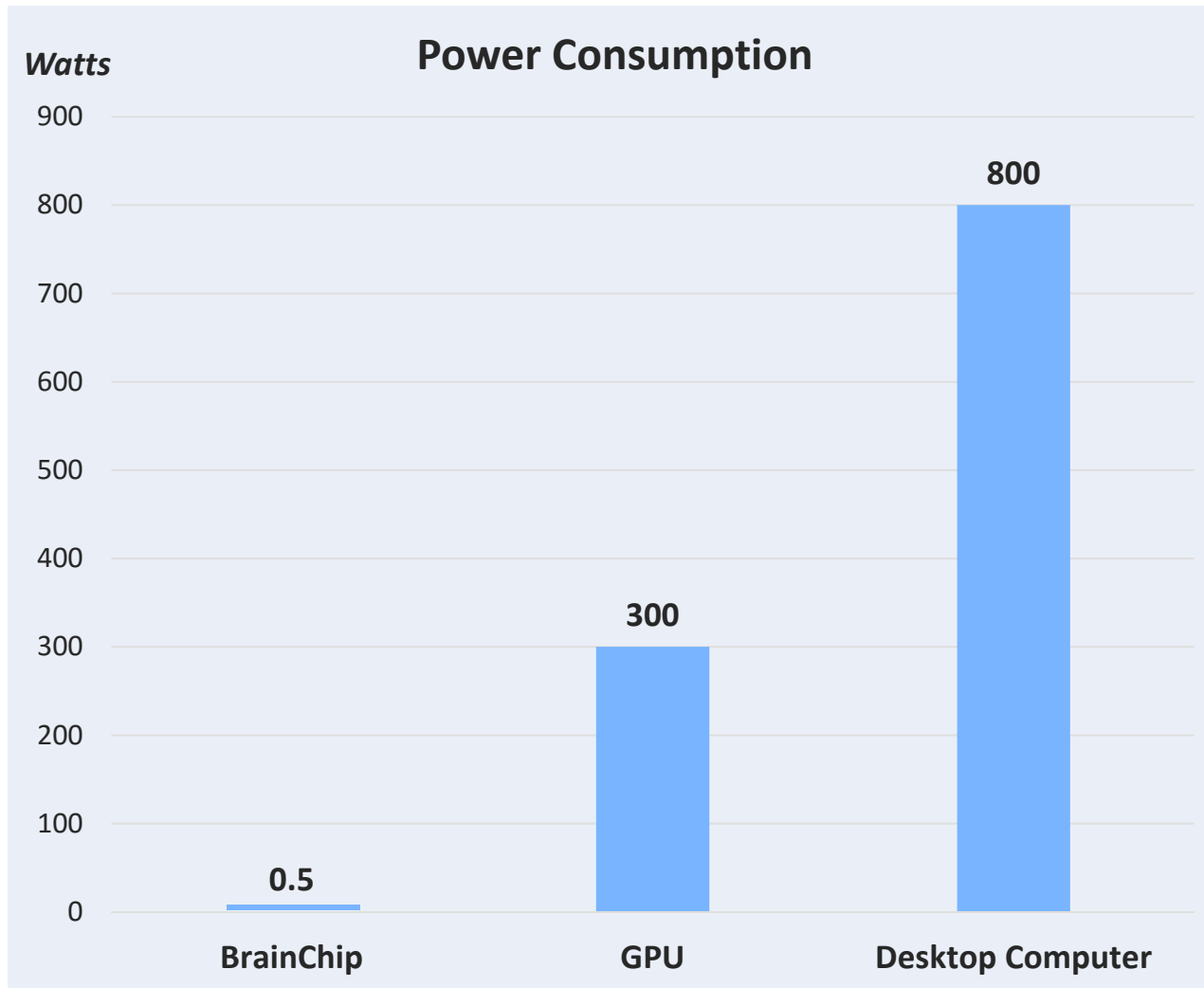


Technology Advantages (cont'd)

Speed (Degree of Parallelism)

Low Power

Self Learns (Autonomous)



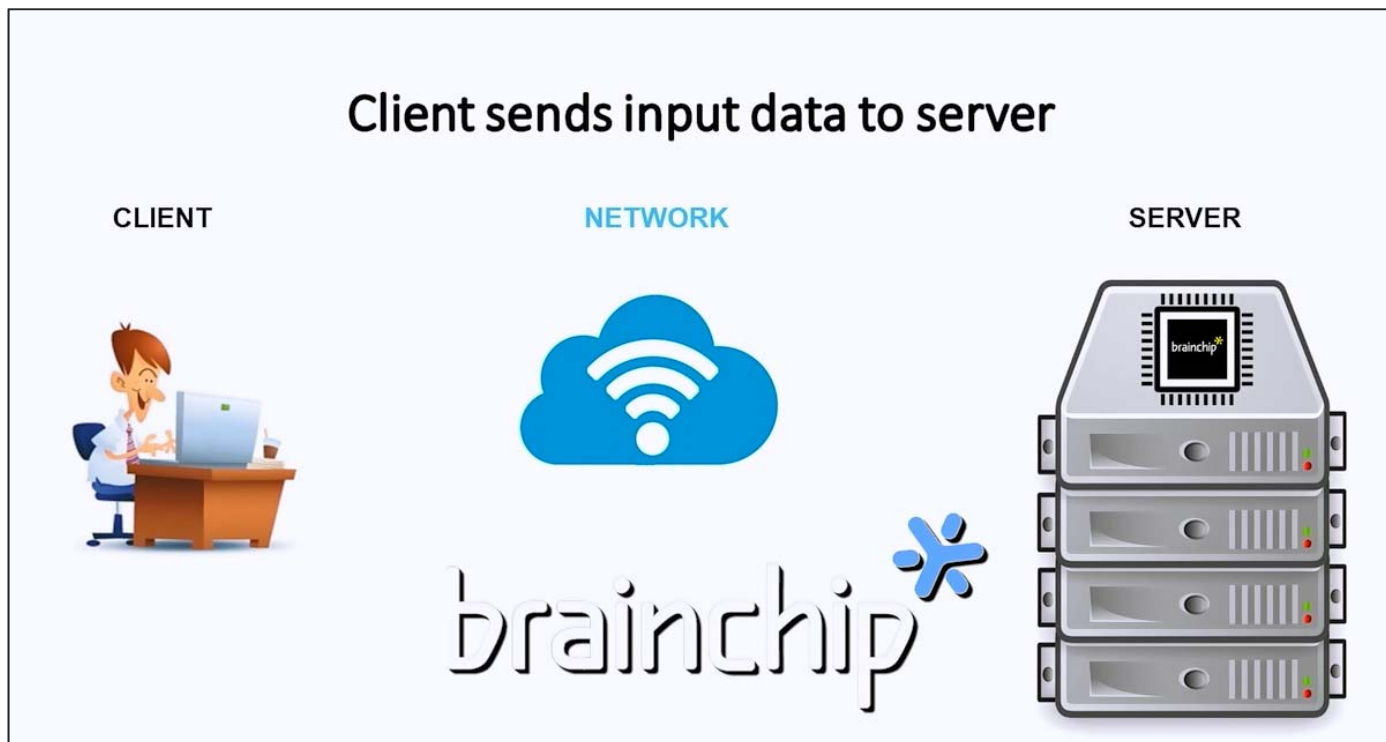
Technology Advantages (cont'd)

Speed (Degree of Parallelism)

Low Power

Self Learns (Autonomous)

Development of an Autonomous Visual Feature Extraction (AVFE) system



[Click here to view the video \(1:36-2:44\)](#)

Leading The Next Generation

SNAP is a standalone fast machine learning technology capable of accelerating a technology-partner's existing deep learning solutions

Previous Generation: Deep Learning































































- Requires millions of samples
- Learns features in days or weeks

Next Generation: Rapid Real Time Learning



- Requires a small sample set
- Learns within in seconds
- Autonomously learns and extracts features

Competitive Landscape

	Companies	Degree of parallelism (speed)	Low power consumption	Chip designed for neural networks	Rapid Learning capabilities on chip	Execution time independent of neural network size	Uses third generation neural networks (spiking)
Hardware - Chip	BrainChip (SNAP)						
	IBM (TrueNorth)						
	Movidius						
	Cognimem						
Deep Learning	DeepMind (Google)						
	Facebook						
	Vicarious General Vision						
	Tera Deep						
Robotics	Brain Corporation						
	Neurala						



Each quadrant represents 25% CAPABILITY



Simplified Neuron model

This table contains commercially available products and announced products. It does not list a range of analog VLSI devices that are developed by Stanford, UCSD, Salk Institute and others because these are research devices. Analog VLSI are difficult to mass-produce.

Market Opportunity

- * The neuromorphic chip market is estimated will be worth **\$4.8 billion by 2022 with a CAGR of 26.31%***
- * License opportunities and related revenues are significant (highlighted in slide 12)
- * Neuromorphic sector and **artificial intelligence** have been seeking SNAP's capabilities
- * SNAP IP is a core enabling technology in neuromorphic semiconductor chips
- * Neuromorphic chips can be used in nearly any smart application or product – a massive and unlimited market

- Smartphones
- Internet of Things (IoT)
- Drones; hazard avoidance, mapping
- Gaming
- Security and Cyber Security
- Driverless Vehicles



Marketing Strategy - Partners

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TECHNOLOGY
RAPID LEARNING NEUROMORPHIC IP

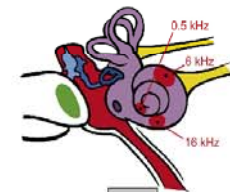
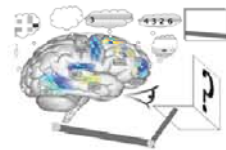
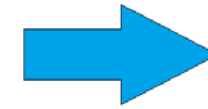


T.B.A. PARTNER

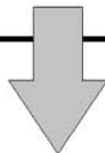
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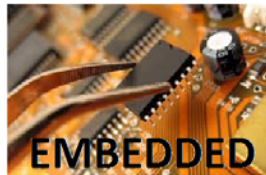
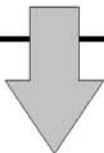
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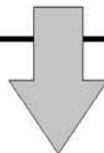
Future Partners...



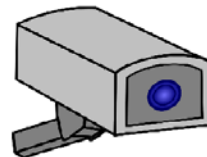
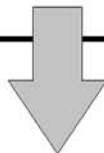
Projected to reach USD 21.23 billion by 2020
mordorintelligence.com



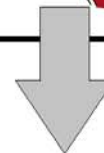
expected to reach USD 233.13 billion in 2021
transparencymarketresearch.com



expected to reach USD 5.59 Billion by 2020
marketsandmarkets.com



grow from \$2.77 Billion in 2015 to \$6.19 Billion by 2020
marketsandmarkets.com



now worth 1.56 Trillion dollars annually
<http://communities-dominate.blogspot.com/brands/>



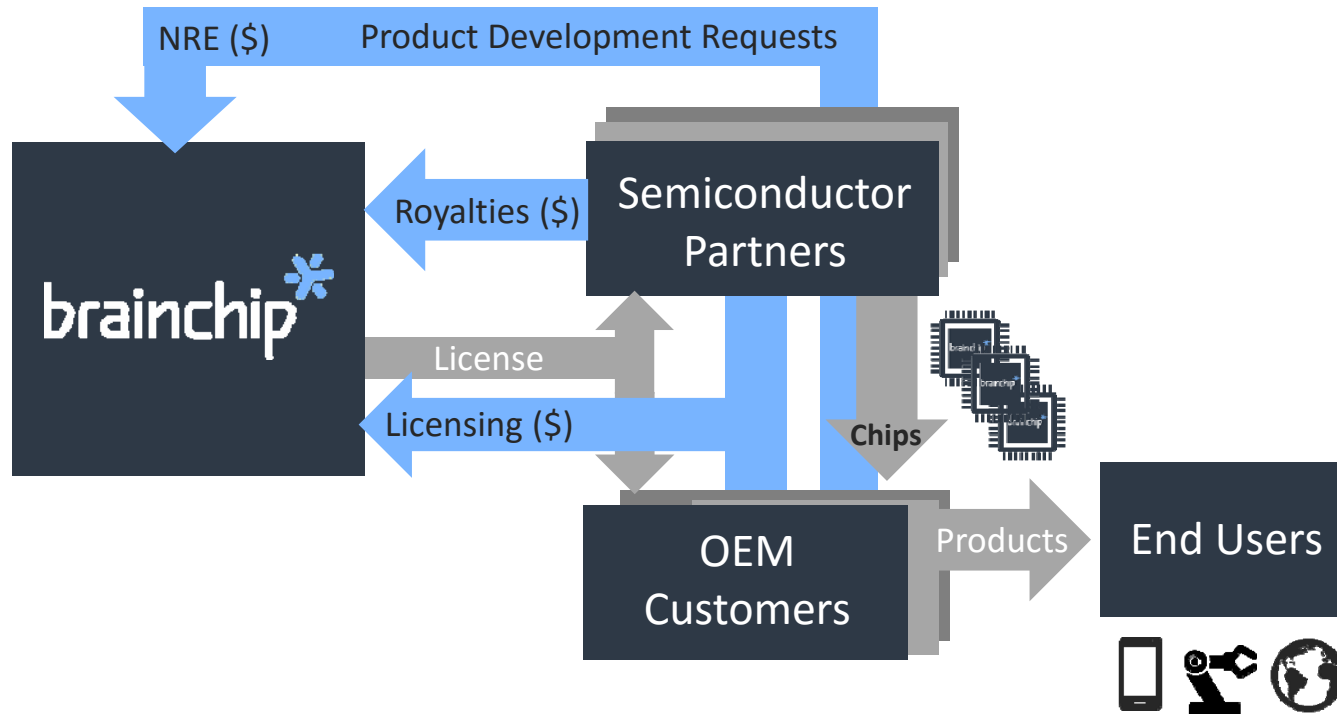
from nearly \$39 billion in 2015 to more than \$76 billion in 2020
Researchandmarkets.com

Commercialization Strategy

- ✧ Become the **de-facto standard** for **autonomous learning**
- ✧ Grow a network of **technology partners**, and **OEM customers** for licensing and to satisfy existing and expanding needs in **artificial intelligence**
- ✧ Deliver high-tech IP products that **integrate into** technology partners' **solutions** to access existing markets
- ✧ Build an expanding portfolio of **global patents**



Business Model

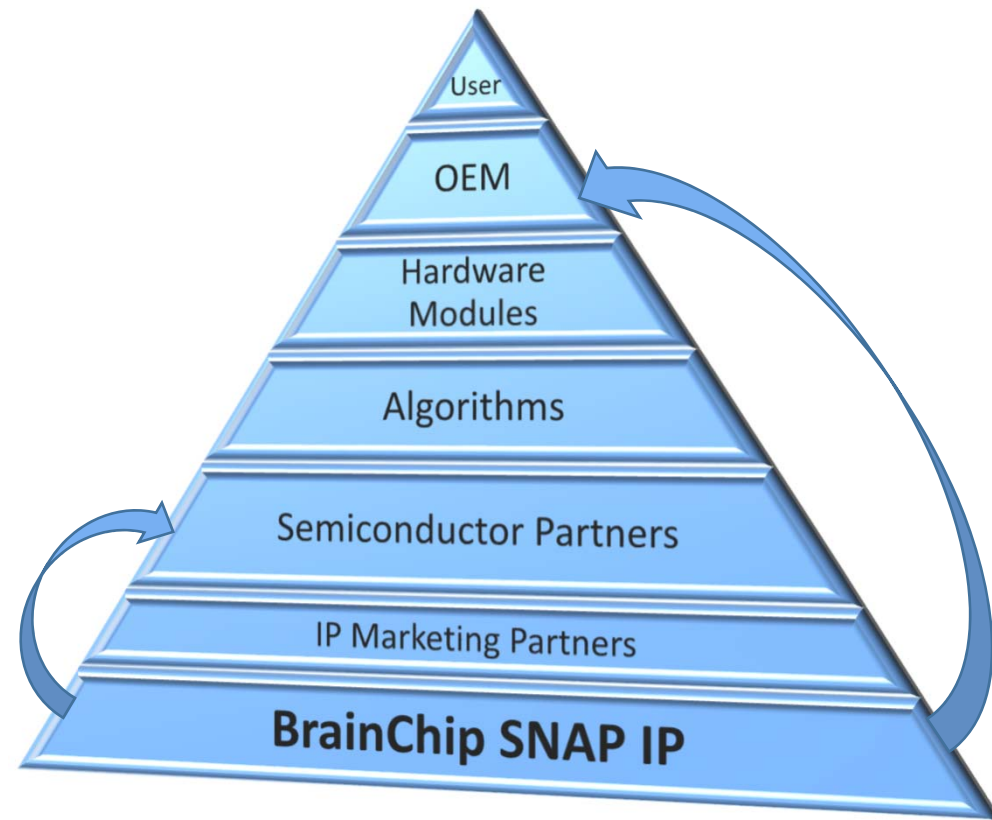


Three Revenue sources:

- 1) **Licensing Revenue** – SNAP licensed to OEM customers and semiconductor companies.
- 2) **NRE Revenue** – Semiconductor company designs and manufactures a specific chip utilizing SNAP with other technologies. The chip is incorporated into a product and sold. BrainChip technical team will generate service income in customizing SNAP to the client application
- 3) **Royalty Revenue** – Royalty for every chip manufactured, based on percentage of chip price.

Multiple Channels to Market

OEM Customers	<ul style="list-style-type: none">• Cell phones• MEMS• Security• Robotics
Hardware & software module solution providers	<ul style="list-style-type: none">• Work with semiconductor partners to complete the solutions
Semiconductor Partners	<ul style="list-style-type: none">• License SNAP and manufacture system on chip products for OEMs
BrainChip SNAP Sales Model	<ul style="list-style-type: none">• Direct Sales to identified customers• Joint marketing• IP sales/ distributor partners



IP Protection

- ✧ Protecting and developing intellectual property is a central part of BrainChip’s business strategy
- ✧ BrainChip is the first company to file a digital neuromorphic chip patent (2008)
- ✧ Citations of BrainChip’s patents are accelerating – a leading indicator for a growing market
- ✧ **1 patent granted** – Autonomous Learning Dynamic Artificial Neural Computing Device and Brain Inspired System: 8,250,011 **cited multiple times**
- ✧ **6 patents currently pending and many more planned**

Leading Companies Citing BrainChip ¹	Cites
Qualcomm	13
IBM	9
Samsung Electronics	1
Others	2

¹Partial list. U.S. patents and cites are as of December 31, 2015.



Board and Management

Mick Bolto
Non-Executive
Chairman

- Mick was a partner at leading global law firm Mallesons Stephen Jaques for 20 years, in the structuring & execution of large-scale transactions around the world. Has since worked in private equity fundraising & investment supervision, creating strategy & helping to deliver viable business results. Mick has been Chairman of numerous listed, private & not-for-profit entities.

Peter AJ van der Made
Founder, CEO & CTO

- At the forefront of computer innovation for 40 years. Designed high resolution, high speed color Graphics Accelerator chip for IBM PC graphics. CTO at vCIS Technology where he invented a computer immune system & became Chief Scientist when it was acquired by Internet Security Systems, & subsequently IBM. In 2010 published Higher Intelligence, a book describing the architecture of the brain from a computer science perspective.

Anil Mankar
COO & SVP Engineering

- 30 years at senior management positions in the semiconductor industry. At Western Digital he developed PC core Logic chipsets. He started as VP Engineering at Conexant Systems Inc and developed many products across industry segments then became CDO overseeing product development for V92 Modem, DSL, Set-top boxes, PC audio and video 'System on a Chip' products. Moved to be SVP of VLSI Engineering at Mindspeed Technologies, responsible for Wireless and VOIP infrastructure product development.

Neil Rinaldi
Non-Executive Director

- Corporate background with an emphasis on M&A, capital raising & business development.

Dr. Adam Osseiran
Non-Executive Director

- At BrainChip since 2012. Currently Associate Professor of Electrical Engineering at Edith Cowan University in Western Australia and holds a Ph.D. in microelectronics from the National Polytechnic Institute of Grenoble.

Scientific Advisory Board

Dr. Nicholas Spitzer Neuroscientist

- ✧ Distinguished Professor at University of California, San Diego
- ✧ Ph.D. Harvard University
- ✧ Editor-in-chief of BrainFacts.org
- ✧ Recipient of a Sloan Fellowship, a Javits Neuroscience Investigator Award & a Guggenheim Fellowship
- ✧ Director of the Kavli Institute for Brain and Mind



Dr. Jeffrey Krichmar Cognitive Scientist

- ✧ Professor at University of California, Irvine
- ✧ Ph.D. George Mason University
- ✧ research interests include neuro-robotics, embodied cognition, neural architecture
- ✧ Previously Senior Fellow in Theoretical Neurobiology at The Neurosciences Institute



Dr. Gert Cauwenberghs Bio-Engineering Scientist

- ✧ Professor at University of California, San Diego
- ✧ Ph.D. California Institute of Technology, Pasadena
- ✧ Research interests include Biomedical integrated circuits and systems, micropower analog VLSI, neuromorphic engineering, adaptive neural computation, learning and intelligent systems.

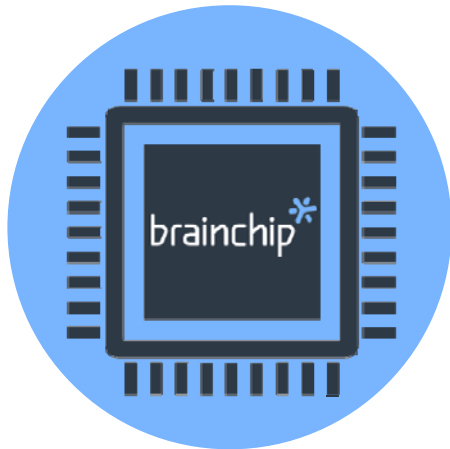


Key Takeaways

- * **First mover advantage** – Next generation technology that learns autonomously, is significantly faster and requires considerably less power than what is currently available
- * **Huge market** – neuromorphic chip market alone to be \$4.8bn* by 2022 consist of abundant opportunities
- * **Hardware-only solution** means thousands of times faster than software, no programming, instant ready neural network with low power usage
- * IP and trade secrets create **high barriers to entry**
- * **Attractive, high-margin revenue model**
- * **Highly experienced management team** with significant insider ownership (60%+)

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- ✧ **Huge market** – neuromorphic chip market alone to be \$4.8bn* by 2022 consist of abundant opportunities
- ✧ **Hardware-only solution** means thousands of times faster than software, no programming, instant ready neural network with low power usage
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