



# N-Driver P302B

**Vehicle-mounted infrared intelligent driving system**



Technology Makes Travel Better

# Company Profile

Relying on the military technology reserves of Wuhan Guide Infrared Co., Ltd., WUHAN XUANYUAN IDRIVE TECHNOLOGY CO., LTD (hereinafter referred to as XUANYAUN IDRIVE or the Company) is a company engaged in entire infrared industry chain layout, through self-research and production with safe and controllable core technology. It is committed to applying far-infrared technology to intelligent vehicles and become a leader in the field of vehicle-mounted infrared thermal imaging.

Main products of the Company include automotive advanced driver assistance systems and intelligent cockpits.

Among them, the vehicle-mounted thermal imaging intelligent driving system developed by the Company, with pedestrian and vehicle detection & identification and alarm functions, has taken the lead in the world in this field. It can easily cope with the complex road conditions such as darkness, haze and strong light glare, greatly improving the vehicle's full-time perception capabilities, and is especially suitable for night driving and intelligent driving fields.



# GUIDE



Focus on infrared thermal imaging industry solutions



The expansion and popularization of infrared thermal imaging technology in the civilian sector



European branch, serving the markets of Europe and America



Mainly engaged in non-lethal police ammunition, after expansion, it has become a production, manufacturing, assembly and integration base for multiple types of missiles.



Mainly engaged in the research and development as well as sales of intelligent safety driving products



Focus on the fields of micro-electromechanical systems and sensing, and build R&D platforms, collaboration platforms and incubation platforms



## 01 A leading enterprise in infrared thermal imaging

- The largest infrared thermal imaging industrial park in Asia
- Market share of infrared thermal imaging ranking No. 1 in China and No. 2 in the world
- The first dual-color dual-band infrared detector in China, with world-leading key performance indicators



## 02 Military quality assurance

- An in-depth pilot unit for military-civilian integration program
- The first private company granted with second-level confidentiality qualification in Hubei Province
- China's first private company engaged in the overall research and development of weapon system



## 03 Core technology being independent and controllable

- Completely independent intellectual property rights, with more than 200 domestic and foreign patents
- Having a research and development base covering the entire infrared industry chain, from the bottom-level infrared core devices to the top-level complete optoelectronic systems



## 04 Multiple breakthroughs in intelligent driving projects

- Multiple intelligent driving application projects under trial production
- The first mass-produced infrared thermal imaging product for passenger cars and commercial vehicles in China
- Mature vehicle-mounted project import mechanism

# technical strength

## Core technology, independently controllable

An infrared detector batch production line with independent intellectual property rights; self-developed on-board infrared algorithms, industry-leading AI-ISP technology, AI super-resolution technology, segmentation rendering technology, and no-blocking algorithm technology, etc., have reached the industry-leading level, and the differentiated competitive advantages are remarkable.



## Set industry standards

VEHIR was primarily responsible for formulating two national industry standards, namely "Passive Infrared Detection System for Automobiles" and "Performance Requirements and Test Methods for Passenger Vehicle Night Vision Systems". Over two hundred related patents were applied for, leading the application and promotion of vehicle infrared technology.



## Vehicle-grade standards and quality system

Core components meet relevant standards such as AEC-Q. The new 8 $\mu$ m infrared detector chip has obtained AEC-Q100 certification. At the same time, the comprehensive introduction of the automotive quality management system compliant with IATF 16949 provides a systematic guarantee for the continuous high-quality delivery of products.



## Mass production delivery capability

Core components meet relevant standards such as AEC-Q. The new 8 $\mu$ m infrared detector chip has obtained AEC-Q100 certification. At the same time, the comprehensive introduction of the automotive quality management system compliant with IATF 16949 provides a systematic guarantee for the continuous high-quality delivery of products.



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## Liability statement

This manual may not be copied, transmitted, transcribed, archived or translated into other languages and computer languages in any form or by any method (electronic, electromagnetic, optical or manual, etc.) without the permission of the Company.

This manual is compiled for the convenience of users to use and understand the products of our company. We will do our best to ensure the accuracy of the contents of this manual, but we still cannot guarantee the completeness of the contents of this manual. Since our products are updated and upgraded from time to time, the Company reserves the right to make changes to the manual at any time without prior notice.

## History of version

Version	Time	Remarks
V1.0	September 28, 2023	First edition

Thank you for purchasing our products. In order to ensure your correct use of this product, it is recommended to read the User Manual carefully before use.

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## Product introduction



N-Driver P302B is a lightweight, automotive-grade chip product customized by XY I-DRIVE for the automotive market. It is mainly composed of two parts: an infrared camera and a control box, which are installed independently. The infrared camera is mainly installed on the inside of the grille above the vehicle bumper, and the control box may be installed in a hidden position in the car. Among them, the infrared camera is used for image acquisition and can adapt to various harsh natural environments; while the control box is responsible for the algorithm strategy of realizing the two major functions PCW and FCW.

It should be noted that the pedestrian collision warning function and forward collision warning function of this system can only remind the driver to be alert to the driving environment ahead, and cannot achieve the purpose of active control to avoid or prevent collision with the target object ahead.

The products can be used in front installation, rear installation and aided driving of passenger cars, commercial vehicles, special vehicles, etc. They can also be used in automotive night vision systems and autonomous driving solutions. The installation method of the products is flexible and changeable, which can meet the needs of customers in different application environments and weather conditions, and also protect the driving safety of vehicles in harsh environments such as dark night, strong glare, haze, rainy and snowy weather, etc.

### Outstanding features of N-Driver P302B products >>

- Intelligent pedestrians & vehicles detection, identification and collision warning;
- Military quality, no fear of photo-electric interference, full-time perception, adaptable to dark and all-weather application;



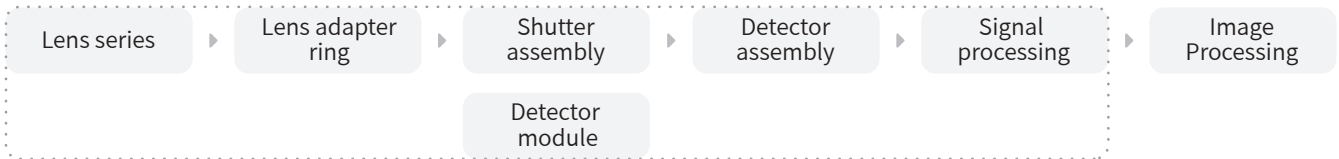
- IP67 and IP69K waterproof and dustproof rating;
- Automotive-grade products, with an operating temperature range of -40~85°C;
- Miniaturized, lightweight, easy to integrate and install, support customization of installation bracket;

## Technical specifications and parameters of product

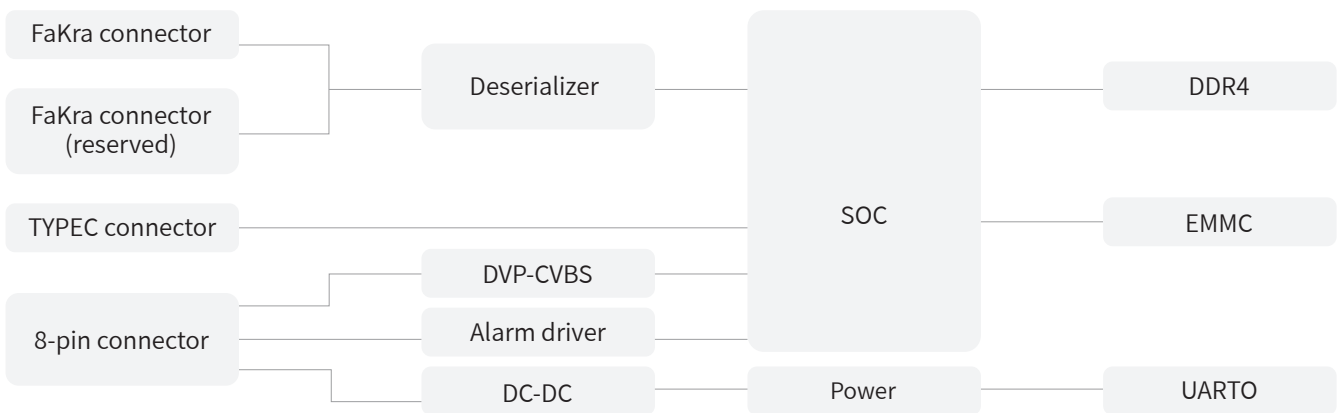
Infrared detectors	
Detector type	Vanadium oxide uncooled infrared focal plane detector
Response band	8~14 $\mu$ m
NETD	$\leq 40\text{mk}@25^{\circ}\text{C}, \text{F}\#1.0$
Detector area array	640 $\times$ 512
Image display performance	
Focal length	9.1mm      13.5mm
Field of view (FOV)	45 $^{\circ}$ $\times$ 37 $^{\circ}$ 32 $^{\circ}$ $\times$ 24 $^{\circ}$
Spatial resolution	1.32mrad      0.89mrad
Action distance	Pedestrian 150m/Vehicle 200m      Pedestrian 200m/Vehicle 300m
Output frame frequency	25HZ
Video output interface	RCA Lotus head
Video output format	Analog video CVBS
Video output resolution	720 $\times$ 576 (PAL system) 720 $\times$ 480 (NTSC system)
System characteristics	
Rated voltage	DC9~32V (typical 12V)
Overall power consumption	$\leq 5\text{W}$ @(12V power supply, window heating not activated) $\leq 8\text{W}$ @(12V power supply, window heating activated)
Imaging start time	$\leq 8.5\text{s}$ (normal temperature)
Automatic heating function	When the window temperature is lower than $2^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , the intelligent heating function will start automatically When the window temperature is higher than $7^{\circ}\text{C}\pm 2^{\circ}\text{C}$ , the heating function will be turned off automatically
Shutter	Automatic shutter compensation
Image algorithm	3D noise reduction RAW Image enhancement
Camera size/weight	36 $\times$ 36 $\times$ 46.5mm / $\leq 120\text{g}$
Control box size/weight	100 $\times$ 80 $\times$ 24mm / $\leq 500\text{g}$
Physical properties	
Camera protection class	IP67
Control box protection class	IP5k0
Environmental parameters	
Operating temperature	-40 $^{\circ}\text{C}$ ~+85 $^{\circ}\text{C}$
Storage temperature	-40 $^{\circ}\text{C}$ ~+90 $^{\circ}\text{C}$

# Product hardware

## ▶▶ Infrared Camera

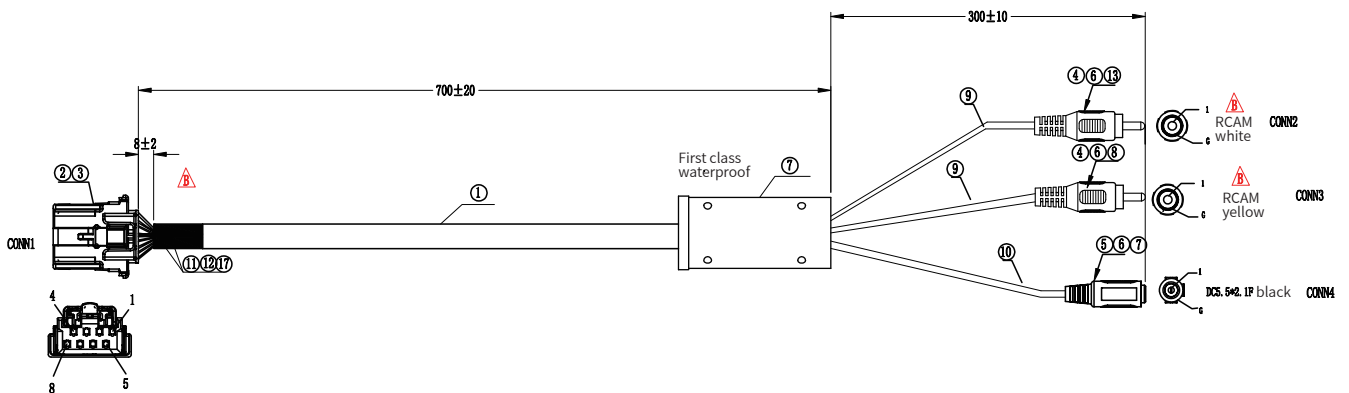


## ▶▶ Control box hardware



## ▶▶ Wiring harness definition

Kaiwang version	Customer version	Change symbol	Change content	Changed by	Date
A	/	/	Original drawings	Zhu Yan	2023/08/02
	/	/	Bare wire size and RCAM color is changed	Zhu Yan	2023/09/05



● Wiring table

CONN1	CONN2	CONN3	CONN4	Color	Wire size
4		1		blue	26#
8		G		White blue	26#
3	1			White	26# 1C+S
7	G			Black (twine)	
1			1	Red	24#
5			1	Red	24#
2			G	Black	24#
6			G	Black	24#

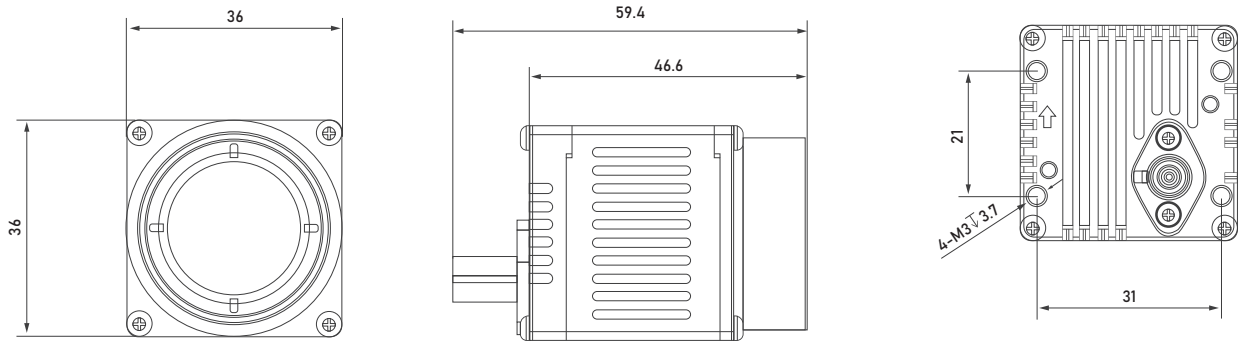
● Electrical apparatus testing conditions

A. Voltage: DC 300V	B. Insulation resistance: $\geq 20M\Omega$	C. On-impedance: $\leq 2\Omega$
Technical requirements: RCA current 1A;	DC5.5 power line current 2A;	

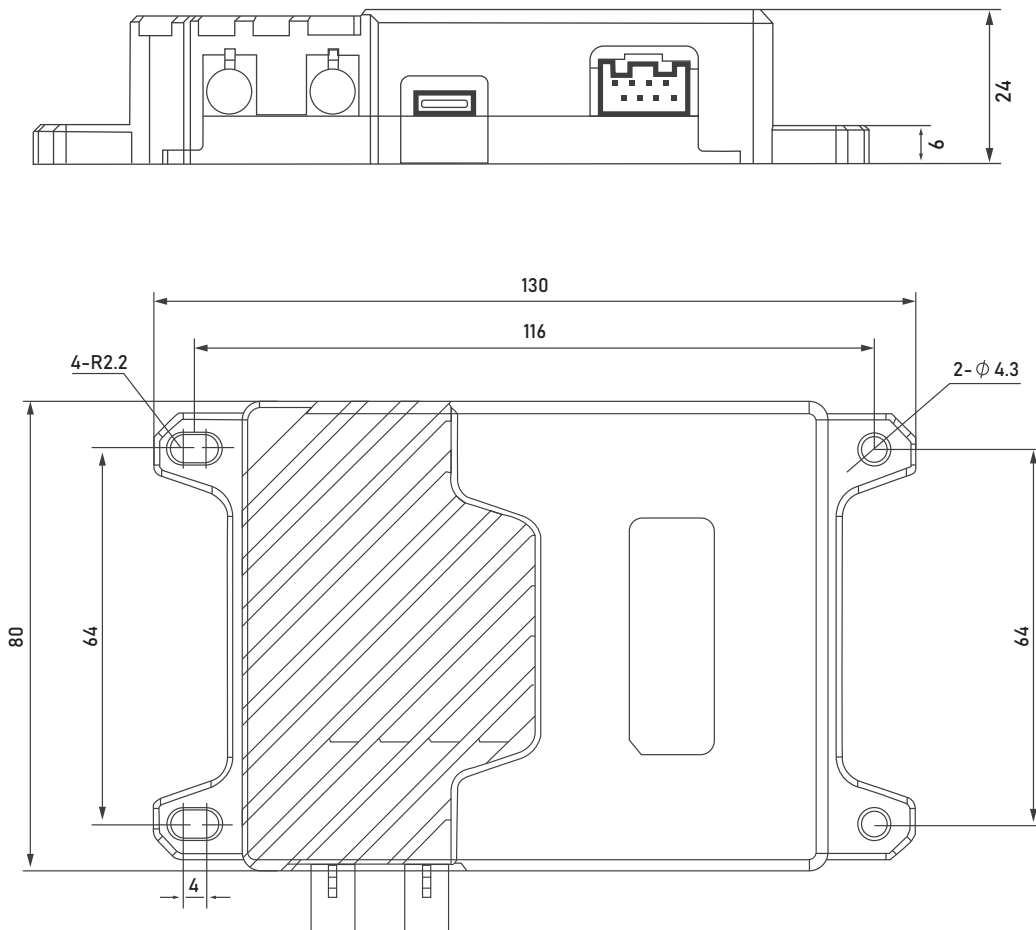
14	Heat shrink tubing, OD6.0, black	1	PC
13	PVC material 45PCW7	/	KG
12	Heat shrink tubing, OD3.0, black	1	PC
11	Ultra-thin heat shrink tubing, OD1.0, black	1	PC
10	3.0PVC casing, OD:4.4, black, semi-matte surface -40~105 degrees 50P	1	PC
9	2.5PVC casing, OD:3.8mm, black semi-matte surface, -40~105 degrees 50P	2	PCS
8	PVC45P yellow (PANTONE114U) (F080)	/	KG
7	PVC45P black outer mold material (B077)	/	KG
6	PE transparent inner mold material PE	/	KG
5	DC5.5x2.1F nickel-plated iron shell with inyl core and opening	1	PC
4	RCA, M bakelite-welded copper shell with brown plastic core, nickel plated tubular closed type	2	PCS
3	Amphenol: 10142348-008LF supporting terminal	8	PCS
2	Amphenol: 10142348-008LF	1	PC
1	UL20276 26#1p+24#4c+26(1C+S) black FS	1	PC
SN	Material description	Qty	Unit

## Product structure and dimensions

### ▶▶ Camera structure

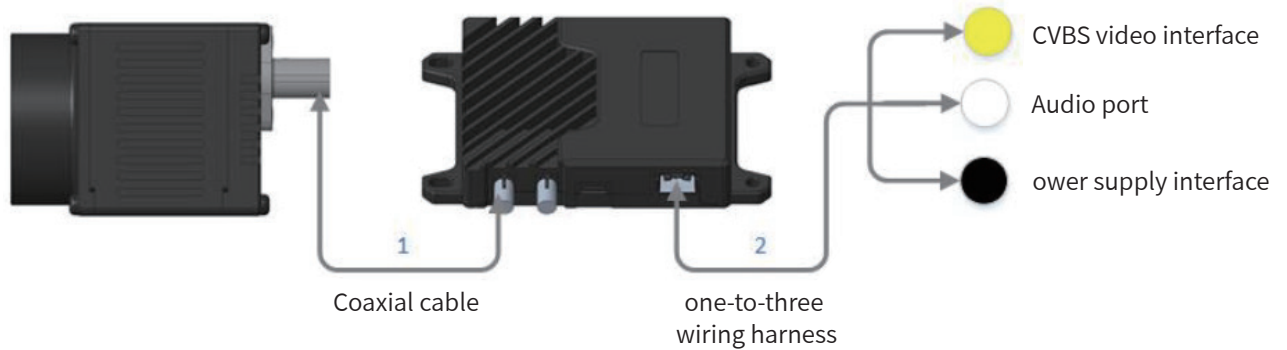


### ▶▶ Control box structure



# Product function description

## ▶▶ Instructions for product connection



## ▶▶ Overview of product functions

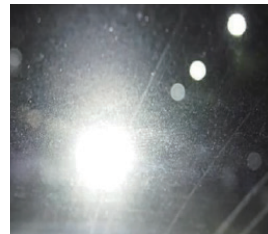
### All-weather operations,with enhanced night vision

The system's infrared image can break through night barriers and can work all weather. With this function, the driver's field of vision is increased, and the problem of limited vision during night driving is solved.



### Anti-glare

The system's infrared image is not affected by changes in light, reducing the impact of glare and sudden changes in light on the driver when driving, and solving the problems of glare caused by passing cars at night and sudden changes in light when entering and exiting tunnels.



### Penetrating fog, haze, and dust

The system's infrared imaging system can still produce clear images in heavy foggy, foggy, hazy, and sand and dust weather, which improves the driver's driving vision in bad weather.



### Pedestrian detection, recognition and collision warning

The system can detect and identify pedestrian targets normally in a completely dark environment. If a pedestrian appears within the vehicle's FOV detection range, it can detect and identify upright pedestrian targets in the image scenario, and mark the detected pedestrian with a green rectangular frame. In combination with infrared AI intelligent algorithm strategy, the collision warning function will be triggered when a pedestrian appears in a dangerous area, and a red pedestrian triangle symbol popping up. At the same time, the control box drives the alarm to sound an alarm synchronously, reminding the driver to pay attention to the pedestrian ahead.



### Vehicle detection, recognition and collision warning

The system can detect and identify vehicle targets normally in a completely dark environment. When other vehicle appears within the vehicle's FOV detection range, it can detect and identify vehicle targets in the image scenario, and mark the detected vehicle with a yellow rectangular frame. In combination with infrared AI intelligent algorithm strategy, the collision warning function will be triggered when a vehicle appears in a dangerous area, and a yellow rectangular frame will mark out the position of the pedestrian, with a yellow triangle symbol popping up. At the same time, the control box drives the alarm to sound an alarm synchronously, reminding the driver to pay attention to the safety ahead.



### ►► Definitions

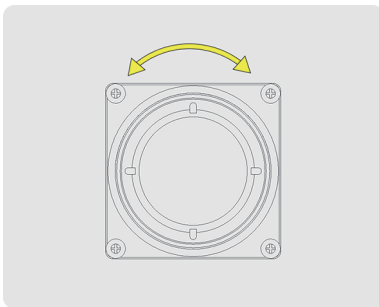
IRC	Infrared Camera
FCW	Forward Collision Warning
PCW	Pedestrian Collision Warning

# Installation requirements

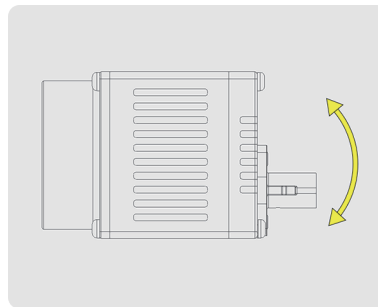
## ▶▶ Instructions for camera installation

In order to ensure your normal use of this infrared intelligent driving system, we suggest that you should carefully refer to the following installation instructions before use.

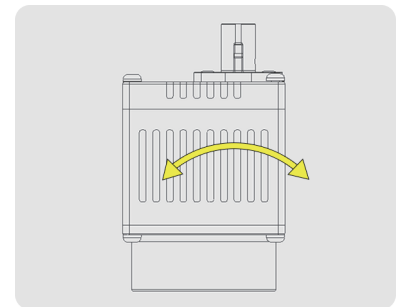
- 01 The mounting bracket shall be designed according to the actual situation of the car body;
- 02 The infrared camera shall be installed directly in front of the vehicle, behind the center grille, and as far away from the radiator tank and speaker as possible;
- 03 The deviation of bracket manufacturing process shall be  $<1^\circ$ ;
- 04 The mounting height of the infrared camera ranges from 40 to 120cm (depending on the height of the vehicle);
- 05 The specific requirements on mounting angle are shown in the figure below (depending on actual situation);



Roll angle error  $<3^\circ$



Pitch pointing error  $<3^\circ$



Yaw pointing error  $<3^\circ$

## ▶▶ Control box installation instructions

The control box shall be firmly installed in the vehicle. After installation, make sure that the control box and the car body do not shake, so as to improve the alarm accuracy of the infrared intelligent driving system. If the control box is not fixed properly, it will increase the false alarm rate of vehicle-mounted infrared intelligent driving system.

## Calibration instructions (important)

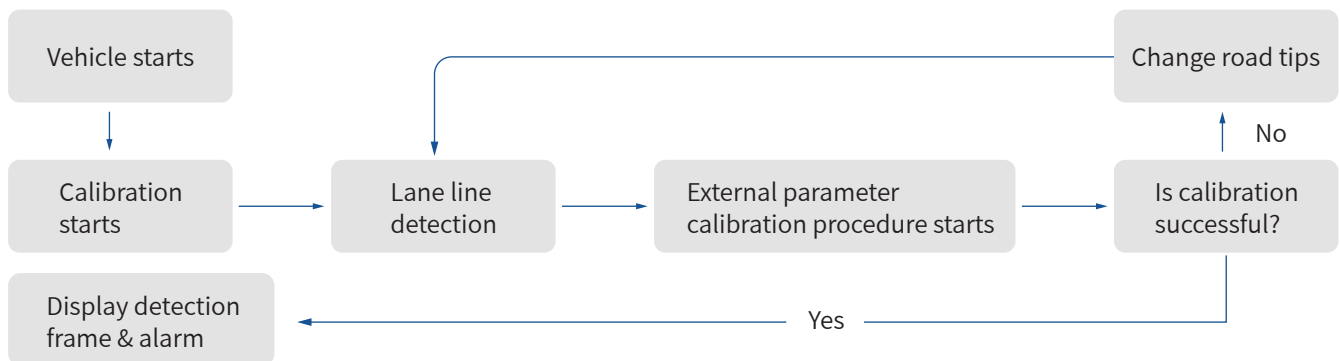
### ▶▶ Definition of external parameter calibration

External parameter calibration is an important process in computer vision, mainly used to determine the relative position and attitude between different cameras or sensors. The goal of external parameter calibration is to calculate the pose of a camera or sensor relative to the reference coordinate system, including the pitch, yaw, roll and other information.

Without external parameter calibration, the vehicle-mounted infrared system can only display infrared images, but cannot display detection frames and realize alarm functions.



### ▶▶ External parameter calibration process



### ▶▶ Detailed steps for external parameter calibration of infrared camera

- Step1** Install the infrared camera correctly on the vehicle;
- Step2** Power on the equipment, carry out the calibration when the vehicle drives normally to a road section with clear lane lines;
- Step3** Start calibration, the information "Please move the vehicle to a road with lane line" in red font will be displayed on the display screen. The "driving calibration" process will last for 5 minutes. If the external parameter calibration is successful, the screen will directly jump to "Calibration completed" in green font; if the external parameter calibration is unsuccessful, it will jump to "Please move to a road with clear lane lines." in blue font. In this case, the vehicle shall be driven to a road with clearer lane lines for external parameter calibration, which will last for 5 minutes until "Calibration completed" is displayed;
- Step4** After completion of the external parameter calibration, when a pedestrian or vehicle target appears in front of the vehicle, the detection frame (pedestrian and vehicle) will be displayed on the display screen, and the alarm function will be enabled simultaneously;



### **One-stop service worry-free throughout the process**

The professional after-sales service team adheres to the concept of "Night vision has no boundaries, service is worry-free", continuously innovating the service model and enhancing professionalism, providing customers with more professional, convenient and efficient service experiences.



### **Quick Response Satisfaction Directly Achieved**

To better serve our customers, we implement the 8137 rapid response policy. We respond within 8 hours of the request, provide a preliminary analysis within 1 working day, offer an effective solution within 3 working days, and complete the repair within 7 working days to ensure customer satisfaction.



### **VEHIR Premium Selection Quality Guaranteed**

We strictly control the product quality and always provide customers with 100% genuine original factory parts, ensuring that the quality and functions are consistent with those of the original products, thus making customers feel more at ease and assured.

## WUHAN XUANYUAN IDRIVE TECHNOLOGY CO.,LTD.

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