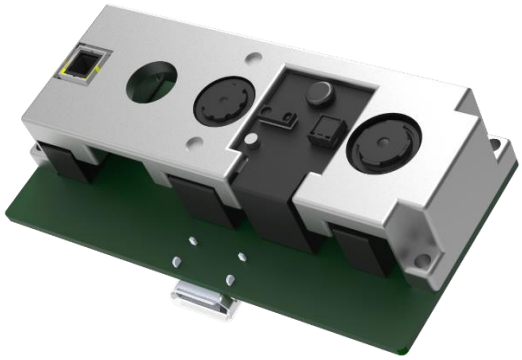
LIPSedge™ L210u/L215u Structured-Light Camera

Technical Specification

LIPS® LIPSedge™ Series – Structured-Light Camera



L210u
Module

L215u
With Enclosure

Oct 2022

Revision 1.0

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January 2022

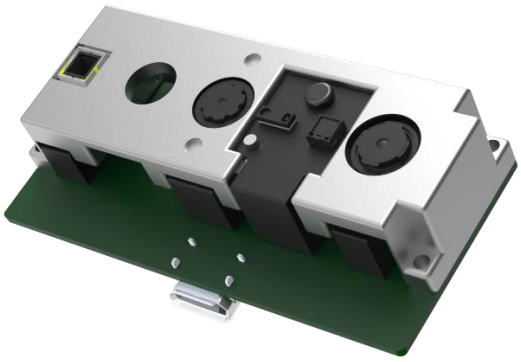
Table of Contents

Revision History

Revision	Description	Date
1.0	Initial Public Release	Oct 2022

1. Overview

The LIPSedge™ L210u/L215u series is the ideal camera solution for 3D Depth applications that require near-range distance with excellent high-depth accuracy. Suitable for use-cases where details are the key factors that differentiate from other solutions when encountering scenarios with high demand. Supporting the most and widely used Computer Vision frameworks, including LIPS® Middleware, as it extends the possibility of implementing solutions without limits.
Based on Structured Light 3D Depth, the LIPSedge™ L210u/L215u is comprised of the latest technologies for each main component including Near-Infrared Image sensor, RGB Image sensor, Near-Infrared Illuminator based on Vertical-Cavity Surface-Emitting Laser, and a Flood Projector.



L210u
Module

L215u
With Enclosure

Features

- High depth accuracy, up to +/- 0.3% @ 100 cm
- Small Form factor with tiny case dimension 63 x 30.2 x 17 mm
- Compact module for fitting into Mobile devices (e.g. Pads)
- High sun light resistance, up to 80K Lux @100cm
- Low power consumption with 1.4W (Typical)
- Platform Support: Windows, Ubuntu
- SDK support for Frameworks & Wrappers: ROS, OpenCV, OpenNI and NVidia ISAAC
- Diverse algorithms examples for different application use cases

Application Use-Cases

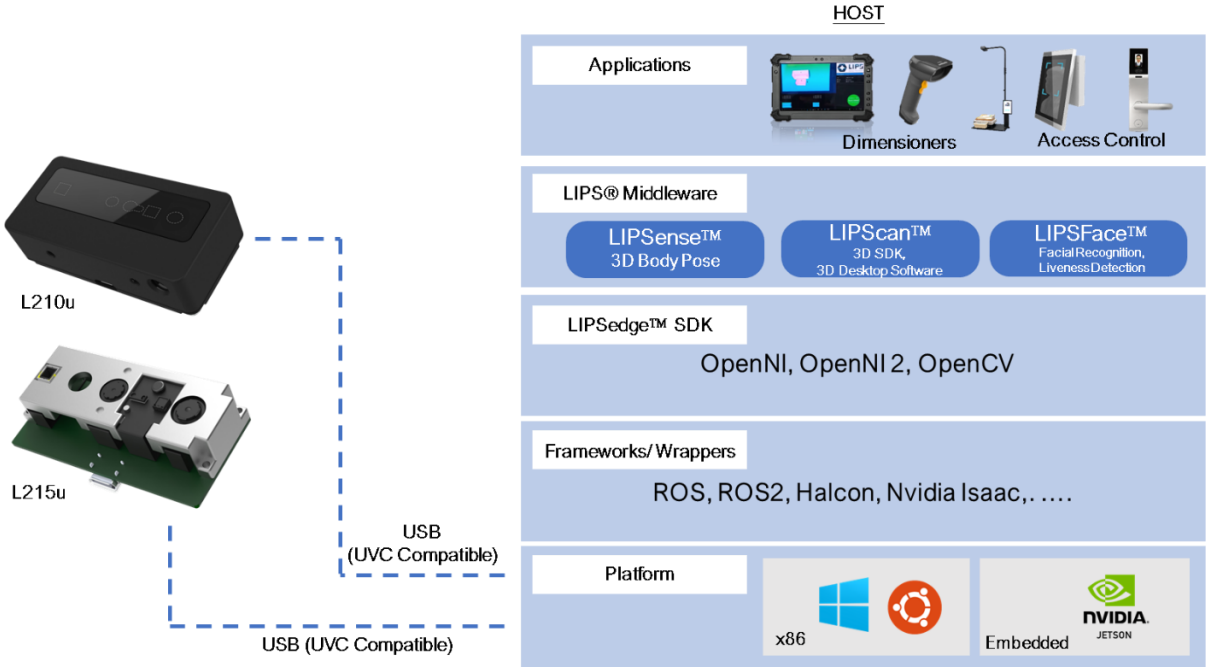
- Facial Recognition
- Dimension Measurements
- Defect Inspection
- Pick & Place Robot

2. Specifications

Image		
Depth	Technology	Structured Light
	Maximum Working Distance	1.2 m
	Minimum Working Distance	0.4 m
	Resolution/Frame Rate (USB output)	1280x800/6fps (16b raw) 640x480/25fps(16b raw)
	FoV(H × V)	50.7° x 74.2° (+/- 2°)
	Shutter Type	Global shutter
	Z Accuracy	0.3% @ 100cm
RGB	Resolution/Frame Rate (USB output)	1280x800/6fps (YUV) 640x480/25fps (YUV)
	FoV (H × V)	H:45.89°@UXGA, 38.86°@720p, 45.89°@VGA V: 58.89°
	Shutter Type	Rolling Shutter
Illumination		
Illumination Type		Infrared
IR Wavelength		940 nm
Illuminating Component		Vertical-Cavity Surface-Emitting Laser (VCSEL)
General		
Dimension (mm)		L210u (Module): 54.0mm x 26.6mm x 14.3mm L215u (with Enclosure): 63.0mm x 30.2mm x 17.0mm
Weight(g)		L215u (with Enclosure): Approximately 85 g (module: 16.4 g)
Ambient Operating Temperature (° C)		0 – 40 (Device); 0 – 60 (module)
Storage Temperature (° C)		-30 ~ 70
Output Interface		Micro USB (USB2.0)
Power		USB power-in, DC 5V/1A
Supported OS		Windows 10, Linux Ubuntu 18.04 /20.04 LTS
Working Environment		Indoor & Outdoor

3. Description and Application Architecture

The LIPSedge ™ L210u/ L215u is a 3D Depth Camera based on structured light, which projects light patterns to calculate the depth and surface information of the objects in the scene. The camera uses an USB 2.0 connection interface to transmit the captured data from the Near-Infrared sensor and the RGB image sensor to process the depth information.



4. Hardware Details

4.1 General Characteristics

#	Key Component	Description
1	NIR Sensor	Receives the IR image
2	RGB Sensor	Receives the RGB image
3	NIR Illuminator	Projects NIR structured dots light
4	Flood Projector	Emit uniform, flat light
5	Micro USB	Power input and data output to host
6	M3 (4mm)	Mounting holes (two)
7	Tripod hole	Extra for tripod to hold camera

4.2 Host Connectivity

The LIPSedge™ L210u/L215u requires a single USB cable to provide power to the camera from the host; whilst the USB cable delivers data between the camera and the host with a data rate up to 480Mbps.

4.2.1 Data and Power Interface (Micro USB pin connector)

Pin no.	Signal	Description
1	Vcc	In, +5V power supply
2	D-	In/Out, Data -

3	D+	In/Out, Data +
4	N.C.	No connection pin. It should be floating.
5	GND	In, Grounding

4.3 Thermal

4.3.1 L210u (Module) Temperature Specification

Items	MIN	NOM	MAX	UNIT
Storage Temperature	-30	-	+70	°C
Ambient Operation Temperature	0	-	+60	°C

4.3.2 L215u (With Enclosure) Temperature Specification

Items	MIN	NOM	MAX	UNIT
Storage Temperature	-30	-	+70	°C
Ambient Operation Temperature	0	-	+40	°C

4.3.3 Power Consumption and Current

Items	Values
Average Power Consumption	1.4W (typical)
Continuous current	0.28A (typical)
Peak current	1.68A

5. Optical System

5.1 Cameras

The L210u/L215u utilizes 2 (two) camera sensors to capture NIR/Depth images and RGB color images.

Table: Camera sensor table

Items	Camera 1 (sensor)	Camera 2 (sensor)
Position	Right	Center
Image	NIR/Depth	RGB
Lens FoV	50.7° x 74.2° (+/- 2°)	H:45.89°@UXGA, 38.86°@720p, 45.89°@VGA

		V: 58.89°

5.2 Illuminators

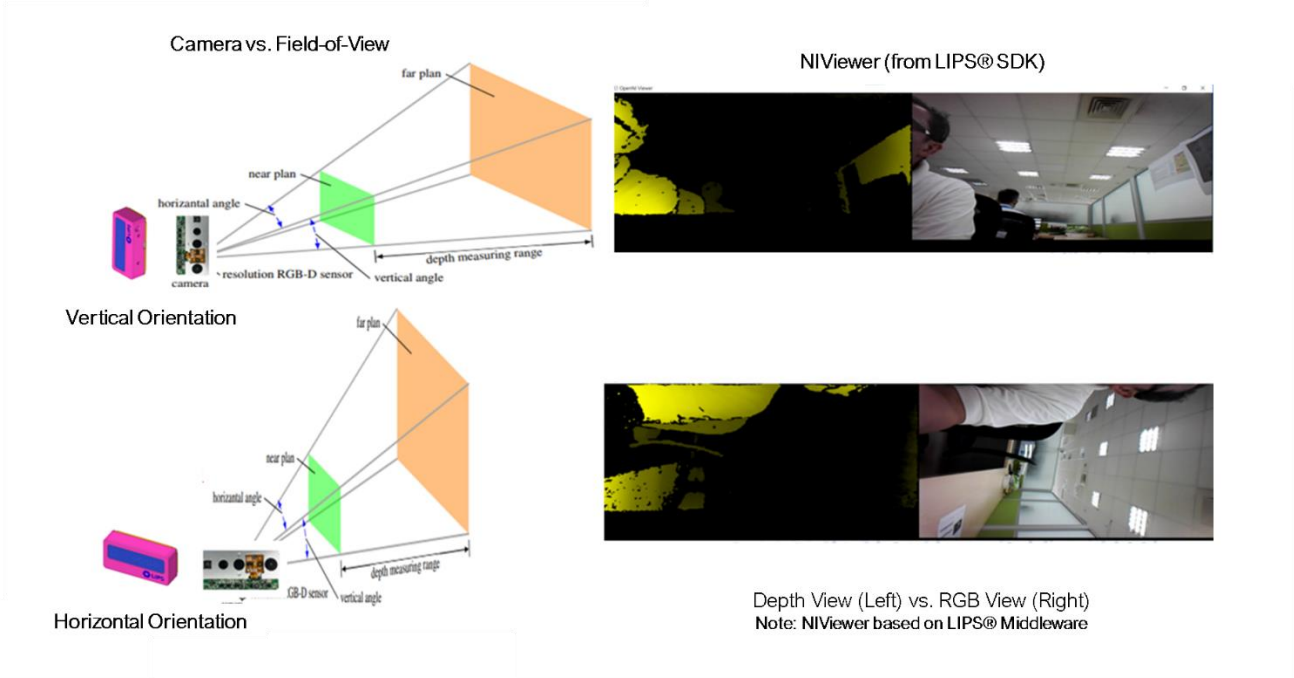
The L210u/L215u optical system consists of a dot illuminator (VCSEL) for structured light and a flood projector for uniform NIR image.

Table: Illuminator parameters

Items	Dot Projector	Flood Projector
Purpose	Structured Light 3D, total 30K dots	Enhance NIR image lightness
Wavelength	950nm	950nm

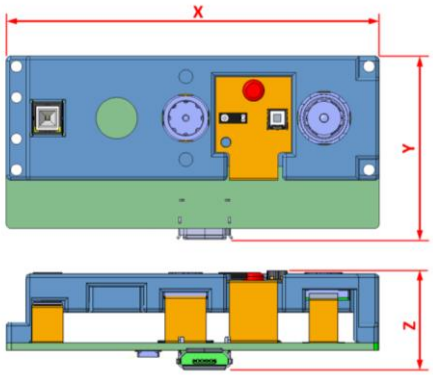
5.3 Image and Field-of-View to Orientation

LIPSedge™ L210u/L215u will capture scene images based on the field-of-view specifications of its sensors.
Refer to figures below for the Camera vs. Field-of-View orientation and camera's image output.



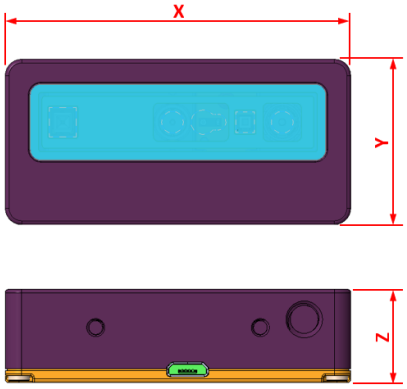
6. Mechanical

6.1 Mechanical Dimension of L210u Module



Dimension	MIN	NOM	MAX	TOLERANCE	UNIT
X	53.8	54	54.2	±0.2	mm
Y	26.3	26.6	26.9	±0.3	mm
Z	13.9	14.3	14.7	±0.4	mm

6.2 Mechanical Dimension of L215u with housing



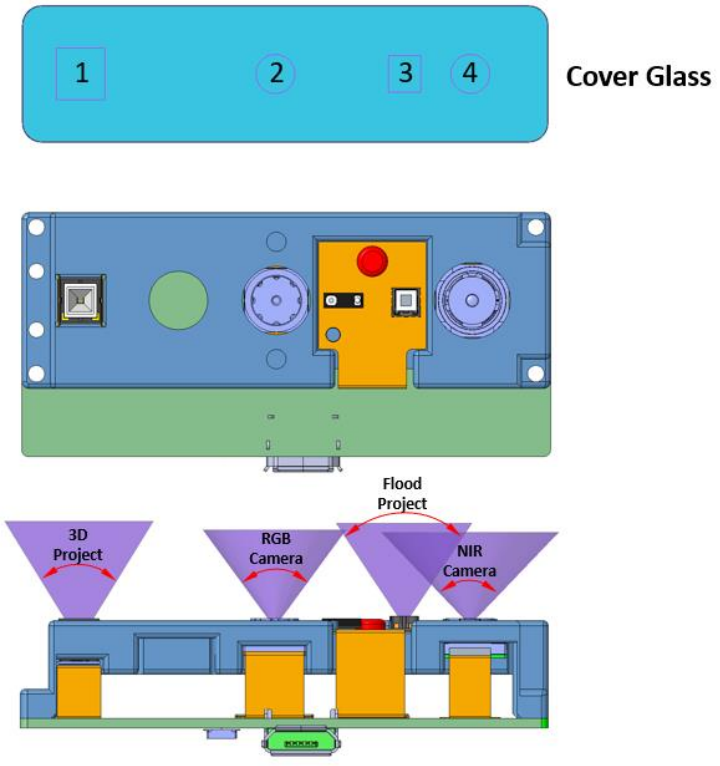
Dimension	MIN	NOM	MAX	TOLERANCE	UNIT
X	57.7	63	63.3	±0.3	mm
Y	29.9	30.2	30.5	±0.3	mm
Z	16.7	17	17.3	±0.3	mm

6.3 Cover Glass

6.3.1 Transmissivity Requirement

To ensure either NIR or RGB light may pass through window without negative impact on the captured image quality and the light emitting, the transmissivity for Dot/flood projectors, NIR/RGB sensors need consideration

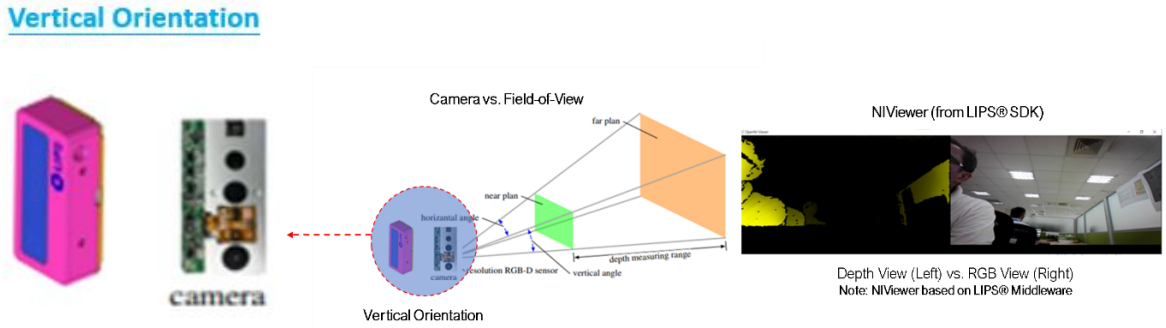
THROUGH HOLE	TRANSMISSIVITY
1, 2, 3 and 4	>98% @ 400 nm to 700 nm >98% @ 940±50 nm



When integrating the L210u Module into devices such as pads, for considerations regarding the cover glass, refer to the document "**L210u Module Design Guide**" for details. Note: Contact LIPS for inquiring the document.

6.4 Installation and Mounting Orientation of Camera

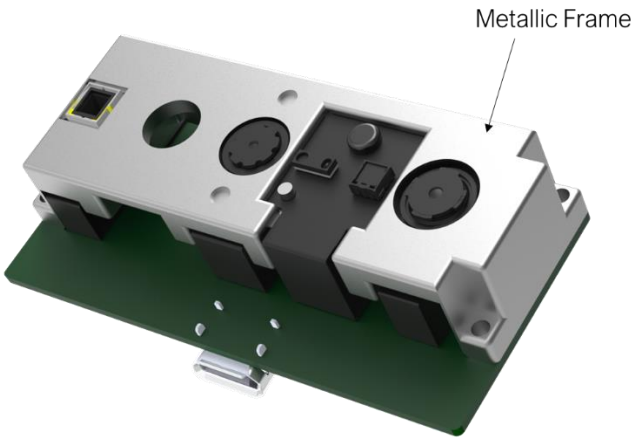
As the image output referred in section 5.3 (Image output and Field-of-View to Orientation), it is recommended using a mounting device when the installation position is vertically oriented.



6.5 Heat Sink

LIPSedge™ L210u is designed with an optimized thermal solution using a metal frame as heatsink. All optical components and physical parts are attached to the metal frame with a robust physical placement.

For heat dissipation mechanism and recommendations, refer to the document - "**L210u Module Design Guide**".



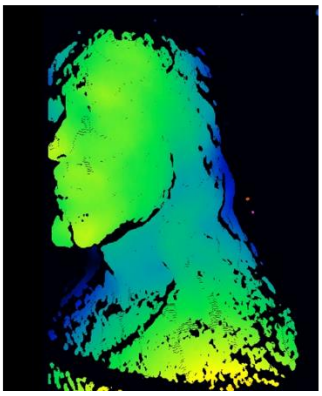
7. Image Quality, Accuracy, Precision and Application Tree

The LIPSedge™L210u/L215u Depth map and Accuracy & Precision charts.

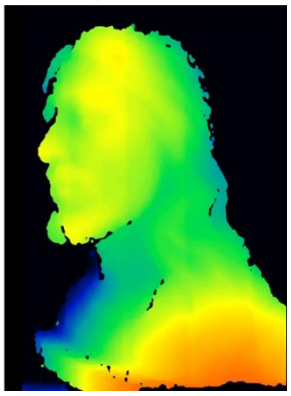
7.1 Depth Map comparison of L210u/L215u

● Right Side

Others

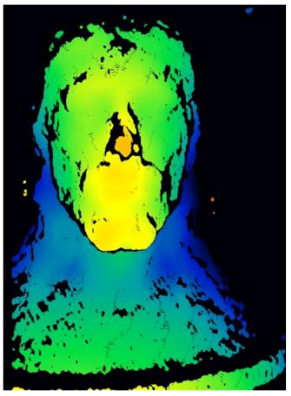


LIPSedge™ L210u/L215u

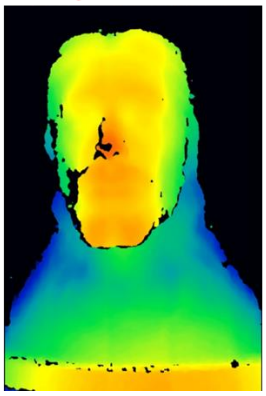


● Front View

Others



LIPSedge™ L210u/L215u



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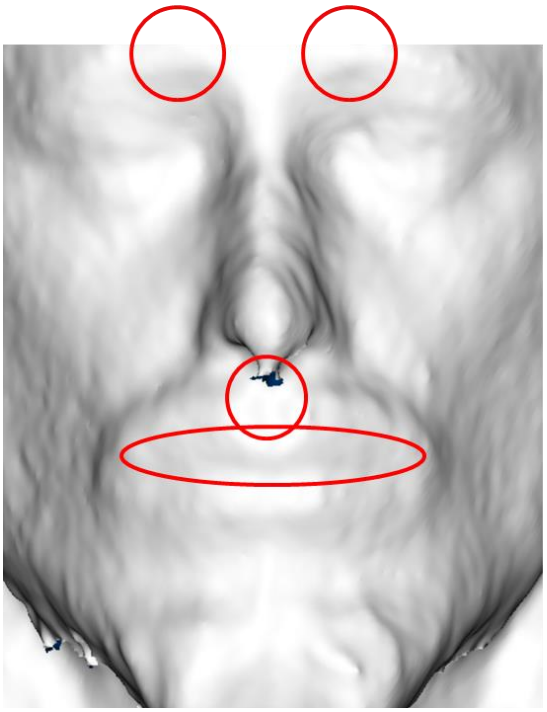
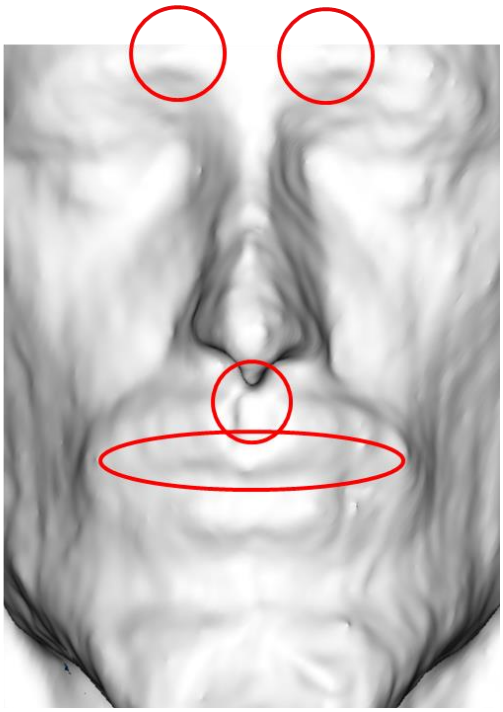
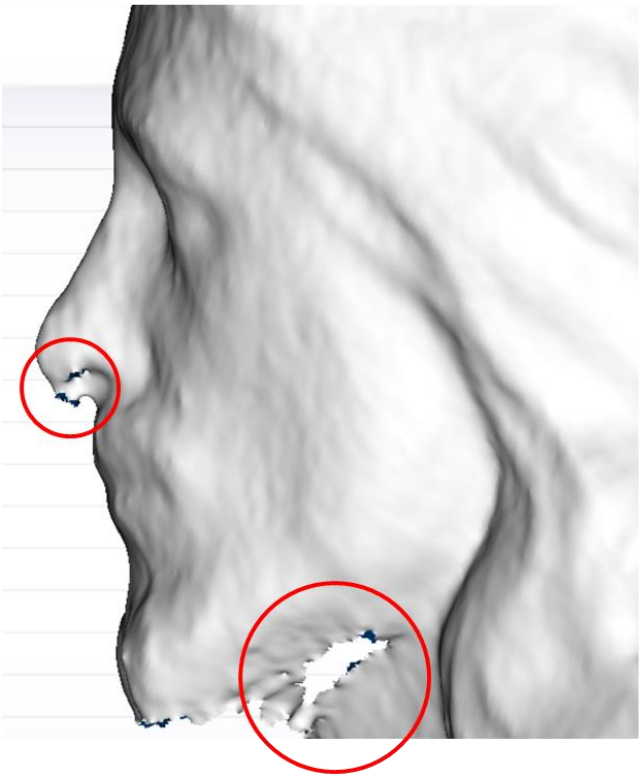


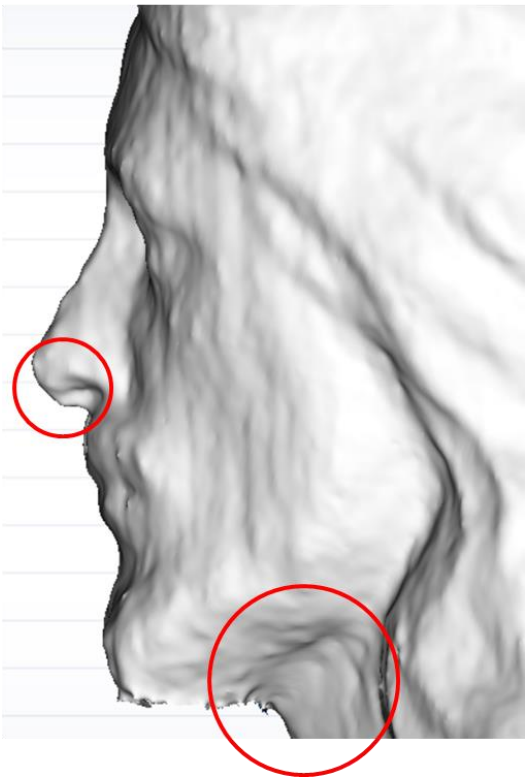
LIPSedge™ L210u/L215u



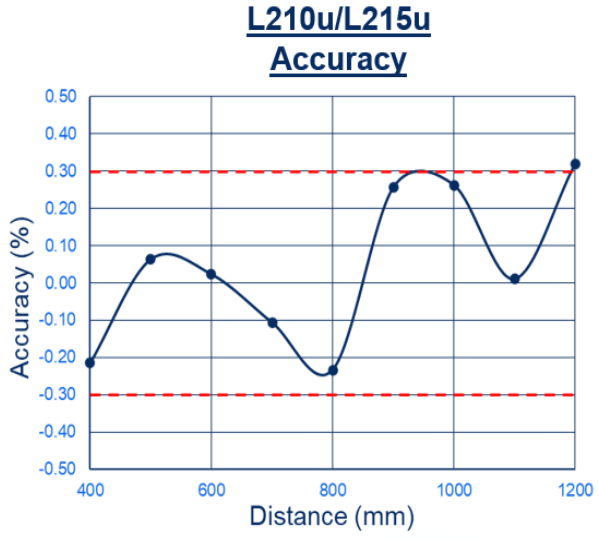
Others

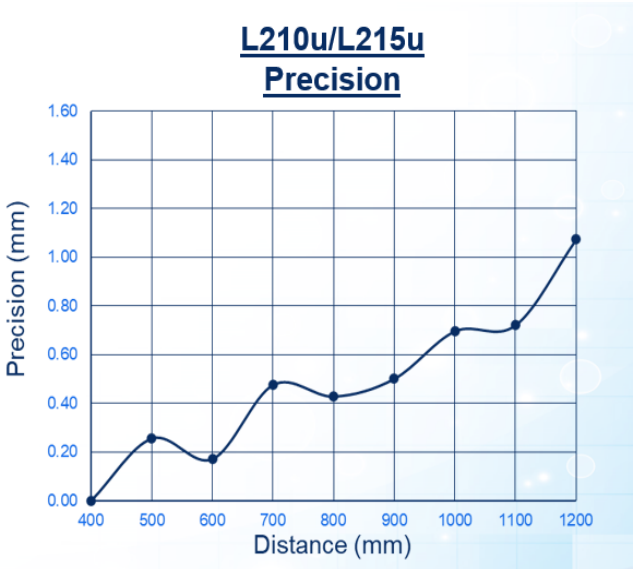


LIPSedge™ L210u /L215u

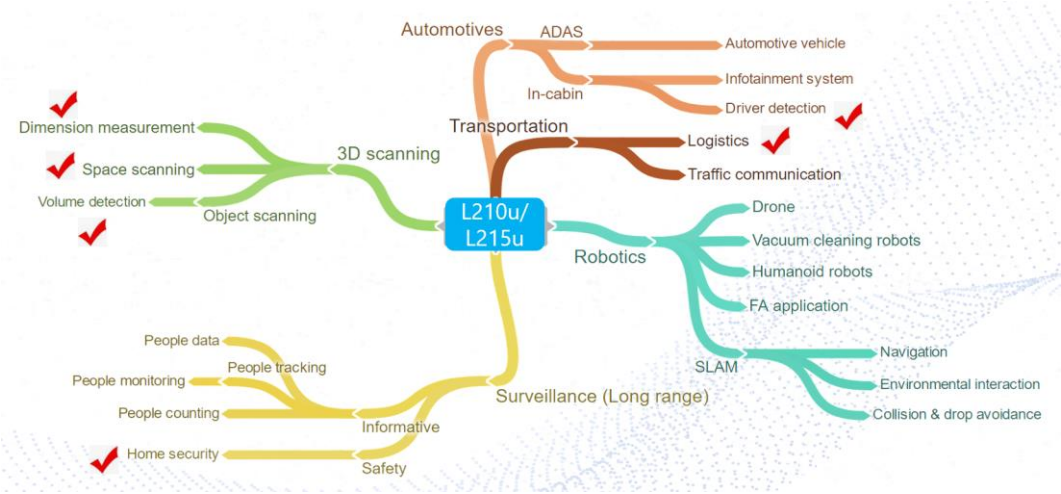


7.2 Accuracy and Precision of L210u/L215u





7.3 Application Tree of L210u/L215u



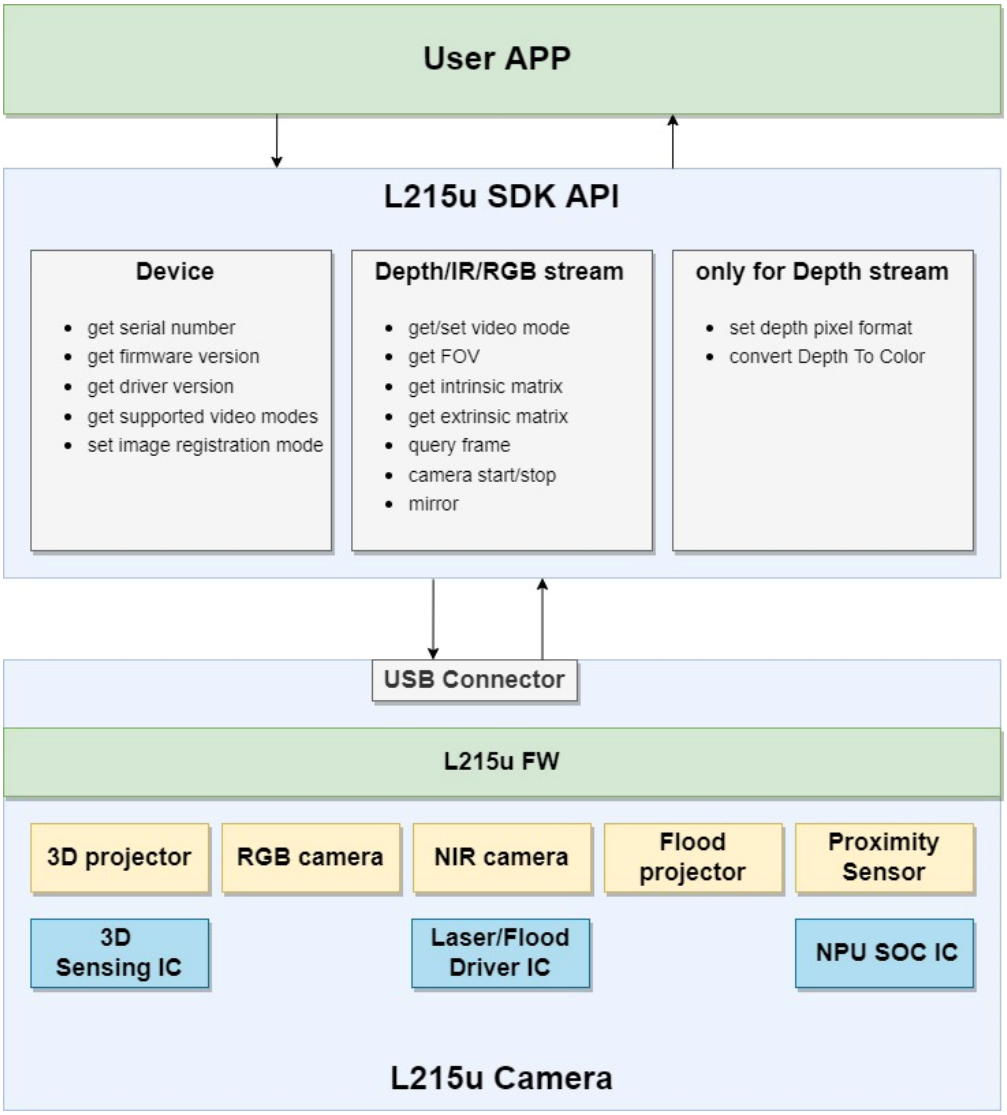
8. LIPSedge™ SDK, Middleware and SW Architecture

LIPSedge™series includes a comprehensive support for development including LIPS® SDK and worldwide industry Frameworks and Wrappers libraries implementation. Please refer to our homepage and related links for more information.

8.1 SDK, Middleware and Sample Codes

LIPS-Developer: https://www.lips-hci.com/developer-documentation
LIPS-GitHub: https://github.com/lips-hci
LIPS User manual: https://www.lips-hci.com/lipssdk

8.2 Software Architecture



9. Regulatory Compliance

LIPSedge™ L210u/L215u is classified as a Class 1 Laser Product under EN/IEC 60825-1.

"Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019"

The product is being certified with FCC, CE, KCC (Korea) and BSMI Taiwan).

FCC Part 15:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation.

European Directives:

Korean EMC Certification:

The product to be sent to Koera for final certification by KCC authorized lab.

Taiwan Comodidate Certification:

LIPS CORPORATION

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