

Hayoou AI ADAS APP

User Manual

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1 introduction

1.1 purpose

At present, AI artificial intelligence technology has begun to be deeply applied in various industries. In terms of driving behavior, not everyone can make a completely correct response in all environments. In particular, people may be tired or distracted. An intelligent assistant that can act like a coach to help everyone keep an eye on changes in the road surface and surrounding environment in real time, and issue early warning feedback in time, is very meaningful. Moreover, the human eye's response ability in low light is not as good as that of the camera, and it is not easy to see clearly in the case of pedestrians with strong light or dark clothes on the opposite side. In some cases at night, the ability of the camera may be better than that of people. Hayou AI Safety Assisted Driving APP is an artificial intelligence application that helps drivers to give early warning in real time and ensure safety.

2 Software overview

2.1 Software function

- (1) Lane departure warning, using the latest lane recognition technology in 2021
- (2) Vehicle and pedestrian detection and identification and early warning mechanism
- (3) Forward ranging and collision warning mechanism
- (4) Processing speed optimization, extremely fast recognition
- (5) Voice reminder and UI interface
- (6) Night Pedestrian Detection and Distant Enhanced Recognition (Advanced Version)
- (7) Different road conditions mode switching and automatic adjustment functions.

2.2 software running

The system runs on the Android client, and the real-time processing part is also in the client. The client uses the Android system. After the software is installed, the client opens the application and directly clicks the corresponding icon to perform the required software operations.

2.3 System Requirements

Android 7.0 or above mobile phone system, 400MB storage space.

3 software usage

3.1 Software Installation

Since this application is an Android full-screen application, there is no Android signal bar in the following screenshots, and the right side is the Android system navigation bar (return, HOME, multitasking switch buttons).



图 3-1 First install the software client

APP website: hayoou.com/safeapp



3.2 Introduction to software settings

Open the client interface, allow the camera to shoot permissions, click the Settings button to start the camera.

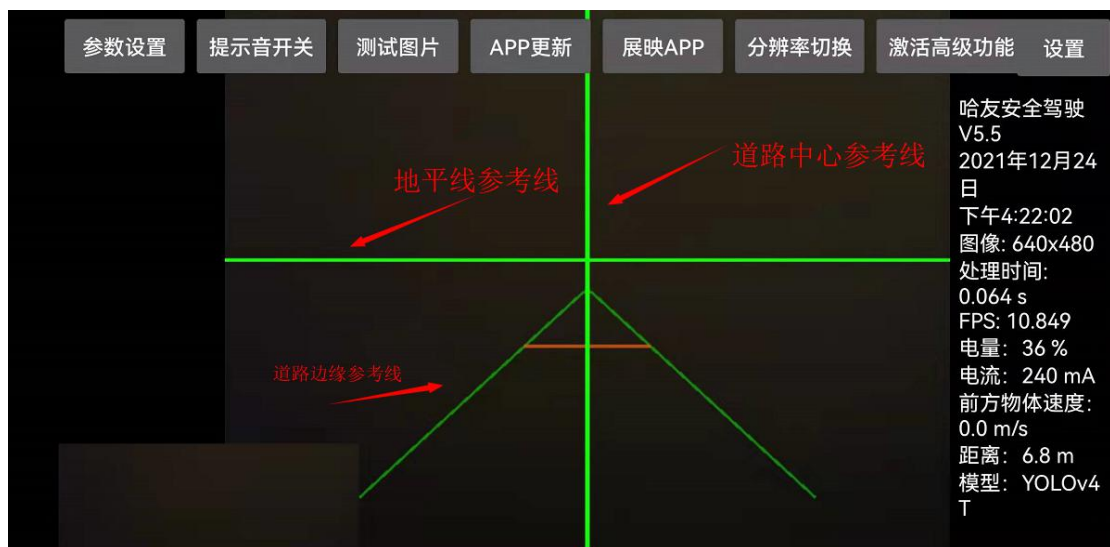


图 3-2 Setting Guide Line Description

Make sure the distant horizon is on the green horizontal guide. Turn off power saving mode and turn on high performance mode to help increase processing speed



图 3-3 参考线调整

in:

Target detection overlap: the degree of overlap between the two object detection frames. The higher the degree of overlap, the more overlapping the extracted target frames are.

Object detection threshold: The confidence threshold of object detection

Alarm time interval: adjust the alarm time interval

High-speed detection distance: Adjust the lane detection distance in high-speed mode

Detection area width: adjust the detection area angle (adjust according to the height of the vehicle)

City detection distance: detect the distance of the vehicle ahead in the city road

Road detection distance: From here to the bottom edge, as long as the detected lane line is touched, the alarm will be triggered

Highway mode: The target detection starting area is green, and the road detection starting area is orange.

Urban road mode: The starting area of target detection is pink, the starting area of road detection is orange, and the starting area of vehicle start detection is gray.

Collision prediction: For example, in 2.5 seconds, the system calculates that it will collide with the object ahead in 2.5 seconds based on the current speed and distance, and will give an early warning. Click to switch the warning time.

The schematic diagram is as follows:

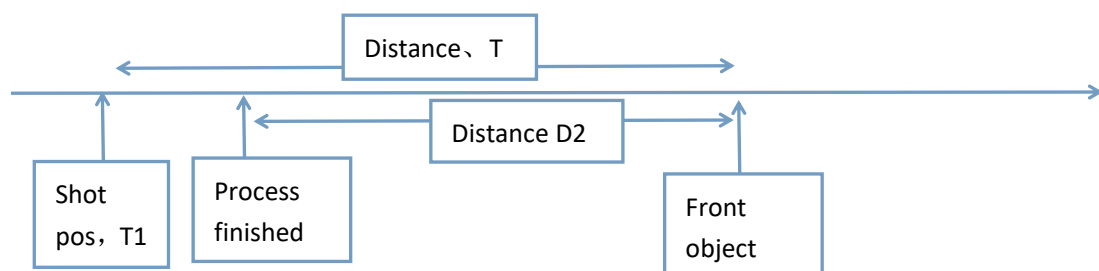


图 3-4 Collision Prediction Schematic

Alarm when $T < 2.5$ seconds

Due to a slight delay in the update of the vehicle speed calculation, the calculation method is: total time $T = \text{estimated time } (D/\text{vehicle speed}) < 2.5$ seconds. Vehicle speed is estimated by fusion on a scale. In the future, it can be connected to the vehicle system to obtain more accurate data.

Quick identification:

Since it takes time for AI to process the picture, if each frame of picture is processed, it needs to completely process 3 steps, which may be slightly delayed. Because some

results may not change much. Therefore, the speed recognition adopts the following steps: 1. Identify the complete picture, analyze 2. Identify the distant picture, analyze 3. Identify the lane, each image input collection only processes one of the steps, and the previous processing results will also be cached. Therefore, the recognition rate is greatly improved, and the smoothness of the picture is improved. The recognition results have less impact. Long press the speed recognition button to switch the recognition model (do not use this in google play version, cause no model file). YOLOX Tiny is better, but the speed is slower. The YOLOV4 Tiny model is recommended first, followed by YOLOX NANO and YOLOX TINY.

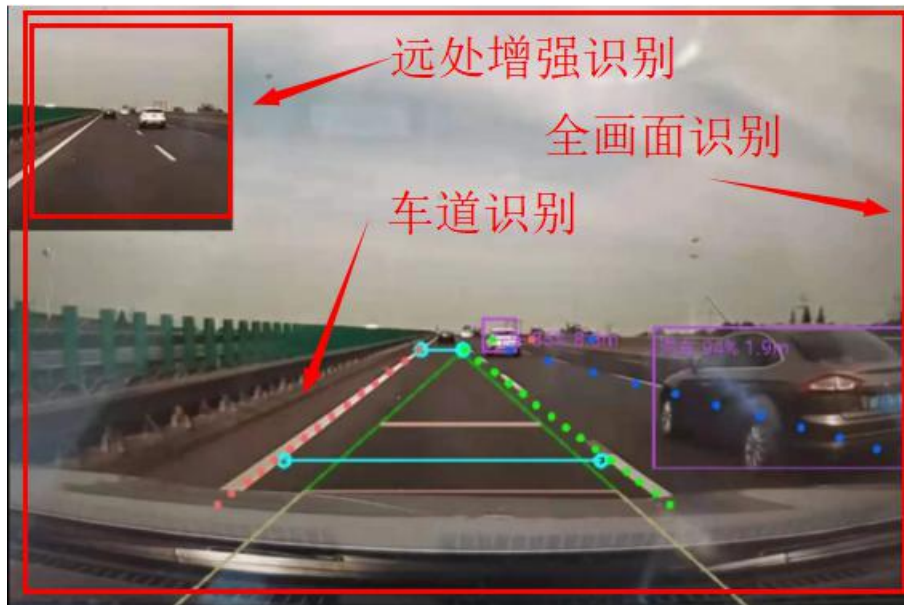


图 3-5 AI screen recognition framework

Ranging
parameters:



图 3-6 Screenshot of AI ranging parameters

Horizon Adjustment: You can manually set the horizon position (will affect ranging)

Distance correction coefficient: proportional, if the original is 5m, the coefficient 1.2 will measure 6m

Perpendicular to horizontal ranging ratio: The ranging model fusion algorithm prioritizes vertical ranging, but vertical ranging may have errors when it encounters up and down slopes. Horizontal ranging may have large deviations, depending on the width of the position where the vehicle ahead is projected onto the lane.

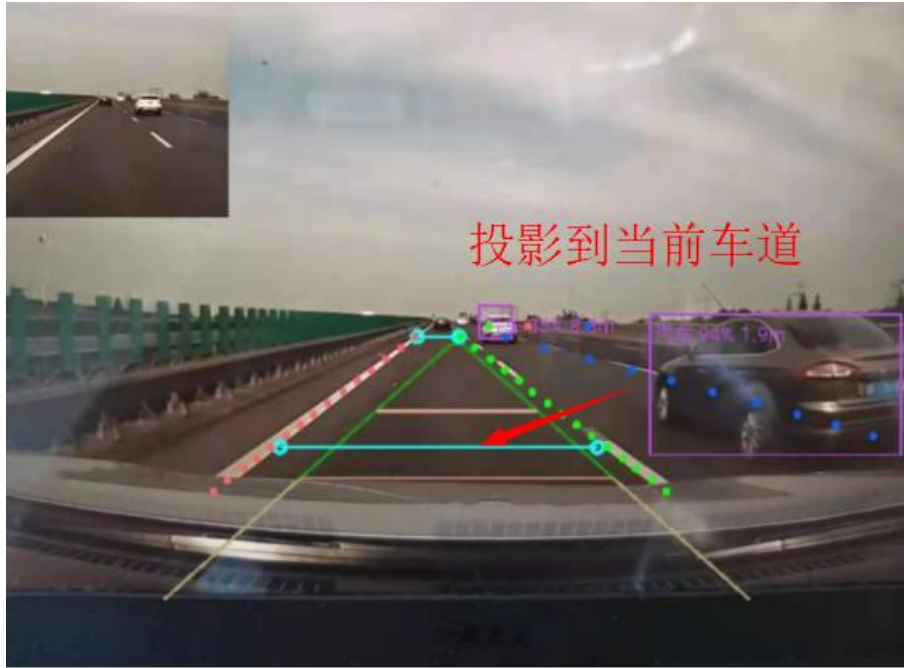


图 3-7 Horizontal ranging diagram

Prompt switch: long press will switch the type of prompt tone, short press will switch between different prompt modes (turn off lane departure, turn off object warning, turn off front car start, etc.)

Test image: You can view the preset image to test the recognition rate and effect. Due to the high resolution of the test image, the rate may be slower

APP update: When the APP starts, it will automatically detect the update and prompt, click this button to enter the APP download page and the latest APP dynamics.

Screening APP: Another artificial intelligence service APP we launched

Resolution switching: short press to switch the resolution (640x480 is recommended to meet the requirements), long press to rotate the screen (the rotation direction of some car cameras may need to be adjusted)

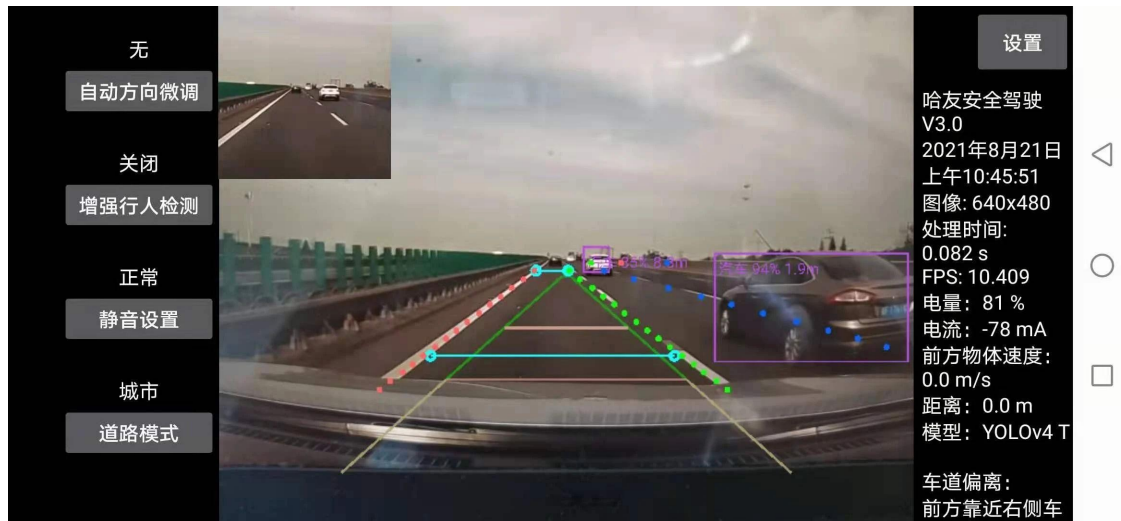


图 3-8 Actual working example diagram

3.3 Premium version activation

The primary version does not include features such as enhanced distance recognition and pedestrian detection enhanced mode and city mode. For premium version, please contact us at hayoou.com/safeapp. Or pay in the app. This product can be used offline, but needs to automatically detect the upgrade and automatic activation status once a year. Each activation code can activate up to 5 devices, which may be adjusted in accordance with our policies in the future.



图 3-9 Activation example

Enter the user name in the first line: more than 6 letters, which can be set by

yourself.

Enter the activation code on the second line, please contact us (hayoou.com/safeapp) to obtain it.

3.4 new version update

When the software is started, the update will be automatically detected. After the update, the parameters of the relevant settings will generally not change, and the activation code will not change.

3.5 Mobile version installation tips

For the car system, please download the APK file directly, and download and install it through the U disk (open the file manager to install) or in the browser of the car. After installation, adjust the horizontal position and set relevant ranging parameters to ensure correct ranging data.

Mobile version:

- It can be fixed horizontally near the top of the front windshield (suction cup bracket: <http://hayoou.com/carsupport>), the higher the position, the better, without shaking
- The horizon line is aligned with the horizontal reference line, aligned with the center of the road
- Connect the power cable to ensure normal power supply for a long time (no need to connect to the network)
- If the power consumption speed is too fast, you can try to turn on the power saving mode of the mobile phone

More car windshield phone holder with suction cup:

- <https://www.amazon.com/dp/B09H72V6S5>
- <https://www.amazon.com/dp/B06XGRS9P4>
- <https://www.amazon.com/dp/B01KFS2BR6>
- <https://www.amazon.com/dp/B093CX6PHY>