



## BrainChip to present at TechKnow Invest Roadshow

**San Francisco, California – October 12, 2017** BrainChip Holdings Ltd. (“BrainChip” or the “Company”) (ASX:BRN), a leading developer of software and hardware accelerated solutions for advanced artificial intelligence (AI) and machine learning applications, is pleased to announce that the Company will be presenting at the TechKnow Invest Roadshow in Melbourne, Australia on 24 October 2017 and Sydney, Australia on 26 October 2017.

The presentation will include information on recent commercial developments including the release of its hardware acceleration board, BrainChip Accelerator and the Company’s AI-powered software product, BrainChip Studio.

A copy of the presentation is attached.

TechKnow is one of Australasia’s premier technology investor events and provides companies with the opportunity to present to a diverse range of investment audiences including institutional investors, brokers and private investors. Further information on the event can be found at:  
<http://www.techknowinvestroadshow.com.au>

### **About BrainChip Holdings Ltd (ASX:BRN)**

BrainChip Holdings Ltd. is a leading provider of software and hardware-accelerated solutions for Advanced Artificial Intelligence and Machine Learning applications. The Company has developed a revolutionary new spiking neural network technology that can learn autonomously, evolve and associate information just like the human brain. The technology, which is proprietary, is fast, completely digital and consumes very low power. The Company provides software and hardware solutions that address the high-performance requirements in Civil Surveillance, Gaming, Facial Recognition and Visual Inspection systems. [www.brainchipinc.com](http://www.brainchipinc.com).



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Louis DiNardo  
President and CEO

Ryan Benton  
Chief Financial Officer

OCTOBER 2017

brainchip 

ASX CODE: BRN | “AN AI PROCESSOR COMPANY”

# Disclaimer



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# Company Overview

- ◆ Founded in 2013. Listed ASX:BRN September 2015.
- ◆ Seasoned Silicon Valley Management Team with Proven Track Record.
  - Executive Office, Sales & Marketing in San Francisco, CA.
  - Design Centers in Aliso Viejo, CA and Toulouse, France
  - Headcount 29
- ◆ The Company has pioneered an AI Processor Architecture based on a spiking neural network that mirrors the learning mechanisms of the human brain.
- ◆ The Company's video analytics and AI-Processor products address large growing markets\*
- ◆ Strong IP Position in Emerging AI Technology Field.

\* The Neuromorphic Chip Market is estimated to be worth \$4.8 Billion by 2022 with a CAGR of 26.31% between 2016 and 2022. Source: Markets and Markets 2015 Report. The Video Analytics markets the Company is targeting is estimated to be approximately \$3 Billion. Source: Homeland Security Report and Company estimates.

Description	BRN
Market Cap*	A\$140.0M
Share Price*	A\$0.165
Capital Raised	A\$19.4M
Issued Shares**	848.2M
Cash**	US\$4.5M

\* As of Close October 6, 2017

\*\* As of June 30, 2017 per Appendix 4D Half-Year Report



*“We require exquisite numerical precision over many logical steps to achieve what brains accomplish in very few short steps.”<sup>1</sup>*

**John von Neumann**  
Inventor of the digital computer

<sup>1</sup> Von Neumann J (1958) The Computer and the Brain. New Haven CT: Yale UP.

# Business Overview

- ◆ **BRN is the global leader in commercialisation of Spiking Neural Networks (“SNN”) technology, which mirrors the processing of the human brain.**
- ◆ **BRN’s patented intellectual property protects its technology and market position.**
- ◆ **BRN products are globally deployed by government and institutional clients.**
- ◆ **BRN’s existing video analytics products are ready to scale with high-margin Annuity Revenue Model.**
  - **BrainChip Studio software was released July 2017.** BrainChip Studio aids users to rapidly search vast amounts of video footage for identifying patterns or faces. This proprietary, standardized software solution is highly scalable and applicable to a range of surveillance applications.
  - **BrainChip Accelerator hardware was released September 2017.** Brainchip Accelerator is a complementary hardware solution that allows more rapid product deployment and generation of annuity revenues (upfront camera sales with annuity software support and maintenance revenue).
- ◆ **Capital Efficient Go-to-market Strategy. Growth with existing customers, and sales through OEMs, Integrators, and Partners will reduce the time and capital required to build large direct sales force.**
- ◆ **Revolutionary AI Processor AKIDA™ in-development is expected to be leader in emerging neuromorphic computing field.**

# Key Recent Announcements

<b>September 2017</b>	<b>BrainChip Launches BrainChip Accelerator</b>	<ul style="list-style-type: none"><li>• BrainChip Accelerator increases the speed and accuracy of the object recognition function of BrainChip Studio software by up to six times</li><li>• Very low-power and can be easily installed within existing video surveillance systems without upgrading power systems or thermal management.</li><li>• Helps law enforcement and intelligence organisations rapidly identify objects in large amounts of archived or live streaming video.</li></ul>
<b>July 2017</b>	BrainChip Launches BrainChip Studio	<ul style="list-style-type: none"><li>• BrainChip Studio is a highly scalable version of BRN's 10-year+ tech development.</li><li>• Whereas BRN's previous software solutions were customised to individual clients, BrainChip Studio provides artificial intelligence (AI) software within self-contained hardware (eg. cameras).</li><li>• The self-contained hardware/software solution appeals to law enforcement and intelligence organisations who require on-site, self-contained monitoring systems (ie. not in the cloud).</li></ul>
<b>June 2017</b>	BrainChip announces collaboration with Safran	<ul style="list-style-type: none"><li>• Safran Group (SAF:EN, Paris-listed, EUR 33b market cap) is trialing the use of BrainChip technology in the manufacturing process of electrical harness assembly, a traditionally labour intensive process.</li></ul>
<b>May 2017</b>	Field Trial commences at leading Las Vegas Casino	<ul style="list-style-type: none"><li>• MGM Group, Las Vegas (NYSE:MGM, \$19B market cap) and 16 casinos in discussions or trials.</li></ul>
<b>April 2017</b>	Engagement in Civil Surveillance with French National Police	<ul style="list-style-type: none"><li>• French National Police (Toulouse) are evaluating advanced forensic video analytic technologies.</li></ul>
<b>March 2017</b>	Exclusive License for Next-Generation Neural Network Technology	<ul style="list-style-type: none"><li>• Gained exclusive rights to the JAST learning rules and algorithms developed by CERCO (Brain and Cognition Research Centre) a leading public research lab based in France. Significantly enhances BrainChip's existing product offering allowing applications across new areas and markets</li></ul>



# Brainchip – Management Team

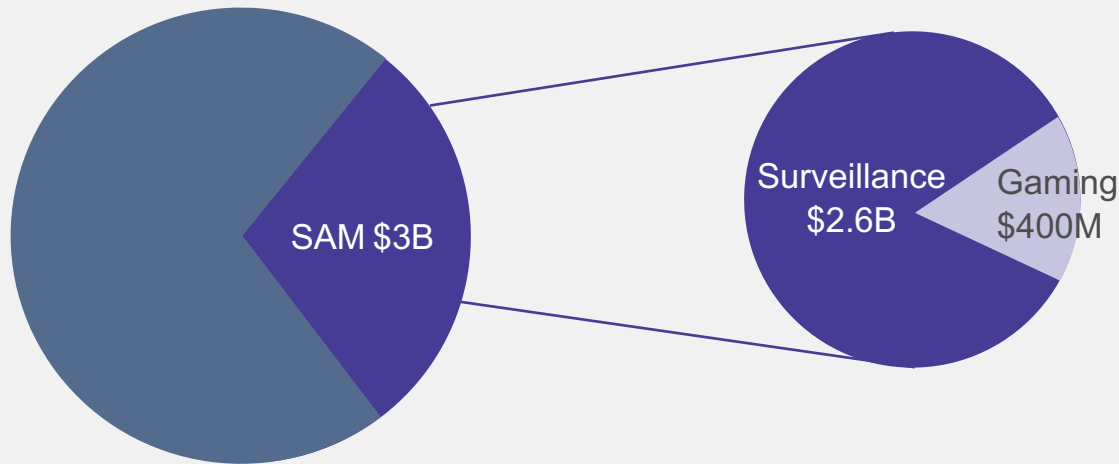


- ◆ **Lou DiNardo, CEO**  
Silicon Valley veteran with multiple CEO roles at NASDAQ and NYSE-listed companies
- ◆ **Ryan Benton, CFO**  
Silicon Valley Executive with multiple CFO roles and formerly CEO of Exar Corporation
- ◆ **Peter van der Made, CTO**  
Technology Veteran with over 35 years of experience
- ◆ **Anil Mankar, CDO**  
Semiconductor Development Veteran with 35 years experience
- ◆ **Bob Beachler, SVP Marketing**  
Silicon Valley Marketing and Business Development Executive with over 30 years of experience

# Video Analytics Market Size

TAM: \$11.2B (2022)\*

SAM: \$3B\*\*



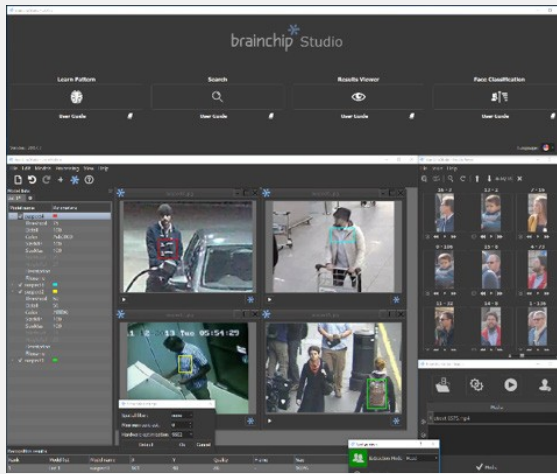
Software and Hardware Solutions deployed to validate technology architecture with marquee but demanding customer base.

\* Source: Markets and Markets

\*\* Source: Homeland Market Research, Company estimates

- ◆ Applications: Homeland Security, Law Enforcement, Schools, Drones, Satellites, Gaming, Advanced Driver-Assisted Systems “ADAS”
- ◆ Pricing Model: combination of up-front license fees (e.g. \$ per camera) and annual maintenance fee or SAAS model (e.g. gaming customers are typically charged \$ per table per day)
- ◆ Go-to-market Strategy: Sell through OEMs, Integrators, and other Partners provides efficient Sales and Distribution channel.

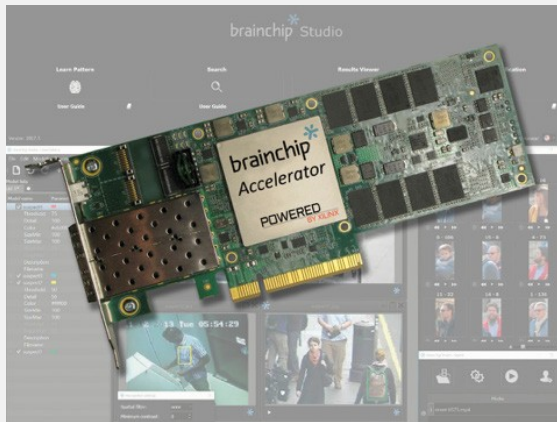
# Current Solutions



## brainchip Studio



- ◆ Forensic video search of Objects and Facial Detection, Extraction and Identification
- ◆ Uses existing video surveillance equipment including low resolution and noisy environments
- ◆ Rapidly search live or exabytes of recorded video for objects across multiple video sources
- ◆ Inexpensive solution vs. prohibitively expensive approach to “classify” all video using deep learning



## brainchip Accelerator

- ◆ First commercial deployment of hardware-accelerated neuromorphic computing
- ◆ Enables 16+ channels of simultaneous video processing
- ◆ Up to 6x speed boost to BrainChip Studio Performance
- ◆ 7x more efficient than GPU-accelerated deep learning
- ◆ 600+fps rapidly Search previously recorded video

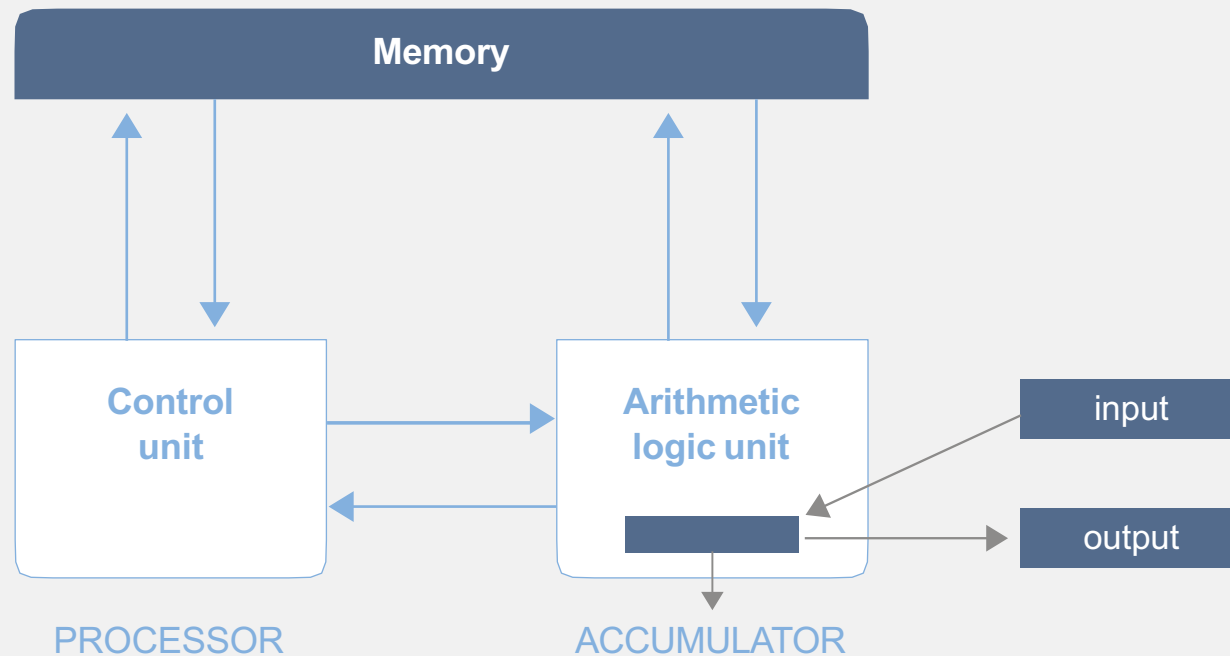
## High-Quality Customer Base



MINISTÈRE DE L'INTÉRIEUR



# Traditional Computing (CPU/GPU) Von Neuman Architecture

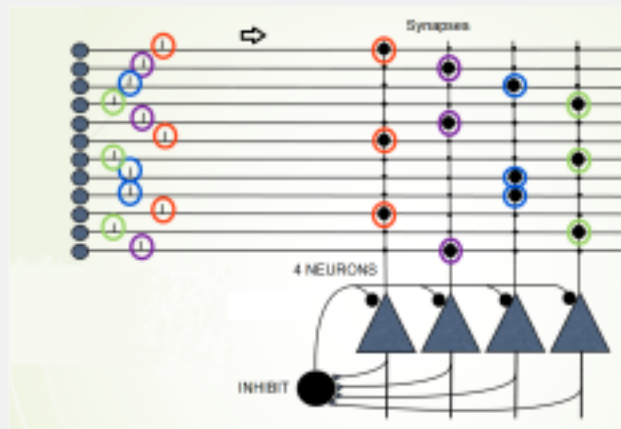
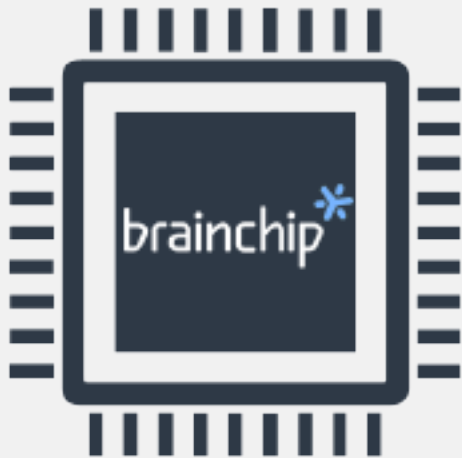
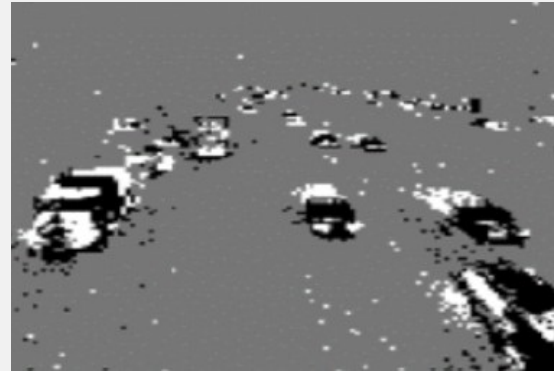
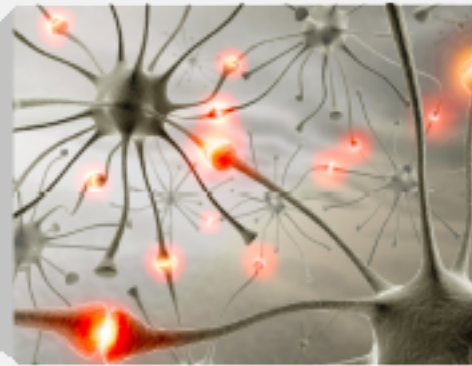


Achieving (or surpassing) human-level machine intelligence and true autonomous learning machines will require a more process and power efficient architecture.

Advantages	Disadvantages
Reliably makes precise calculations	Serial Processing
Resolve anything that can be reduced to mathematical problem	Dependent upon pre-programmed code
Benefited to-date from Moore's Law Cost Savings	Deterministic
	Power Intensive



# Brainchip's Spiking Neural Networks Process Data Similar to the Human Brain

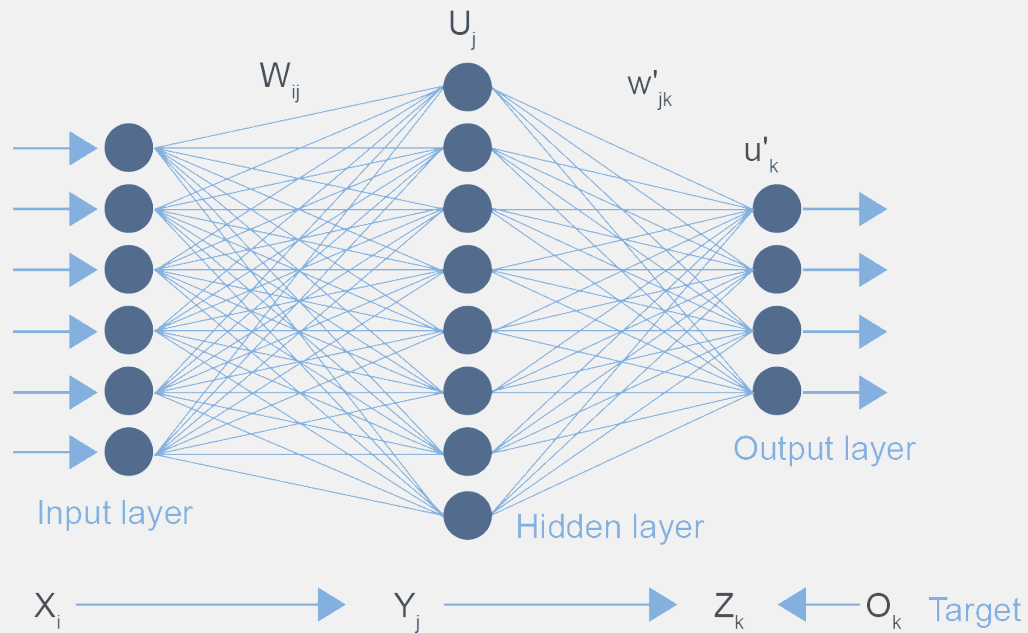


- ◆ Neurons in the brain pass messages to each other in short bursts.
- ◆ Neuromorphic Computing emulates the brains function to create a new method for processing data.
- ◆ Brainchip Spiking Neurons respond to patterns by repetition – just like human brains.



# Brainchip's Proprietary Neuromorphic Computing Architecture

## Neural Network Architecture

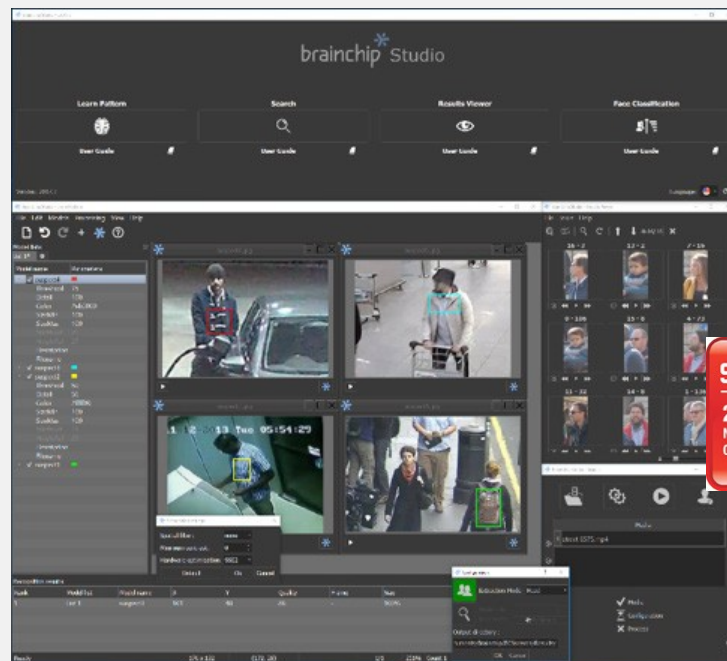


Traditional Compute “LEFT BRAIN”	Neural Network “RIGHT BRAIN”
Serial Processing	Massively Parallel
Dependent upon pre-programmed code	Algorithm-based detects and predict patterns in complex data
Deterministic	Autonomous Learning allows it to Adjusts its behavior as it interacts with data
Power Intensive	Low power

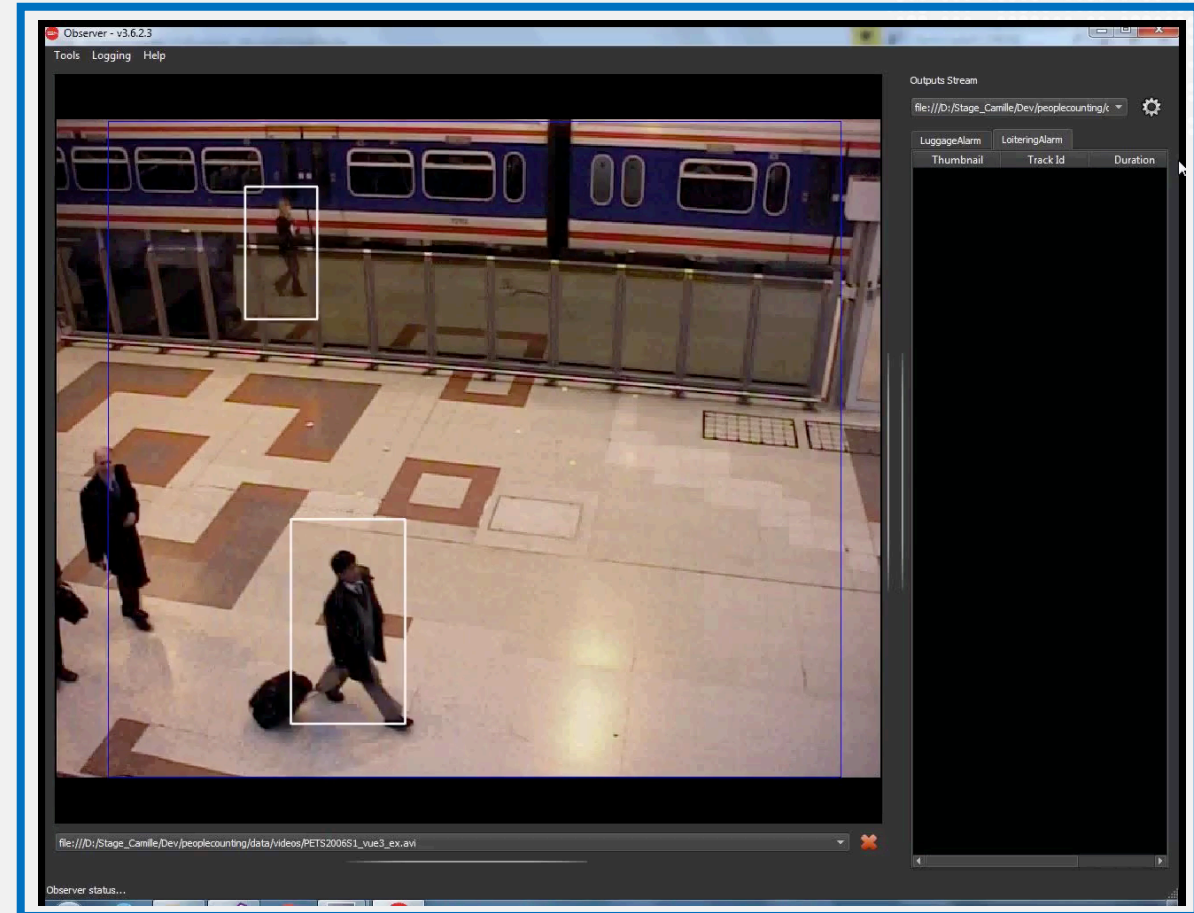
# Brainchip Studio Video Analytics Software Powered by Brainchip SNN Technology

## brainchip Studio

- ◆ People/Object Tracking
- ◆ Behavior Analytics



## VIDEO



# Potential Growth in Existing Customers

**Civil surveillance.** BrainChip services civil surveillance segments through its video analytics (facial and pattern recognition) technology. Opportunity for increased penetration of existing law enforcement and airports customers whilst opening new geographies and segments.

- **Law enforcement.** Existing customers French Police (Toulouse) and Interior Ministry.
  - **Airports and aviation.** Existing customers Airbus and Bordeaux Airport.
- Opportunities to expand in these areas globally.

**Commercial surveillance.** The gaming sector presents immediate market opportunities.

- **Gaming deployment.** Mohegan Sun casino has deployed BRN products.
- **Gaming sector trials.** 17 casinos are currently trialing or reviewing BRN products.

## Original equipment manufacturers

- **Safran** (stock code – EPA:SAF, Paris-listed, EUR 36bn mkt cap) is a world leader in electrical systems for aircraft. In June 2017, it announced a collaboration with BRN on the development of machine vision inspection systems to help control pin insertion. The system will utilize BRN's neural network technology coupled with augmented reality to provide real-time inspection for in-line harnesses assembly.
- **Rockwell Collins** (stock code – NYSE:COL, NYSE-listed, US\$21.24bn mkt cap) partnership presents OEM opportunities in aviation and airports.



# AKIDA™ Neuromorphic Processor Unit (NPU)

(in Development)

## ◆ Product Description

- General Purpose Processor based upon Patented (2008) Spiking Neural Network
- Fully parallel architecture

## ◆ Training Method

- Unsupervised Learning – Trains itself to recognize patterns

## ◆ Specifications

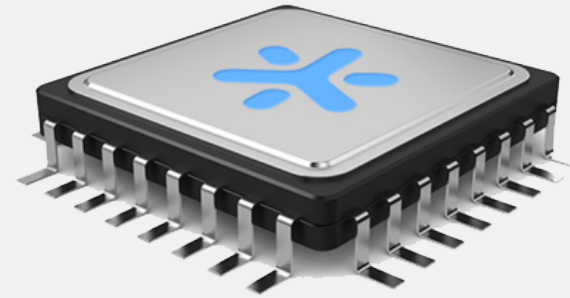
- 8x more neurons than competitive test chips
- 13x more synapses than competitive test chips
- Ultra-low Power

## ◆ Development Overview

- Milestones: FPGA early 2018, Dedicated Silicon late 2018

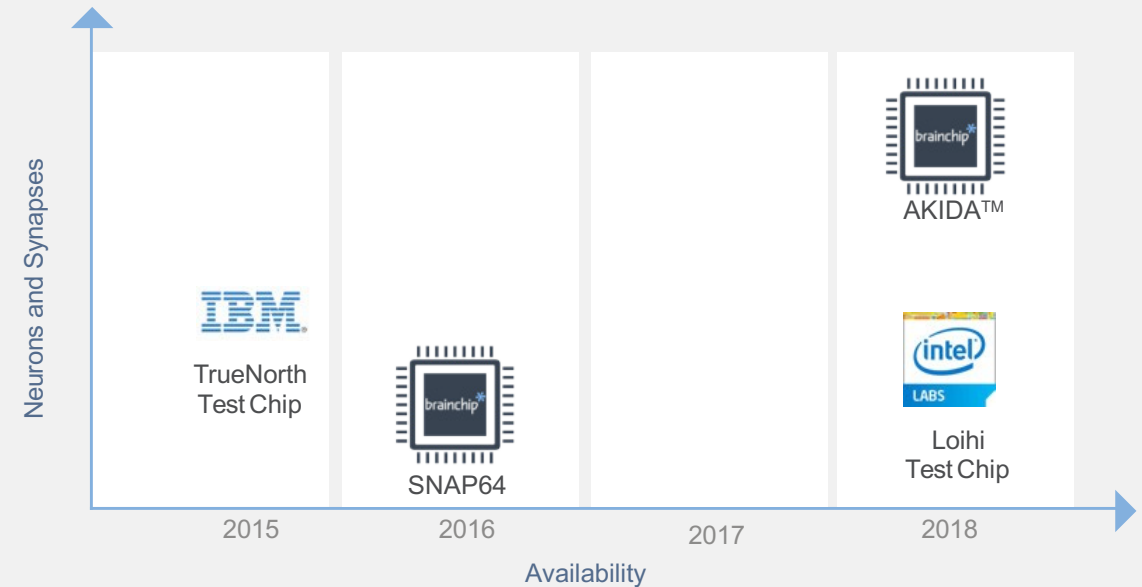
## ◆ End Market Applications

- Robotics
- Gaming
- ADAS/Autonomous Vehicles
- Drones & Air Transport
- Surveillance & Cyber Security
- Speech & Image Recognition
- Stock Market Forecasting



**AKIDA™ SAM:  
\$4.8 Billion\***

- The Neuromorphic Chip Market is estimated to be worth \$4.8 Billion by 2022 with a CAGR of 26.31% between 2016 and 2022. Source: Markets and Markets 2015 Report



## ◆ Existing Video Analytics Products

- **Growing existing customer relationships with annuity revenues** - Annuities are expected to grow, with hardware sales including software maintenance & support sales.
- **New customers in existing segments** - Existing segments include law enforcement, national security and gaming.
- **New market segments** - Multiple new segments with large, global markets exist (e.g.. Machine vision, data analysis). Opportunities exist to grow OEM relationships via Rockwell Collins, Safran and others.

## ◆ Revolutionary AI Processor AKIDA™ has potential to be market leader in emerging market.

- **BRN is market Leader in Spiking Neural Networks Technology.** BRN's patented intellectual property protects its market position.
- **AKIDA™ Processor is in development and expected to be available to sample in 2018.** Application across a wide range of large industries, including robotics, surveillance and automotive.



# Intellectual Property

## ◆ 1 foundational patent granted

- Patent 8,250,011 – Autonomous Learning Dynamic Artificial Neural Computing Device and Brain Inspired System.
- This is the first patent (Filed 2008) in the industry related to Neural Computing.
- Patent citations are accelerating (see table to right) – a leading indicator of the value of this patent and a sign for a growing market.

## ◆ 6 patents currently pending

- US2017236051A1 Intelligent Autonomous Feature Extraction System Using Two Hardware Spiking Neural Networks with Spike Timing Dependent Plasticity. (Filed 2017)
- US2017236027A1 INTELLIGENT BIOMORPHIC SYSTEM FOR PATTERN RECOGNITION WITH AUTONOMOUS VISUAL FEATURE EXTRACTION. (Filed 2017)
- US2017229117A1 LOW POWER NEUROMORPHIC VOICE ACTIVATION SYSTEM AND METHOD. (Filed 2016)
- US2017024644A1 NEURAL PROCESSOR BASED ACCELERATOR SYSTEM AND METHOD. (Filed 2016)
- US2016019457A1 METHOD AND A SYSTEM FOR CREATING DYNAMIC NEURAL FUNCTION LIBRARIES. (Filed 2016)
- US2015379397A1 SECURE VOICE SIGNATURE COMMUNICATIONS SYSTEM. (Filed 2015)

Leading Companies Citing BrainChip Patent 8,250,011	Cites
IBM	17
Qualcomm	14
Samsung Electronics	1
Postech Foundation	1
Hewlett Packard	1
HrL Laboratories	1

# Competitive Advantage



## BRN's patented intellectual property protects its market position.

- ◆ The AI sector includes well-known companies like Cisco Systems, IBM, Intel, Google, Microsoft, NVIDIA, Qualcomm and Samsung, which are evolving their own versions of cognitive architectures across different platforms.
- ◆ BrainChip is a global leader in commercialisation of SNN.
- ◆ To date, SNN development has been mostly within academic research institutions and not commercial.
- ◆ SNNs provide multiple advantages over other AI models: Instantaneous training, low computational overhead, and high accuracy in difficult environments.
  - Fast and Efficient
  - Low-Light Performance
  - Low-Resolution Performance
  - Lower Cost
  - Lower Power

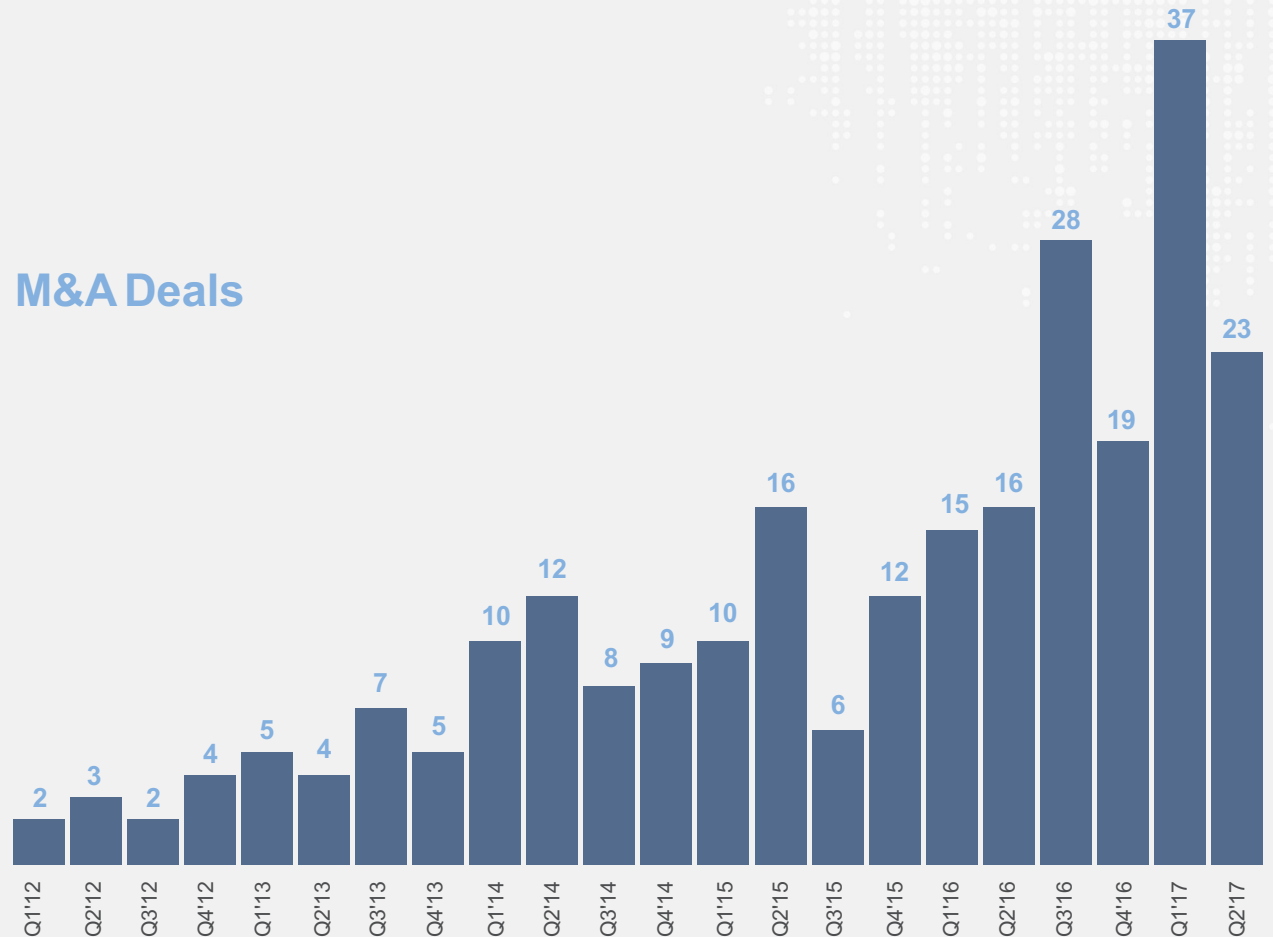
# Financial History

	Six Months 30 Jun 2017 \$US	Six Months 31 Dec 2016 \$US	Six Months 30 Jun 2016 \$US	Full Year 2016 \$US
Revenue	\$133,102	\$149,284	\$-	\$149,284
Interest Revenue	11,587	12,360	4,615	16,975
Other Income	224,267	(55,405)	66,832	11,427
	\$368,956	\$106,239	\$71,447	\$177,686
Research & Development expenses	(556,968)	(507,995)	(359,365)	(867,360)
Administration and other expenses	(2,369,626)	(1,764,168)	(865,449)	(2,629,617)
Interest expense	(3,782)	(10,602)	-	(10,602)
Cash Operating Expenses	(2,930,376)	(2,282,765)	(1,224,814)	(3,507,579)
Amortisation of intangible assets	(334,171)	(198,429)	(881)	(199,310)
Share based payment expense	(2,921,012)	(760,686)	(314,696)	(1,075,382)
Non-Cash Operating Expenses	(3,255,183)	(959,115)	(315,577)	(1,274,692)
Total Operating Expenses	(6,185,559)	(3,241,880)	(1,540,391)	(4,782,271)
<b>Loss from Continuing operations before Income Tax</b>	<b>\$(5,816,603)</b>	<b>\$(3,135,641)</b>	<b>\$(1,468,944)</b>	<b>\$(4,604,585)</b>
Income Tax Expense	-	(251,029)	-	(251,029)
<b>Loss from Continuing operations after Income Tax</b>	<b>\$(5,816,603)</b>	<b>\$(3,386,670)</b>	<b>\$(1,468,944)</b>	<b>\$(4,855,614)</b>

# AI M&A Activity: 2012-Q2 2017

- ◆ Baidu has been particularly aggressive in its AI acquisitions in 2017, with three M&A deals so far this year, including its acquisition of Amazon Alexa Fund-backed Kitt.ai in Q2 2017.
- ◆ Google is the most active acquirer of AI startups, with 12 acquisitions under its belt since 2012.
- ◆ Over 250 private companies using AI algorithms across different verticals have been acquired since 2012, with 37 acquisitions taking place in Q1 2017 alone.
- ◆ Q1 2017 saw one of the largest M&A deals: Ford's acquisition of Argo AI for US\$1 billion.

## M&A Deals



Source: <https://www.cbinsights.com/research/top-acquirers-ai-startups-ma-timeline/>



# Brainchip – Summary



- ◆ Public Market Investors – Opportunity to Invest in a Pure-Play AI Company
- ◆ Highly Experienced Management Team – All Seasoned Silicon Valley Executives
- ◆ Large Markets \$8B\* – Competitive Landscape Remains Fluid
- ◆ Differentiated and Proven Technology – Existing Customer Base Provides Validation of Technology
- ◆ Significant Intellectual Property – Fundamental Patent Cited 35 times by Top Tier Technology Leaders.
- ◆ Existing Video Analytics Provide Revenue Growth Opportunity with High Margin Model – Existing and New Customers
- ◆ Revolutionary AKIDA™ Neuromorphic AI Processor in Development

\* The Neuromorphic Chip Market is estimated to be worth \$4.8 Billion by 2022 with a CAGR of 26.31% between 2016 and 2022. Source: Markets and Markets 2015 Report. The Video Analytics markets the Company is targeting is estimated to be approximately \$3 Billion. Source: Homeland Security Report and Company estimates.



# Q & A