

Drivora

Universal Advanced Driver Assistance System

User Manual

Version 1.0

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3 Introduction & Safety

Welcome

Thank you for choosing **Drivora**, a Universal Advanced Driver Assistance System (ADAS) designed to improve driver awareness by monitoring the vehicle's surroundings and providing real-time visual and audio alerts.

Drivora combines multiple sensing technologies to detect potential driving hazards, helping drivers make safer decisions on the road. The system is intended to assist the driver and should always be used alongside safe driving practices.

4 Introduction & Safety

Main Features

- Forward Obstacle Detection
- Rear Blind Spot Monitoring
- Lane Departure Warning
- Vehicle Stability Monitoring
- Real-time Mobile Dashboard
- Audio Warning System
- Local Wi-Fi Communication
- Vehicle-specific Calibration

Safety Information

WARNING

Drivora is a driver assistance system only. It does **NOT** control the vehicle and must never replace attentive driving.

5 Introduction & Safety

⚠ WARNING

Always observe:

- Traffic conditions
- Road signs
- Mirrors
- Blind spots
- Surrounding vehicles

before making driving decisions.

⚠ CAUTION

Do not install the system:

- Near airbags
- Inside engine compartments
- On unstable surfaces
- Near excessive heat sources

6 Introduction & Safety

NOTE: After relocating any hardware component, perform system calibration before driving.

Safe Operating Conditions

Requirement	Recommendation
Operating Temperature	-10°C to 60°C
Vehicle Voltage	12V DC
Cleaning	Dry microfiber cloth only

7 Package Contents

Item	Quantity
Main Hub Module	1
Front Sensor Module	1
Rear Sensor Hub	1
Ultrasonic Sensor Probes	3
IMU Module	1
Wiring Cables (with waterproof connectors)	3
Mounting Accessories	1 Set
User Manual	1

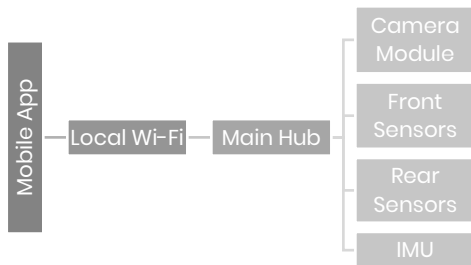
Package Inspection

Before installation:

- Check for physical damage.
- Ensure connectors are clean.
- Verify all accessories are included.
- Report missing components before installation.

8 System Overview

Drivora consists of several hardware modules connected to a central processing unit (Main Hub). Each module performs a dedicated sensing function while the mobile application provides a real-time interface for monitoring and configuration.



9 System Overview

Functional Overview

Module	Function
Camera	Lane detection
Front Sensor	Forward obstacle detection
Rear Sensors	Blind spot monitoring
IMU	Vehicle stability monitoring
Main Hub	Sensor fusion & processing
Mobile App	User interface

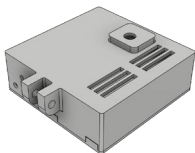
10 Hardware Components

1. Main Hub Module

The Main Hub is the central controller of the Drivora system. It receives data from all sensor modules, processes hazard information, and communicates with the mobile application. The camera module included captures the forward road view for lane departure detection.

Functions

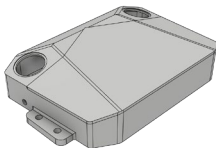
- Sensor data processing
- Wi-Fi communication
- Audio alerts
- System management



11 Hardware Components

2. Front Sensor Module

Detects obstacles located in front of the vehicle.

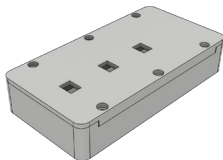


3. Rear Sensor Module

Three ultrasonic sensors monitor the rear blind spot zones. Hub collects all the data coming from the probes.

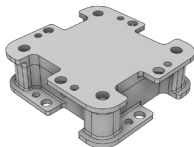
Positions:

- Rear Left
- Rear Center
- Rear Right



4. IMU Module

Measures vehicle motion for stability analysis.



13 Hardware Installation

Before Installation: Ensure the vehicle ignition is switched OFF before installing any hardware components.

Required Tools

Recommended tools:

- Screwdriver set
- Wrench set
- Drill
- Plastic trim removal tool
- Cable clips or zip ties
- Double-sided adhesive tape
- Measuring tap

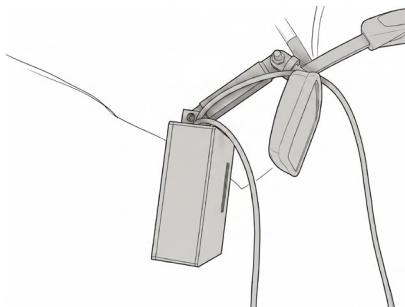
14 Hardware Installation

Main Hub Installation

Mount the main hub behind the interior rear-view mirror.

Installation Guidelines:

- Ensure an unobstructed forward view.
- Align the camera horizontally.
- Avoid blocking the driver's visibility.
- Route the cable through the headliner toward the Dashboard.



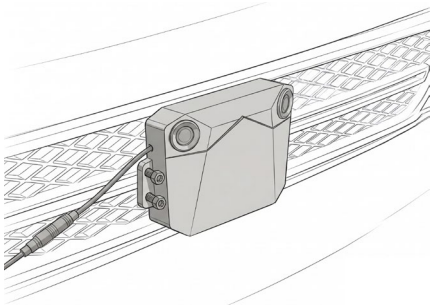
15 Hardware Installation

Front Sensor Module Installation

Mount the front sensor at the center of the front bumper.

Installation Guidelines:

- Ensure clear forward detection.
- Avoid obstruction by number plates or accessories.
- Maintain recommended installation height from the ground.



16 Hardware Installation

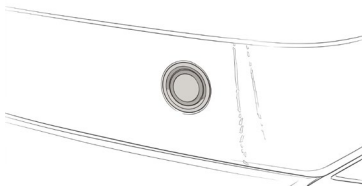
Rear Sensor Module Installation

Install the three rear sensor probes evenly across the rear bumper by drilling. Connect the probes to Rear Hub and secure it inside the Rear Cargo side panels.

Sensor Positions: Left, Center, Right

Installation Guidelines:

- Maintain equal spacing.
- Drilling hole diameter: 23mm.
- Align sensors horizontally.
- Ensure unobstructed sensing area.



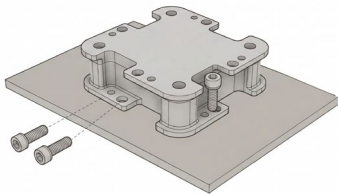
17 Hardware Installation

IMU Installation

Mount the IMU on a rigid horizontal bottom surface inside the cabin or bottom outside.

Installation Guidelines:

- Follow the Arrow facing vehicle front and Upside Label.
- Fix to the bottom center of the vehicle.
- Secure firmly to prevent vibration.
- Do not install on flexible panels.

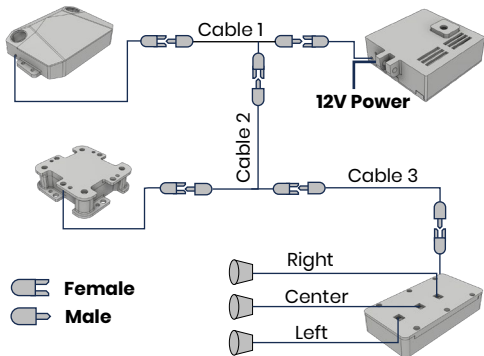


18 Wiring Guide

Wiring Overview

The Drivora system consists of a Main Hub connected to all sensing modules through dedicated connectors. Ensure all connectors are securely fastened before powering the system.

Complete system wiring diagram



Connector Identification

Connector	Connected Devices
Cable 1	Front, Main Hub, Cable 2
Cable 2	IMU, Cable 2, Cable 3
Cable 3	Rear, Cable 2

Vehicle Power Connection

Connect the Main Hub directly to the vehicle power supply via battery or key switch.

Wire	Function
Red	+12 V DC
Black	Ground (GND)

WARNING

Always verify the vehicle voltage before connecting the system. Incorrect polarity may damage the system.

Cable Routing Recommendations

For reliable operation,

- Secure all cables using cable ties.
- Avoid excessive cable bending.
- Keep wiring away from high-temperature areas.
- Do not route cables near moving mechanical components.
- Leave sufficient slack near connectors to reduce strain.

Wiring Inspection Checklist

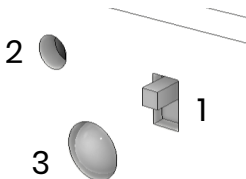
Before powering the system, verify:

- ✓ Front sensor connected
- ✓ IMU connected
- ✓ Rear Hub connected
- ✓ Sensor probes connected to Rear Hub
- ✓ Power cable connected
- ✓ Connectors fully inserted
- ✓ Cables secured

22 Main Hub Controls

Main Hub Overview

The Main Hub provides manual system control and visual status indication through a power switch, reset button, and LED indicator.



1. Power Toggle Switch

The toggle switch controls the overall system power.

Position	Description
ON	Powers the system
OFF	Turns the system off

23 Main Hub Controls

2. Reset Push Button

The reset button is used to restore factory settings. It will reset all the system settings along with the Wi-Fi credentials.

Action	Function
Long Press (10s)	Restore factory settings

3. LED Indicator

The LED provides information about the current power state.

LED Status	Meaning
Solid Green	System operating normally
Off	No power
Blink	Reset completed

System Requirements

The Drivora mobile application is available for Android devices.

Recommended requirements:

- Android 9.0 or later
- Wi-Fi connectivity
- Landscape screen orientation
- Minimum 4 GB RAM

Installing the Application

1. Install the Drivora application.
2. Grant the requested permissions.
3. Enable Wi-Fi.
4. Launch the application.

25 First-Time Setup

When Drivora is started for the first time, complete the Setup Wizard before normal operation.

Step 1 – Connect to the Main Hub

Select the Drivora Wi-Fi network and connect with the default credentials:

SSID:	Drivora
Password:	12345678

Step 2 – Create or Sign In

Create a new account or log in using your existing credentials.

26 First-Time Setup

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Create Account

DRIVORA U-ADAS SETUP

VEHICLE INFORMATION

VEHICLE MODEL

 Toyota

VEHICLE CATEGORY

Sedan 

DRIVER INFORMATION

FULL NAME

 Sachith Nirmal

EMAIL ADDRESS

 sachithnirmal16@gmail.com

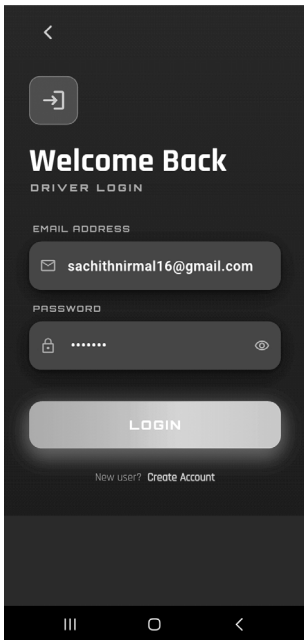
PASSWORD

CONFIRM PASSWORD

III O <

27 First-Time Setup



A mobile application login screen with a dark theme. At the top left is a back arrow. Below it is a square button with a right arrow and a document icon. The main heading is "Welcome Back" in large white font, followed by "DRIVER LOGIN" in smaller white font. There are two input fields: "EMAIL ADDRESS" containing "sachithnirmal16@gmail.com" with an envelope icon, and "PASSWORD" containing six dots with a lock icon on the left and an eye icon on the right. A large "LOGIN" button is centered below the fields. At the bottom, it says "New user? Create Account". The bottom of the screen shows a dark navigation bar with three icons: a hamburger menu, a circle, and a back arrow.

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→]

Welcome Back

DRIVER LOGIN

EMAIL ADDRESS

✉ sachithnirmal16@gmail.com

PASSWORD

🔒 👁

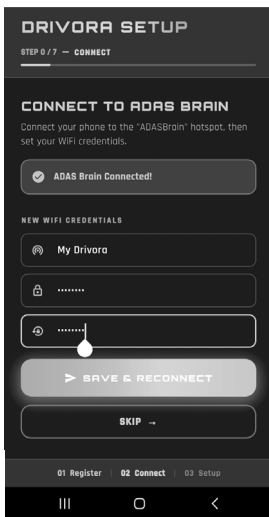
LOGIN

New user? [Create Account](#)

28 First-Time Setup

Step 3 – Reconnect

Change the credentials to your own and reconnect.



DRIVORA SETUP

STEP 0 / 7 - **CONNECT**

CONNECT TO ADAS BRAIN

Connect your phone to the "ADASBrain" hotspot, then set your WiFi credentials.

✓ **ADAS Brain Connected!**

NEW WIFI CREDENTIALS

📶 **My Drivora**

🔒

📶 |

➤ **SAVE & RECONNECT**

SKIP ➤

01 Register | **02 Connect** | 03 Setup

29 First-Time Setup

Step 4 – Vehicle Information

Enter:

- Vehicle Type
- Load Condition
- Track Width
- Wheelbase
- Vehicle Height

These parameters improve warning accuracy.

VEHICLE PROFILE

Select your vehicle type and current load condition.

VEHICLE TYPE

Compact

Passenger

SUV / Tall

Tall or high-COG vehicle. (e.g. SUV, Van, Pickup)

LOAD CONDITION

Light

Normal

Heavy

Normal occupancy with moderate cargo.

30 First-Time Setup

VEHICLE DIMENSIONS

Enter dimensions in metres. These calibrate distance thresholds.

Track Width (m)

1.56

Wheel Base (m)

2.67

Vehicle Height (m)

1.57

SEND TO ADAS BRAIN

SKIP THIS STEP

Step 5 – Sensitivity Selection

Select the preferred warning sensitivity.

Mode	Description
Near	Short warning distance
Normal	Recommended
Far	Early warning distance

31 First-Time Setup

FRONT SENSOR SENSITIVITY

Sets how close objects must be before front collision warnings trigger.

Near

Normal

Far

Normal - Balanced warning distance for everyday driving.

REAR SENSOR SENSITIVITY

Sets the detection range for the 4 rear blind-spot sensors.

Near

Normal

Far

Normal - Balanced warning distance for everyday driving.

SEND TO ADAS BRAIN

SKIP THIS STEP

32 First-Time Setup

Step 6 – Calibration

Complete:

- IMU Calibration
- Camera Alignment

Wait until calibration completes successfully.



33 First-Time Setup

Position the camera unit ⓘ Tips

WARN: LEFT DEPARTURE



34 First-Time Setup

Step 7 – Sound Settings

Configure buzzer tones and audio volume for different warnings. Test the audio using Test buttons.

BUZZER SOUND SETTINGS

Assign a unique pattern and volume level for each alert unit.

ⓘ Patterns auto-swap to stay unique.

↑ FRONT COLLISION

TEST

PATTERN

1. Urgent Triple Pulse

VOLUME

100%

↓ REAR BLINDSPOT

TEST

PATTERN

2. Wide Double Pulse

VOLUME

100%

Step 8 – Finish Setup

Save all settings. The Dashboard will automatically open after successful configuration.

Setup Checklist

- ✓ Account created
- ✓ Wi-Fi connected
- ✓ Vehicle information entered
- ✓ Sensitivity selected
- ✓ Calibration completed
- ✓ Dashboard ready

36 Dashboard & Features

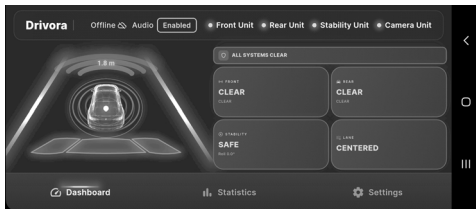
Dashboard Overview

The Dashboard is the primary interface displayed while driving. It provides real-time vehicle status, hazard alerts, and system information.

Dashboard Layout

Area	Description
Top Status Bar	System status and connection
Vehicle Display	Live vehicle visualization
Hazard Panel	Current warning message
Sensor Indicators	Individual sensor status
Bottom Navigation	Dashboard, Statistics, Settings

37 Dashboard & Features



Warning Types

Warning	Description
All Clear	No hazards detected
Front Collision Warning	Obstacle detected ahead
Rear Blind Spot Warning	Object detected behind vehicle
Lane Departure Warning	Vehicle leaving lane
Vehicle Instability	Excessive roll or pitch detected

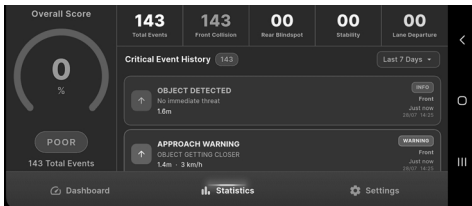
38 Dashboard & Features

Statistics Page

The Statistics page summarizes recent driving events.

Displays include:

- Driver Score
- Warning Counts
- Recent Events
- Driving History



39 Dashboard & Features

Audio Alerts

Each warning is accompanied by a distinct buzzer pattern. Assign these patterns as you prefer in the Settings page.

Status Indicators

The Dashboard continuously monitors communication between all hardware modules.

Colour	Status
Green	Connected
Yellow	Delayed communication
Red	Offline

If a module becomes unavailable, the Dashboard displays the corresponding warning and continues monitoring the remaining modules.

40 Settings & Calibration

Settings Overview

The Settings page is used to customize vehicle parameters, warning behavior, sound output, and connection options. Changes made here affect how Drivora responds to driving conditions.

Vehicle Profile Settings

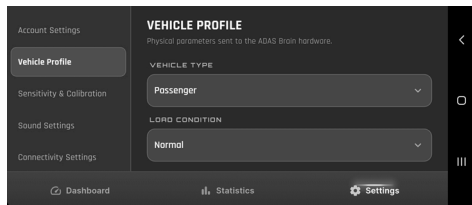
Use the Vehicle Profile section to update vehicle-specific values.

Setting	Description
Vehicle Type	Selects the body style or category
Load Condition	Selects the usual load condition

41 Settings & Calibration

Track Width	Used for motion and stability calculations
Wheelbase	Used for vehicle geometry processing
Vehicle Height	Used for vehicle profile estimation
Load Condition	Light, Normal, or Heavy

⚠ NOTE: Re-run calibration after changing any vehicle geometry values.

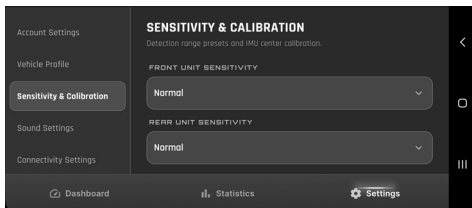


42 Settings & Calibration

Sensitivity Settings

Drivora provides three warning sensitivity levels.

Mode	Description
Near	Shorter warning range
Normal	Balanced default mode
Far	Earlier warning range



43 Settings & Calibration

Calibration

Calibration ensures the system is aligned correctly with the vehicle.

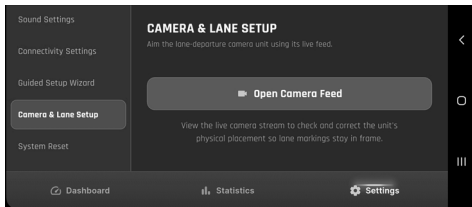
IMU Calibration

1. Park the vehicle on level ground.
2. Keep the vehicle stationary.
3. Start calibration from the app.
4. Wait until the process completes successfully.

Camera Alignment

1. Open the live camera view.
2. Adjust the camera angle if required.
3. Confirm that road markings are visible and centered.
4. Save alignment settings.

44 Settings & Calibration



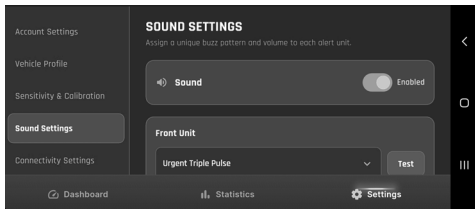
Sound Settings

The Sound Settings section controls audio feedback from the integrated buzzer.

Available options include:

- Enable or disable buzzer alerts
- Select warning tone patterns
- Adjust volume levels
- Test the selected sound before saving

45 Settings & Calibration



Connectivity Settings

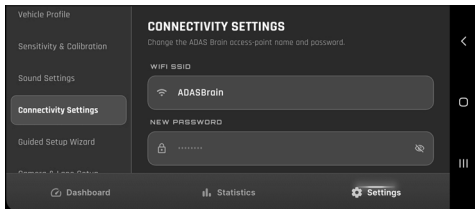
The Connectivity section allows the user to view or modify the Drivora Wi-Fi config.

Typical options:

- Change Wi-Fi SSID and password
- Reconnect mobile device after saving new credentials

⚠ CAUTION: After changing Wi-Fi credentials, reconnect the phone / tablet to the new network before reopening the app.

46 Settings & Calibration

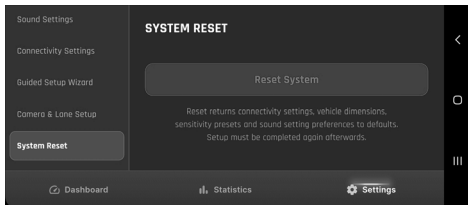


System Reset

Use the reset option only when the system must return to default settings.

⚠ WARNING: A reset may remove saved configuration values and require setup to be repeated.

47 Settings & Calibration



Maintenance Overview

Regular maintenance helps keep Drivora operating correctly and extends system life.

Routine Maintenance Checklist

Perform the following checks periodically:

- Clean camera lens
- Clean ultrasonic sensor surfaces
- Check cable condition
- Confirm mounting stability
- Verify power connection
- Check Wi-Fi communication
- Inspect the LED indicator
- Recalibrate after repositioning components

Cleaning Instructions

Use a soft dry cloth or lightly damp microfiber cloth.

Do not use:

- Harsh chemicals
- Abrasive materials
- Excess water
- Oil-based cleaners

⚠ CAUTION: Do not cover or paint over any sensor face.

Troubleshooting Guide

Problem	Possible Cause	Recommended Action
System does not power on	Loose power connection	Check wiring and vehicle power

50 Maintenance & Troubleshooting

LED remains red	Internal fault or connection issue	Restart the system and inspect cables
Mobile app cannot connect	Wi-Fi not active	Turn on Main Hub and reconnect
Front warning not shown	Camera or front sensor issue	Check mounting and connector
Rear warning not shown	Rear sensor not connected	Inspect rear sensor wiring
Stability warning incorrect	IMU not calibrated	Re-run IMU calibration
Dashboard data delayed	Weak network link	Reconnect to local Wi-Fi
Audio alerts silent	Buzzer disabled or volume low	Check Sound Settings

When to Recalibrate

Recalibrate the system after:

- Mounting changes
- Sensor replacement
- Camera repositioning
- Main Hub relocation
- Vehicle profile updates
- System reset

Service Reminder

If repeated faults occur after troubleshooting, stop using the system and inspect all hardware connections before continuing normal operation.

System Specifications

Item	Specification
Product Name	Drivora
System Type	Driver Assistance System
Communication	Local Wi-Fi
Application	Flutter Mobile App
Operating Voltage	12V DC
Audio Output	Integrated buzzer
Installation Type	Vehicle-mounted

Hardware Specifications

Component	Key Specification
Main Hub + Camera	Central processing and communication unit with forward road view detection
Front Sensor	Forward obstacle monitoring
Rear Sensors	Rear blind spot monitoring
IMU Module	Roll and pitch stability sensing

53 Technical Specifications

Environmental Conditions

Item	Recommended Range
Operating Temperature	-10°C to 60°C
Storage Temperature	-20°C to 70°C
Mounting Location	Inside vehicle cabin or specified external mounting point
Cleaning Method	Dry or slightly damp cloth only

Mobile App Requirements

Item	Requirement
Platform	Android
Screen Mode	Landscape recommended
Connection	Drivora local Wi-Fi
User Interface	Dashboard, Statistics, Settings

Warranty Information

Drivora is provided as a project prototype and demonstration system. Warranty coverage, if applicable, depends on the project or deployment terms provided by the development team.

Warranty Limitations

Warranty does not apply to damage caused by:

- Incorrect installation
- Improper wiring
- Physical impact
- Water exposure beyond intended use
- Unauthorized modification
- Misuse or neglect

Support

For installation help, configuration support, or hardware troubleshooting, contact the project team or the designated support channel provided with the product.

Email: e21050@eng.pdn.ac.lk

Project page:

<https://projects.ce.pdn.ac.lk/3yp/e21/Drivora>

Version: 1.0

Revision date: July 2026

Final Reminder: Drivora is designed to assist the driver, not replace the driver.

Always drive carefully, monitor surroundings directly, and follow road safety rules at all times.