

SPAD Based Spot DToF System



- Adaps Intro
- Depth Sensing System Intro
 - Flood-flash DToF system
 - Spot DToF system
- Chip Architecture and Spec
 - Architecture
 - Features
 - SPAD spec
- Application – Metaverse





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为未来创造慧眼



Established in 2018
★Shenzhen ★Shanghai



>90 full-time employees



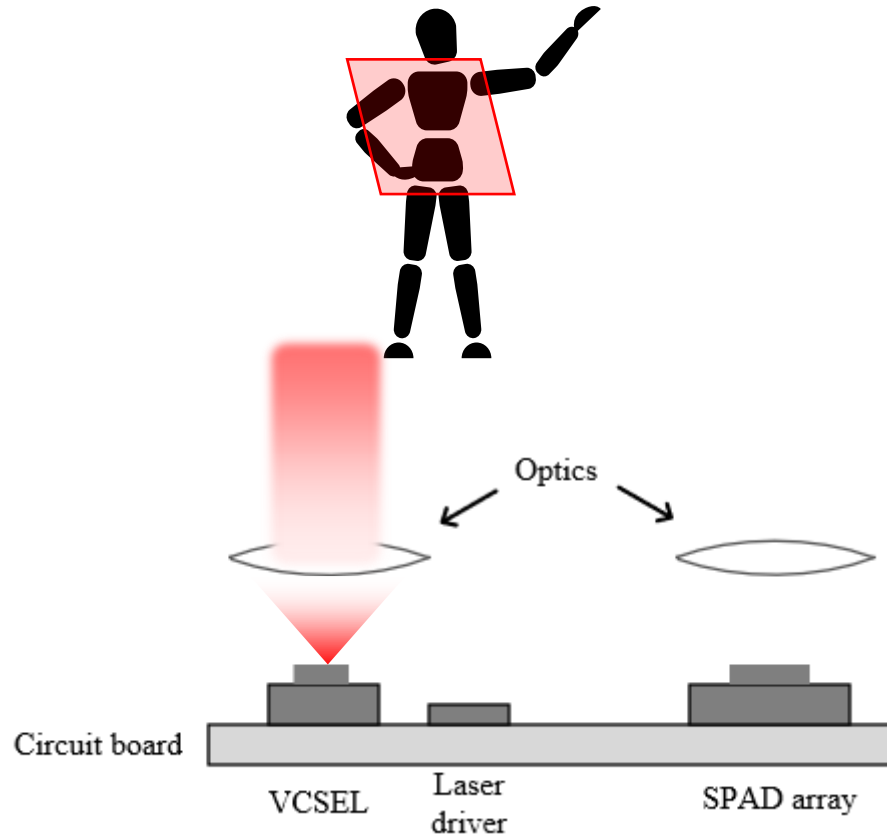
- 1st place in China Innovation & Entrepreneurship Competition 2019
- ISO9001:2015 certification



Culture:

Fast and efficient, technology driven, customer first, integrity, unity and cooperation





Pro:

- High resolution depth map (QVGA ~ VGA)
- Solid-state system
- Simple optics and mechanical parts

Con:

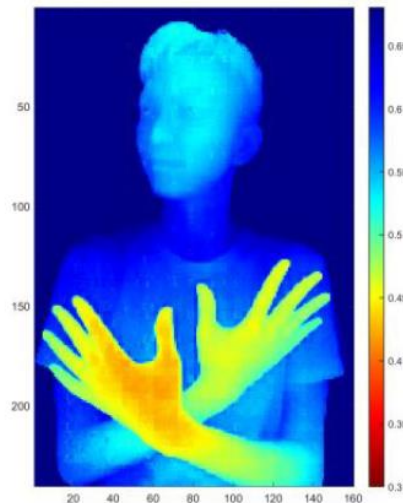
- High power consumption due to high resolution
- Limited max detectable distance
- Limited performances in high ambient light environment



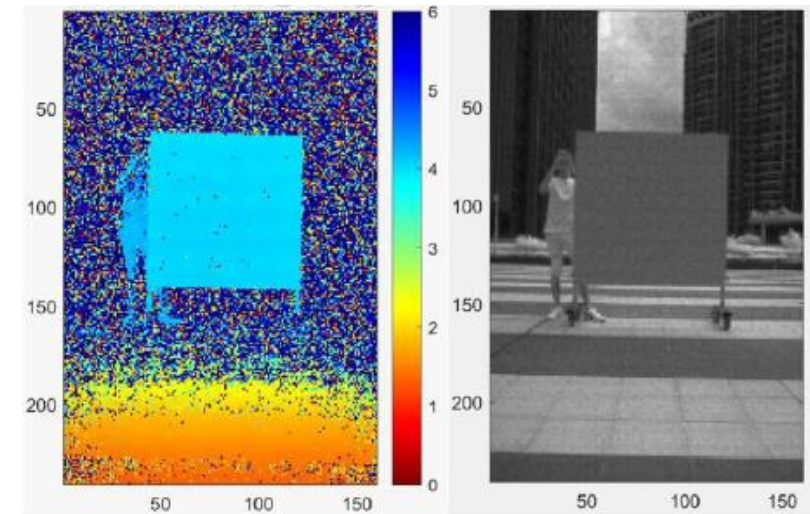
- ADS6303 module is a flood-flash system
- The system outputs high accuracy 240x160 depth map with (Chao, 2022)
 - >300mW Rx power consumption
 - <4m max detectable distance @10kLux
- Such system limits sensor applications in battery powered products and high ambient light scenarios



ADS6303 Module

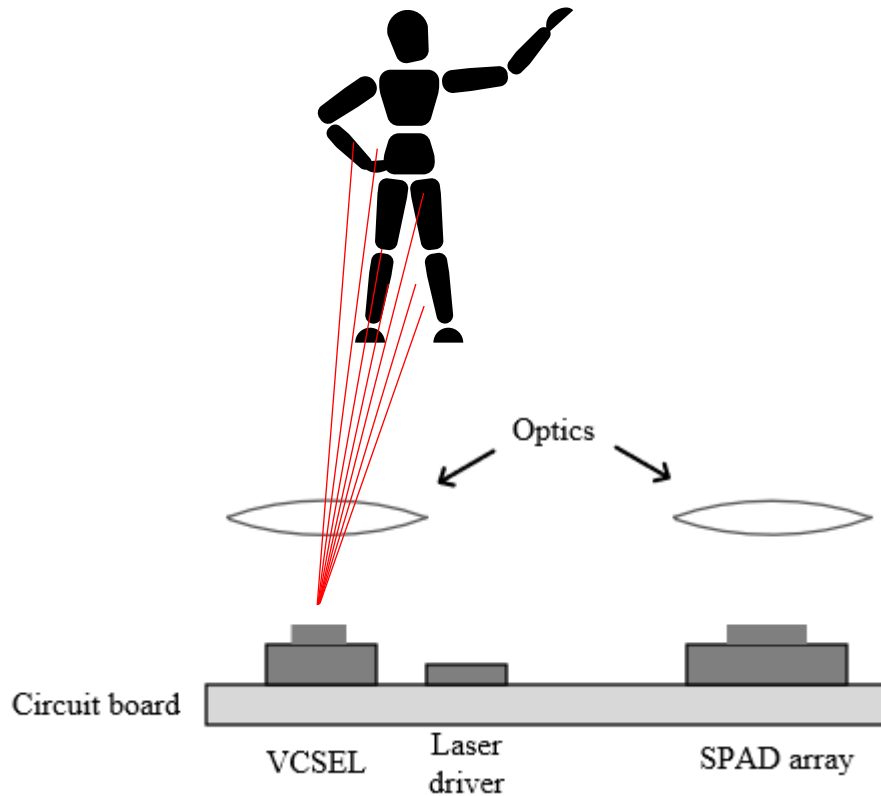


Indoor measurement



Outdoor measurement @10kLux





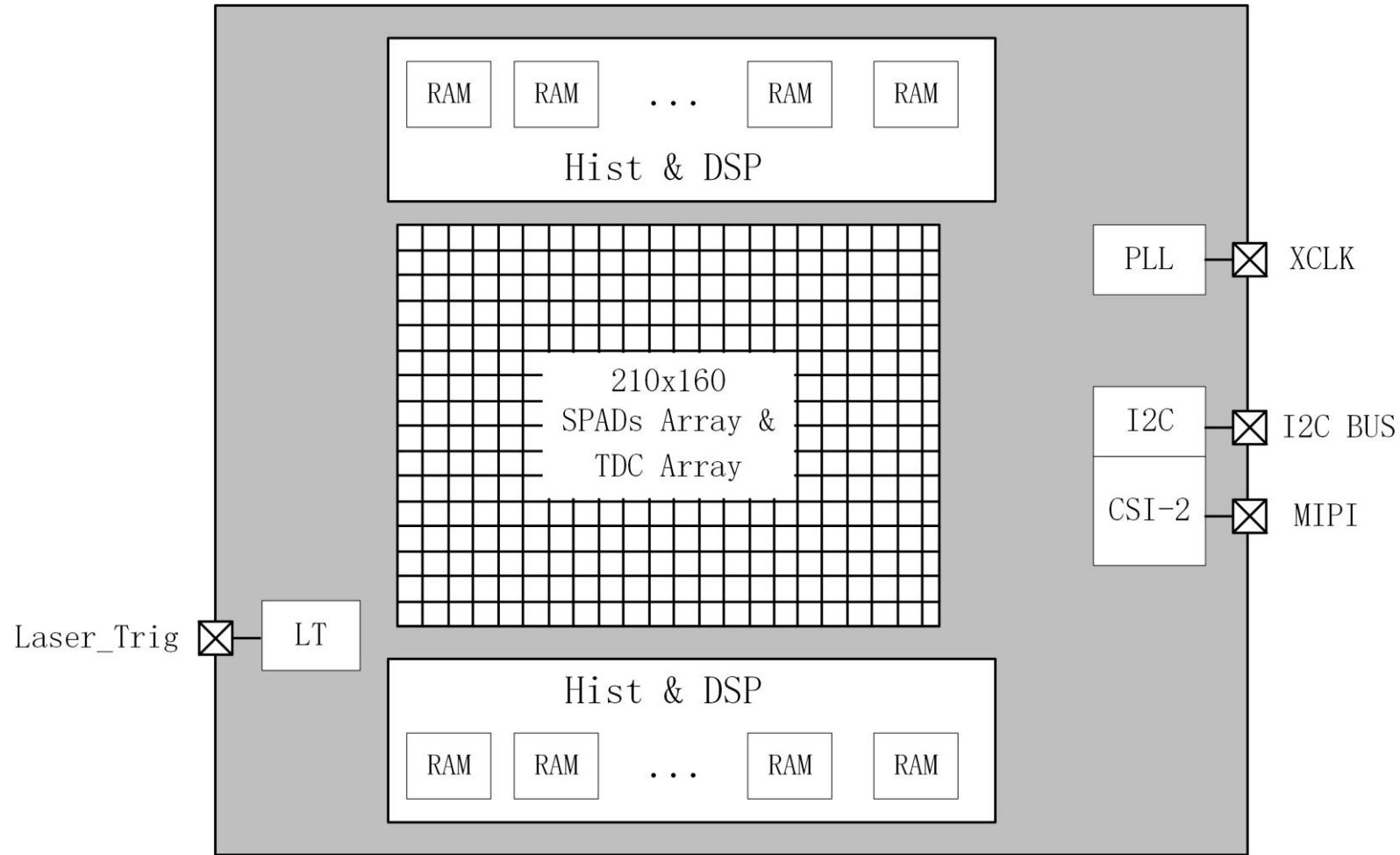
Pro:

- Low power consumption with high accuracy depth map
- Solid-state system
- Longer detectable range in high ambient light

Con:

- Sparse resolution
- Complex optic design
- Increasing chip architecture and algorithm complexity

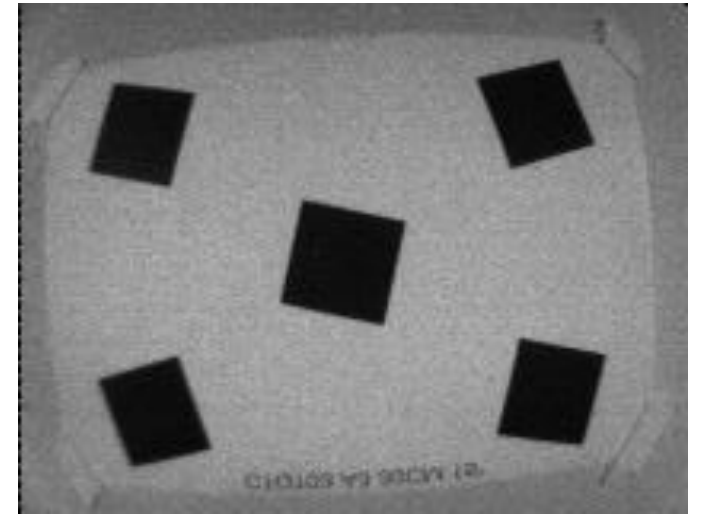




- 3D stacking technology
- Hybrid bonding
- Logic 40nm technology
- Chip size: 3.6 x 3.4 mm²
- 1MHz I2C
- 2-lane MIPI @ 1.5Gbps/lane
- Laser trig output via high speed LVDS
- TDC resolution: 50ps – 300ps programmable

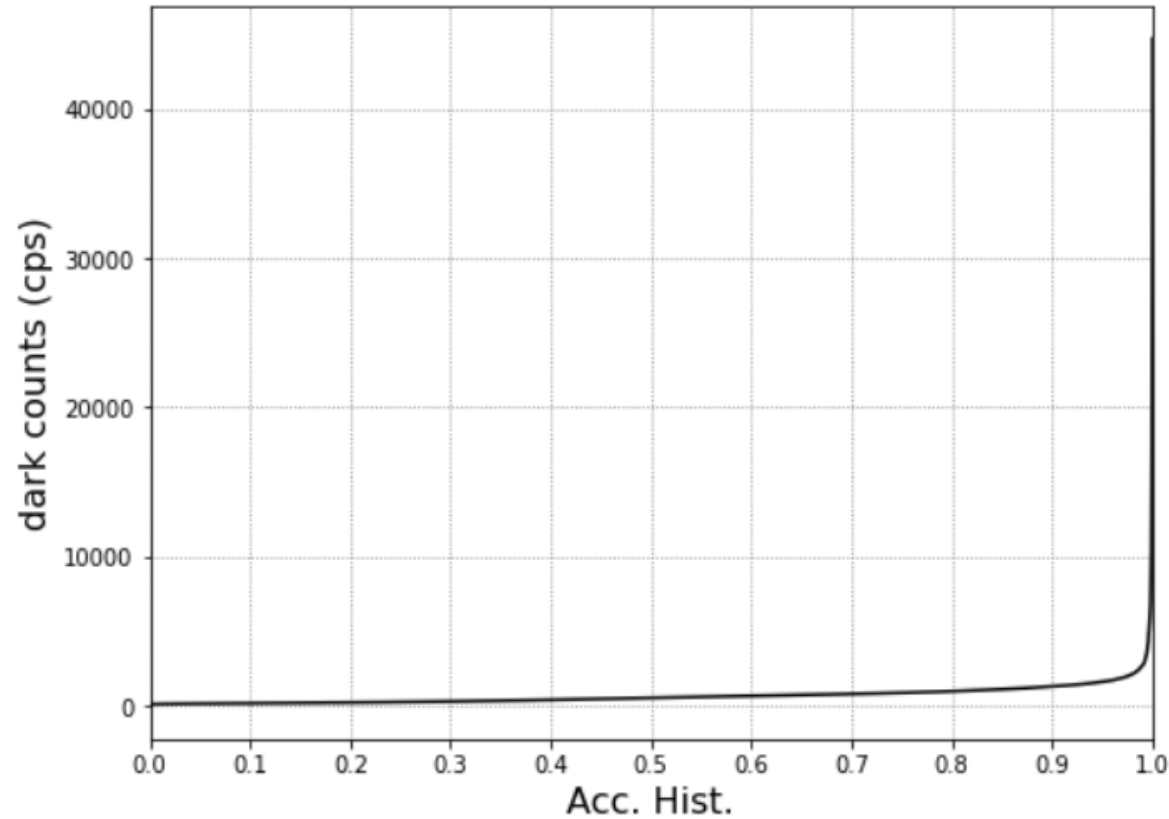


- Flexible spot configuration
- Dynamic Region of Interest (DROI) addressing
- Hard synchronization with RGB sensor in Master/Slave mode
- Multi power saving modes for various applications:
 1. Low Power Mode
 2. Standard Mode
 3. High Ambient Mode
- High distance dynamic range 0.15m ~ 10m
- Working mode:
 - PCM(gray image): The chip can output a 210*160 intensity image
 - Proximity: The chip can function as a proximity sensor with configurable region of SPAD
 - Depth sensing: the chip is highly flexible. The chip is compatible with different pattern of illumination



Gray image





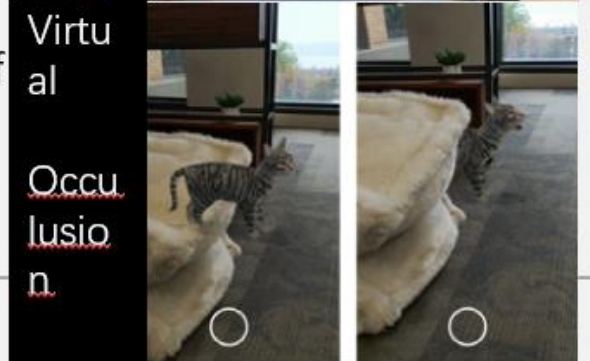
Parameter	Value
Pitch	10um
VBD	21V
940nm PDE	14% @ 3V VEX with micro-lens
Median DCR	467cps @ RT
99% DCR	< 3kcps @ RT
Dead time	10ns



	Reflectivity	Max Dist. indoor	Max Dist. Outdoor	FPS	Rx Power(no depth compute)
Low Power Mode	17%	6m	5m @5kLux	15FPS	55mW
	17%	6m	5m @5kLux	30FPS	68mW
Standard Mode	17%	8m	5m @20kLux	15FPS	80mW
	17%	8m	5m @20kLux	30FPS	110mW
High Ambient Mode	17%	8m	5m @50kLux	30FPS	130mW

- High accuracy measurement while maintains low power consumption
- The chip is capable of adapting various application scenarios with optimized power consumption and system performances





AR view

One way of viewing



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