OPNOUS 炬佑智能科技

we sense, therefore we are...

Intuitive ToF
Cyberverse...
The leading ToF IC & System Innovator

- Provide Full Smart ToF System
  - Smart ToF Sensor
  - Smart Lighting Driver
  - Smart 3D SoC

Customized Solution with optical system
Incl. Lens, Vcsel, DOE.
Product Line-up

Leading Intuitive Sensing IC & System Innovator

Product Portfolio

Provide Full Smart ToF System

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<tr>
<th>ToF Sensor</th>
<th>Vcse Driver</th>
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<tr>
<td>Pulse ToF @CMOS process, Low Power&lt;150mW, Single Supply 3.3V Accuracy &lt;0.5% over configurable range Fast response up to 120fps Support 850nm &amp; 940nm</td>
<td>12V/10A Driven Capability Dynamic control, Smart Correction, Eye Safety &amp; Damage Protection, Temperature/Current Sensing</td>
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Dynamic ToF®
Intuitive ToF®

ISP

Smart
3D
SoC

Multi ToF support
Smart ToF Control Algorithm
Smart Calibration
Multi interface support

3D Depth Sensing Module

3D Sensing Systems

Compact 3D sensing module to extract depth information
Projected applications for 3D face & gesture recognition, 3D Gaming, AR/VR, Robot, Auto-driving, Smart-Phone, Surveillance, industry automation, Intelligent Logistics
## 已发布产品

### TOF 芯片系列
- **3D智能处理芯片**
- **智能激光控制芯片**

### 3D传感模组系列
- **智能校正算法**

### Roadmap

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<th>Sensing</th>
<th>Processing</th>
<th>Lighting</th>
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<td>OPN8008 320x240</td>
<td>OPN8001 100x100</td>
<td>OPN700X Vcsel Driver</td>
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<tr>
<td>VGA Sensor 640x480</td>
<td>1Mega Sensor</td>
<td>3D Controller Gen 1st</td>
</tr>
<tr>
<td>All-in-one Dynamic Intuitive 4D TOF</td>
<td>3D Controller Gen 2nd</td>
<td>3D Controller Gen 1st Integrated with Vcsel</td>
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<th>2019Q1</th>
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<th>2020</th>
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<td>Released</td>
<td>In Development</td>
<td>Planning</td>
<td>Concept</td>
<td>Released</td>
<td>In Development</td>
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- **OPNOUS CONFIDENTIAL**
Development Center

Optical LAB
Electrical Laboratory
Reliability Test LAB
3D Image Tuning Facilities
3D Sensing Module Test Facilities
Auto Calibration Magic BOX
Application & Demo Video

1) **Office/Shop People Tracking System**
2) **Body Gait Tracking**
3) **Density Meter/Size Measurement**
4) **Face 3D Modeling**
5) **Hospital Patient Monitoring System**
6) **CleanRobot**

9/8/2019
远景很美丽。。。

现实很骨感。。。

远处的美景令人陶醉，但近处的现实却让人感到无奈。
Dynamic ToF
Coded Illumination ToF

Camera Adapts to the Environment
- sunny day
- cloudy day
- night
- scene
- increasing light spread

Errors in Shape Recovery
- camera view
- computed shape
- error = 1.0 meters
- error = 0.6 meters
- 3 meters
- 1 meter
- sensor

Hybrid Pulse D ToF Sensor
Innovative Diamond Pixel
Built-in Dynamic Processing
Smart Lighting
**OPN7000 Features**

- **Vcsel driver:**
  - ✓ Up to 12V supply voltage
  - ✓ Up to 10A output current with configurable current limiter
- **OC/OT fault alert**
- **12-bit ADC @ 1M/s sample rate:**
  - ✓ Vcsel diffuser fault detection (PD/ITO) for eye protection
  - ✓ Internal/external temperature sensing
  - ✓ Current sensing
- **Smart correction for automatic voltage/temperature variance compensation**
- **I2C control**
- **CMOS/LVDS input interface**
- **Package:**
  - ✓ 32-pin QFN, 4mm x 4mm
  - ✓ 28-ball WLCSP (0.4mm pitch), 2.84mm × 1.91mm
Smart Correction vs. Temperature Calibration

Test condition:
• Vcsel: 4.5V/5.6A
• Depth ground truth: 2m
• 30 frames
Smart Correction for Temperature Compensation

Smart correction on

Smart correction off
Vcsel Current vs. Integration Times
3D Face Modeling
Super High Resolution
High Accuracy Measurement
Volume Accuracy <1%
Robotics/Clean Robot Module
Wide Review/Full range Accuracy <1%

Y: Depth Accuracy (mm)
X: Measurement Distance (mm)
Multi-ToF Interference Immunity
>100 Sensors
Calibration on different reflection

Before Calibration

After Calibration
Long Distance Outdoor

>10m

80 klux
Multi Path Interference Correction measurement in small room

Room (长 x 宽 x 高 单位: m)
2.505 x 2.343 x 2.857

Test result

X: Measurement Distance (mm)
Y: Depth Accuracy Ratio

N1 is our solution
Multi Path Interference Correction

The Yellow Duckling
Fast Sensing Reduce Motion Blurs
IC, Module, Platform, Algorithm & Partners
More than Depth Sensing
--- 4D Sensing
5G Intuitive Smart Sensing

Smart System

- Sensor
- IC
- Hardware System
- Software System
- Algorithm

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