USING ARTIFICIAL INTELLIGENCE TO BUILD SMARTER CITIES

By

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Gyrfalcon Technology Inc.
Milpitas, California
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Topics

- Company Introduction
- Technology Introduction
- How Artificial Intelligence will benefit smart city
- Application scenarios using Artificial Intelligence for smart city
- Summary
Artificial Intelligence

– The foundation of the smart city
Company overview

- Founded in 2017 by veteran Silicon Valley entrepreneurs. Headquarter in Milpitas, California.

Team have combined expertise in ASIC design, memory & storage, and technology to product over the last 30 years.

Combined more than 40 publications and 200+ patents in data distribution, Neural Networks, memory & storage technologies.

Published more than 5,000 paper citations in AI, memory & storage areas since 1988.

Worldwide Operations
The mission

Dedicated AI Processor
To create the low-cost, low-power, high-performance and high-efficiency processors for Artificial Intelligence

Device-side Oriented
To bring cloud AI capability to the edge and local devices, working off-line independently, run faster and more efficiently

Consumer Driven Innovation
To develop the world-leading Artificial Intelligence technology to address the need for cost-effective solutions for consumer market
Evolution of computing technology continues, but very slowly.

AI industry relies on the breakthrough of computing Power.
Domain Specific Architecture

- Moore’s law is over, DSA is taking over the AI computing era.

- Source: Prof. John Hennessy – Presented in March 2017, Stanford University
# Matrix Processing Engine

<table>
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<td>Domain Specific Architecture</td>
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- **CPU (Intel)**
- **Single Processing Unit**
- **Clock & Process (Moore’s Law)**
- **Complicated tasks**
- **General Processor**

- **GPU (Nvidia)**
- **Many Processing Cores**
- **Parallel Processing** (Volta GPU 5,120 cores)
- **Graphics**

- **Matrix Processing Engine (MPE™) (GTI)**
- **Scalable Cells**
- **Size of Matrix** (Lightspeeur® MPE 168 x 168 MACs)
- **AI Computing**

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*Chua & Yang*
Scalable Architecture

AI Process-In-Memory (APiM)

AI Data Center (Cloud)

AI Device (Edge)

AI enabled IoT (Point)
Technology & Solution Summary

**AI-Processing-In-Memory (APIM)**
AI systems unifying advanced memory technology with AI computation, providing massive high-density processing power with true, on chip parallelism
World-first in the industry

**AI Data Center**
Proven abilities to reduce 70%+ Data Center power consumption
Lowest Watt/TOPs in the industry

**AI Device**
Provide AI & Deep/Machine Learning intelligence features to the consumer devices
Best Energy Efficiency in the industry

**AI enabled IOT points**
Intelligence networks embracing IoT edge devices to understand each-other with Machine Language
World-first in the industry
Introducing The Lightspeeur® Family

- **The Lightspeeur® 2801S** CNN accelerator features high performance and superior energy efficiency (9.3 TOPS/Watt), enabling ultrafast AI computing and is winning design in/win from world class manufactures of cell phone, laptop, TV, smart home, etc.

- About 90X more efficient than leading USB Compute stick, Gyrfalcon standard **USB 3.0 AI Stick** can be connected to a range of devices such as PCs, laptops and mobile phones to enhance their image and video-based deep learning capabilities to unprecedented levels.

- Unlock new possibilities with breakthrough energy efficiency, the **multi-chips server board** with M.2 and PCI Express interface provides superior parallel compute capabilities for cloud Inference applications.

**Video of AI Function Demos on Lightspeeur®:**
[https://www.youtube.com/watch?v=yzf9KKTURSo](https://www.youtube.com/watch?v=yzf9KKTURSo)
Lightspeeuer™ M series – SPR2801S

- SPR2801S addresses the huge market needs of AI computing

**Performance**
- 2.8TOPS@50MHz, by novel architecture

**Power**
- 0.3W@full workload
- 0.18W@30fps VGG

**Efficiency**
- 9.3TOPS per Watt, extremely efficient

**Memory**
- No off-chip DRAM, over memory wall
Big benefits

- A typical hybrid architecture where CPU and SPR2801S are working together.
Our SDK and AI stack

- Software Development Kits include turn-key designs, system verification hardware, software and easy-to-use tools, which enable fast porting and time-to-market
The Application scenarios for Smart City
AI CITY
SMARTER, SAFER CITIES

Over 28M WW visitors to JP in 2017
Global event security
Public safety
Law enforcement
Public Safety

PROBLEM

Security installation for big, high-profile event
Many entrances and exits
Short setup time

SOLUTION

AI monitoring, prevent before happens

object detection & tracking
facial recognition & property extraction
personnel behavior analysis
real-time alarm & early warning
Public Safety

PROBLEM

Smart search and video tagging

SOLUTION

Real-time monitoring

GTI AI acceleration card

AI-powered video analysis
**PROBLEM**

Inefficient collection of crime scene evidence
Compact and portable camera to carry
Suspect facial recognition

**SOLUTION**

AI camera helps with the anticipant, recognition and appraisal of crime risk and the initiation of some action to remove and reduce it
AI CITY
SMARTER, LIFEFUL CITIES
Tourism experience
Public interactive self-service
Traffic management
City resource
Improving Tourist Experience

**PROBLEM**

Travel industry is still relying on old technology for guides

**SOLUTION**

Smart travel assistant box makes your handset understand the world instantly
Enhancing Urban Livability

PROBLEM

Today’s Interactive kiosk has no AI capabilities

SOLUTION

New retail along street
AI kiosk in shopping mall
AI kiosk at bus stop
Smart Traffic Management

PROBLEM

- 4.5 million vehicles in Tokyo
- Traffic congestion
- Annual economic Impact

SOLUTION

- Real-time traffic monitoring
- AI Traffic Assistant
- Adaptive Signal Control Technologies
Optimizing City Resource

**PROBLEM**

- Huge parking demand

**SOLUTION**

- Real-time monitoring and analysis
- AI enabled real-time parking predication and management systems
- Dynamic parking management
Summary

With advance Artificial Intelligence computing power and technology, AI will

- Helping officials learn more about how people use cities
- Improving infrastructure and optimizing the use of these resources
- Improving public safety in cities

* Source: Smart City Artificial Intelligence Applications and Trends by Jon Walker
AI – The Foundation of The Smart City
Thank You!