



#635



In-car HMI UX Evaluations

In-Car HMI UX Evaluation & Benchmarking

MINI Electric Countryman

In this edition, our experts test the all-new Mini Electric Countryman. The circular OLED central display is particularly impressive, along with all the fun touches such as the 'key' switch to 'start' the car, Spike the British bulldog avatar and the contemporary design and micro-animations throughout the system. The most significant reason for the MINI's low score, however, is its extremely poor stability: 11 bugs, four of which are considered critical, including a full system crash.

Additionally, it suffers from serious intermittent lag throughout the duration of operation, ranging from minor frustration to complete inability to interact. This tarnishes the otherwise delightful approach, lessening the sensation of a luxurious product.

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COVERAGE



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Scoring

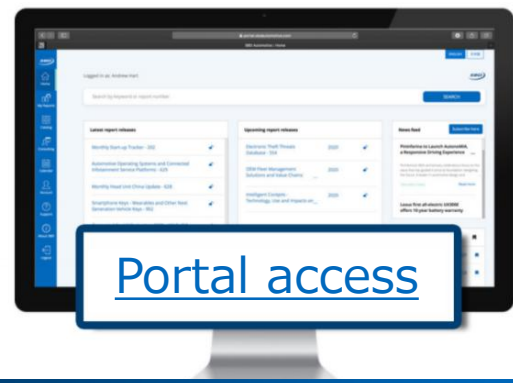
- > **Features and functionality:** evaluating whether the solutions provide features that customers expect, need and solve problems (or provide a wow factor).
- > **Reliability/stability:** evaluating the repeated usability and whether the users can have a similar (positive) experience each time.
- > **Usability:** evaluating whether the features available are easy to learn and use. This considers areas such as ergonomics, legibility, usability characteristics and how the system implements the various features.
- > **Perceived quality:** evaluating the potential perception in quality of the HMI components and how this contributes to the overall customer experience.

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In-Car HMI UX Evaluation & Benchmarking MINI Electric Countryman

635 - In-Car HMI UX Evaluation & Benchmarking – MINI Electric Countryman

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Introduction



Report Introduction

Welcome to the 2024 HMI benchmarking report series. This report has been created to provide a fair, unbiased and objective view of the latest in-vehicle HMI solutions in the US, European, and Chinese markets. Evaluations are carried out by SBD usability experts with a deep understanding of CASE domains such as the Connected Car and ADAS & autonomy domains.

SBD supports clients throughout the development of new HMI and products from a relatively simple companion app to a more complex multi-domain infotainment solution. The methodologies used in these reports take into account many years of experience with consumer testing and custom client projects to provide a fair and, as much as possible, objective methodology.

All viewpoints and analysis within the report are aimed defining areas of concern through a data driven approach. This report aims to benchmark and score solutions whilst also being able to provide actionable recommendations to design and development teams.

Please note that due to the ever-evolving automotive technology market, SBD updates it's methodology each year, but does not update scores from the previous years. Therefore, please assume a slight drop in scores for both user experience (UX) and functionality from the previous year.



Intuitive



Supportive



Flexibility



Consistency



Brevity



Depth



Presentation

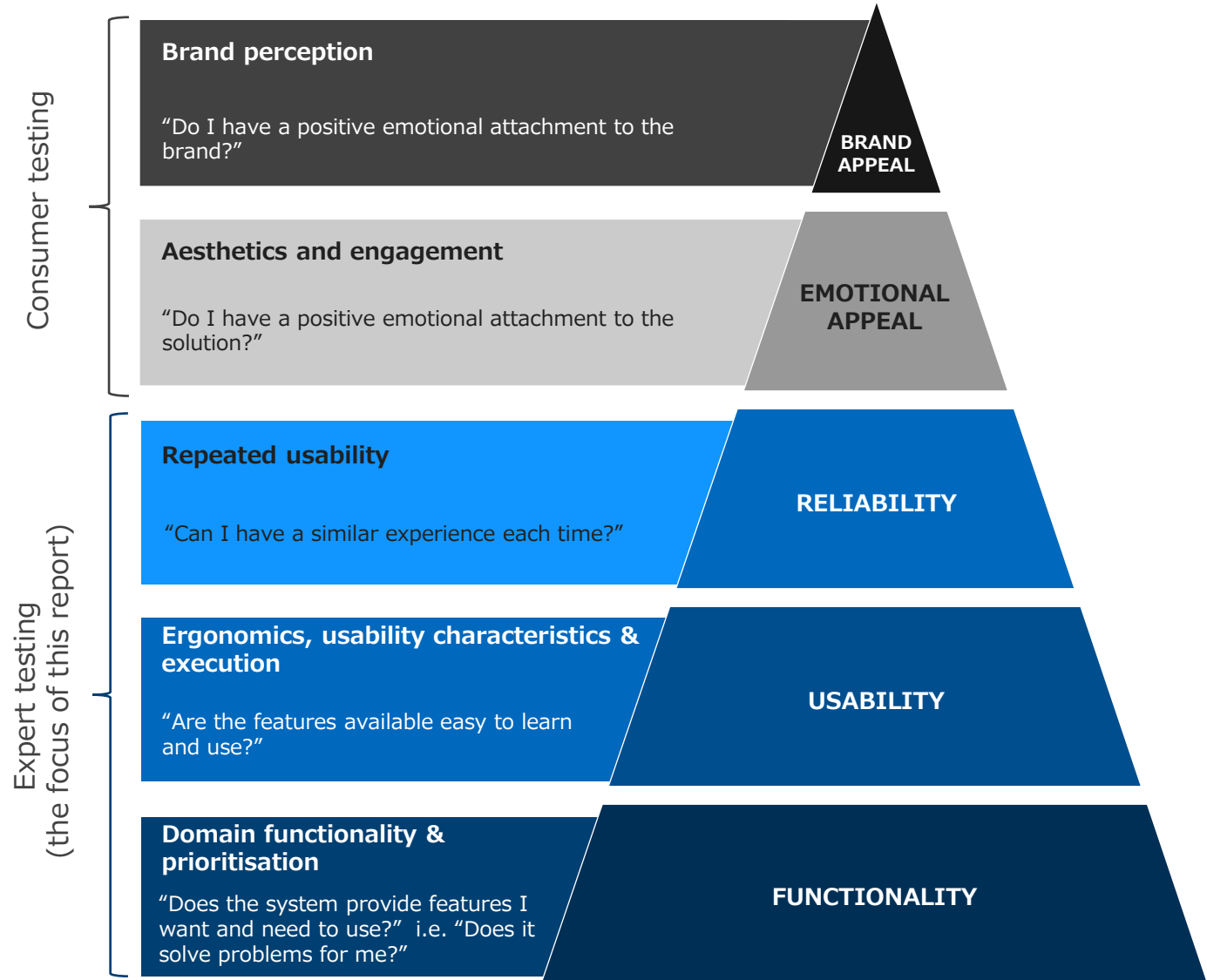
Section	Content
Birds Eye View	An overview of the key findings from SBD's various CX related and adjacent reports.
Executive Summary	Presents key highlights and conclusions from the report.
The Basics	What do you need to know about SBD's CX evaluation methodology?
Analysis	Analysis of report findings by SBD experts.
Features and functionality	Overview of key features and functionality by domain.
Execution	Assess success of implementation and overall execution of various system elements.
Perceived quality	Scoring and analysis of interior perceived quality levels.
ADAS domain	Highlight and analysis of key positive and negative points within the ADAS domain.
Infotainment domain	Highlight and analysis of key positive and negative points within the infotainment domain.
Navigation domain	Highlight and analysis of key positive and negative points within the navigation domain.
Voice recognition domain	Summary and scoring of various aspects of the voice recognition system.
Convenience domain	Summary of various convenience focussed features.
Future Outlook	Seven UX principles are considered against drivers and barriers into the future of this reports test vehicle.
Next Steps	Can SBD help you with any unanswered questions?



Aim of this report

One of the core goals of these studies is to provide a true indication of what the final customer experience of each solution could be. To do this evaluations are focused on providing scoring and analysis in the following areas:

- **Features and functionality:** evaluating whether the solutions provide features that customers expect & need, and solve problems (or provide a wow factor)
- **Usability:** evaluating whether the features available are easy to learn and use. This considers areas such as ergonomics, legibility, usability characteristics and how the system implements the various features
- **Reliability/stability:** evaluating the repeated usability and whether the users can have a similar (positive) experience each time
- **Perceived quality:** evaluating the potential perception in quality of the HMI components and how this contributes to the overall customer experience



SBD's view on the hierarchy of needs for CX benchmarking



Scope of report: focus on in-car HMI evaluations

The scope of evaluations in this report are constrained to the in-car HMI experience, in both static and dynamic conditions. One notable element is driver distraction which SBD covers at only a high level in this study as carrying out a full driver distraction evaluation requires biometrics test equipment to ensure the collected data is unbiased and objective.



A full evaluation of the end-to-end customer experience is not within scope of this report, but it is something which SBD has many years experience in from both a consumer and expert perspective. Other areas such as the companion app, online portal and in-home smart devices are not in scope as they are defined as “out of car” experiences.

Within the vehicle, any HMI element the user interacts with is evaluated including steering wheel controls, touch screen displays, voice control, HUDs and digital keys. The features and services on offer have been broadly grouped into the following domains (or test areas):

- ADAS domain
- Infotainment domain
- Navigation domain
- Voice recognition domain
- Convenience domain





2024 vehicle list

The MINI Countryman is the last car evaluated in 2024. SBD chose nine cars to evaluate in 2024, based on two selection categories. New/interesting UX focuses on systems with to never-seen-before features or functionality, or the implementation of a solution that has previously been a challenge or pain-point for end-users. New mass-market UX includes vehicles in segments that are sold in high numbers and are entering a new generation of UI for that vehicle.

Group A

Cars tested & Report published



BMW X1

- First BMW to be released with iDrive9
- Android based system
- US market test



Mercedes-Benz E-Class

- All-new MBUX Superscreen
- Unique features, apps and games
- German market test



Lincoln Nautilus

- BlueCruise hands free
- Digital Experience
- All-new infotainment system
- US market test



Hyundai KONA Electric

- 12.3-inch cluster and central display
- New Bluelink+ services
- US market test



MINI Electric Countryman

- MINI Operating System 9
- MINI Navigation AR
- Circular OLED display
- UK market test

Group B

Cars tested & Report published



Xiaomi SU7

- Xiaomi's first vehicle offering
- New vehicle from CE company
- Xiaomi Pilot MAX
- Chinese market test



Acura ZDX

- Google Built-in
- AcuraWatch 360+ with hands free cruise
- US market test



AVATR 12

- Harmony 4.0 OS
- Huawei ADS 2.0 (ADAS)
- Innovative displays
- Chinese market test



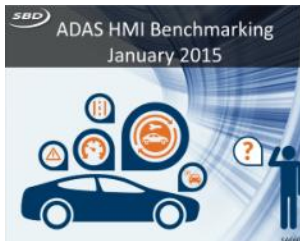
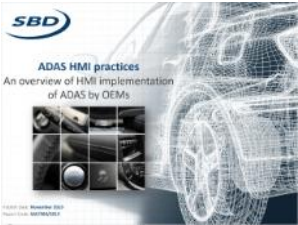
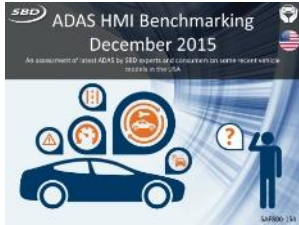
Audi Q6 e-tron

- All-new "Digital Stage" infotainment system
- AR HUD integration
- UK market test



SBD experience through years of testing in-car solutions

Over the last ten years SBD has evaluated over 100 solutions from a Connected Car or ADAS perspective for our public report series (many more for private client evaluations). This current report series is an evolution of both test methodologies to provide a holistic view of in-car HMI. Furthermore, custom evaluations methodologies used across the globe for SBD clients have been included where applicable to enhance to overall approach.





One page methodology overview

One of SBD's core goals of this report is to be as objective, fair and as transparent as possible. To achieve this, various methodologies are used throughout the testing to evaluate different areas of the solution in various conditions.

These methodologies are a mix of different types of tests:

- **Objective tests:** where the value provided is not influenced by a tester's viewpoint e.g. response time
- **Subjective tests:** the test score is based on the expert testers' viewpoints e.g. task ease of use
- **Task-based:** evaluations carried out based on a predefined task list e.g. navigate to a pizza restaurant near location X
- **Freeform:** random free testing by the tester with no clear pre-defined task list. This allows the testers flexibility to dig deeper into various parts of a solution when needed
- **Scoring range:** ranges and definitions of how to score a test element e.g. poor depth and accuracy score = the results provided are not in line with what is reasonably expected by the user
- **Static:** tests are carried out when the vehicle is not moving
- **Dynamic:** tests are carried out when the vehicle is moving in various road conditions and locations e.g. motorways/highways, cities, villages, country roads etc.
- **Misuse/failures:** carried out to evaluate the stability of the solution in unusual conditions e.g. repeatedly pressing the voice command button

This document does not provide a detailed description of the methodology and this page serves to provide an overview of the approach.

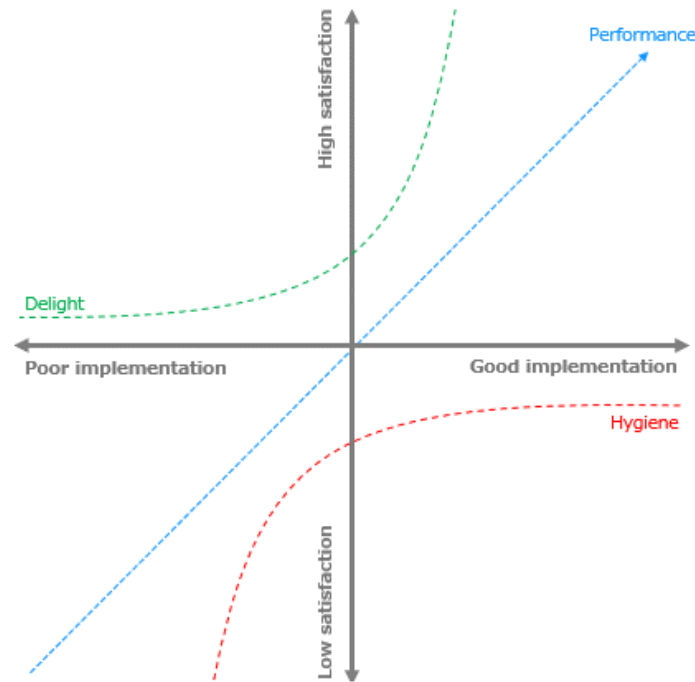
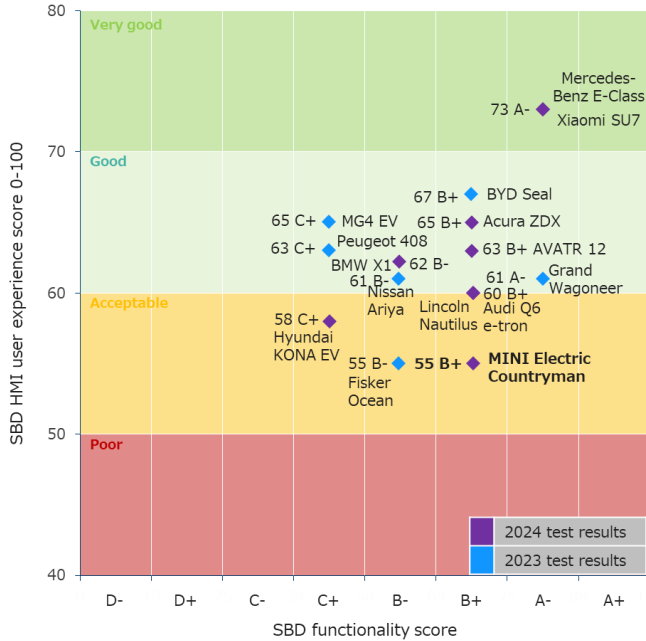
For a detailed discussion and presentation of SBD's methodology please [contact us](#).

Test area	Type of tests							
	Objective	Subjective	Task based	Freeform	Scoring range	Static	Dynamic	Misuse/failures
First impressions		✓		✓		✓	✓	
Static tasks	✓	✓	✓		✓	✓		
Dynamic tasks	✓	✓	✓		✓		✓	
Random free	✓	✓		✓		✓	✓	✓
Navigation specific tests	✓	✓	✓		✓		✓	✓
Voice recognition	✓	✓	✓	✓	✓	✓	✓	✓
Performance & response	✓		✓			✓	✓	✓
System Usability Scale (SUS)		✓			✓			
Final SBD UX score	✓	✓			✓			
ADAS	✓	✓	✓		✓	✓	✓	
UX heuristics	✓		✓			✓	✓	
Execution		✓			✓			
Ergonomics	✓	✓	✓			✓	✓	
Legibility & readability	✓		✓			✓	✓	
Perceived Quality (PQ)	✓	✓	✓	✓	✓	✓	✓	

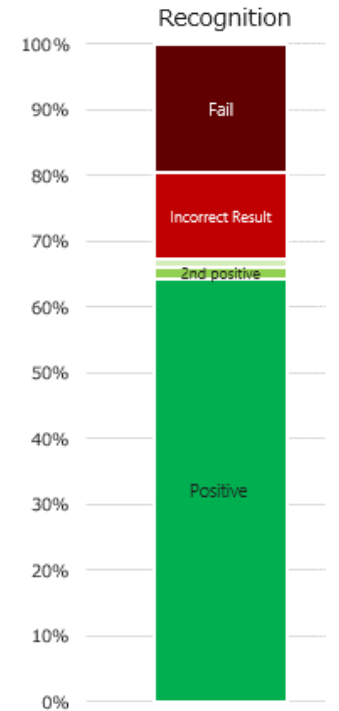


Report structure and how to interpret certain data sets

Throughout the testing and evaluation process SBD uses multiple methodologies to align to the situation and test area. Outputs from these evaluations can be broadly grouped into the following three types of report outputs - SBD's goal with these options is to ensure understanding of the results are as clear and fair as possible.



UX heuristic	Score
Cockpit clutter	Good
GUI clutter	OK
Display quality/size	Good
Map aesthetics	Very good
Map layout	OK
Navigation routing	OK
Instrument cluster	Good
General system HMI	OK



UX & functionality score

Final usability scored based on a 100-point scale with solutions scoring less than 40 defined as “not fit for purpose” with major user complaints expected and score above 80 defined as “exceptional”.

Functionality score based on eight core feature set areas: delight features, performance features, hygiene features, navigation feature, ADAS, IoT integration, music, entertainment and info features.

Modified Kano feature analysis

Features plotted against three lines based on their implementation and satisfaction levels:

- **Delight** features: “wow” features likely to provide high satisfaction even with poor implementation
- **Performance** features: as the level of implementation increases so does the customer satisfaction
- **Hygiene** features: poor implementation provides low satisfaction, but good implementation may not provide positive satisfaction as it can be considered as expected functionality

Subjective & objective scores

Scoring across multiple areas through subjective scoring with pre-defined ranges, definitions, and comparison to past results.

Objective scoring generally based on a pass/fail criteria or time-based considerations. SBD attempts to minimize subjectivity as much as possible with results aimed at being fair and reasonable with a minimal level of bias.



Example slides from the report

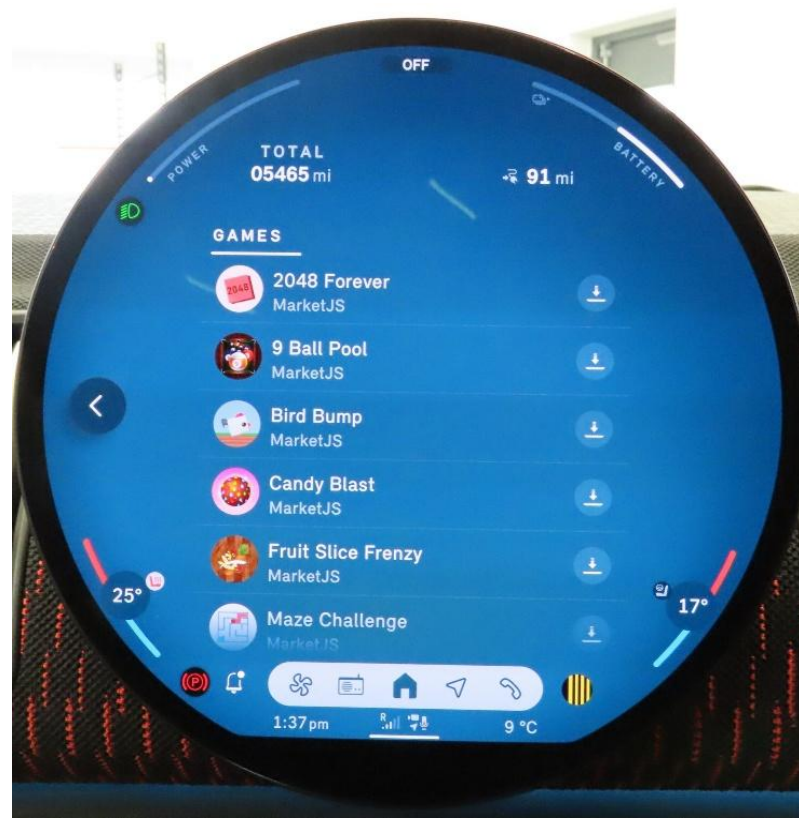
This block contains an example slide from the report. The top portion of the slide features a photograph of a car's interior dashboard, showing a digital instrument cluster and a steering wheel. Below the image is a dark blue footer area containing the SBD logo on the left, and the text 'December 2024', '625-24(24)', 'In-Car HMI UX Evaluation & Benchmarking', and 'MINI Electric Countryman' on the right. At the bottom of the slide is a prominent blue button with the text 'Request price' and a white chevron symbol pointing to the right.

Engaging branding supported by many effective implementations



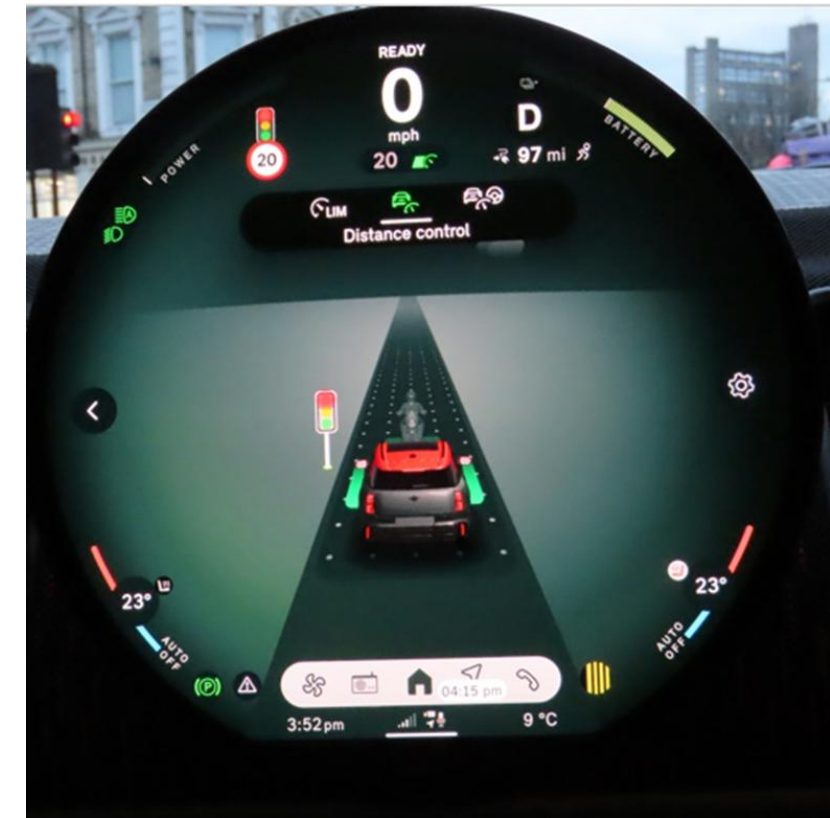
Strong brand identity

Branding of the entire car is unmistakably MINI and is an extremely strong selling point due to its premium-esque feel that harks back to the original MINI in numerous areas. Hardware and software have a consistent theme to them that is British, playful and completely contemporary. The high level of attention to detail throughout makes the car a pleasant place to be, with plenty of fun, surprises and successful implementations that are expected to win customers' hearts and solidify brand loyalty.



Impressive media offering

MINI provides an impressive app store, offering multiple apps including many games and music streaming apps. An additional benefit is that games can be played either using the touchscreen or smartphone as controller using AirConsole. Music apps include Amazon Music and Spotify. Offering this level of native apps is a plus point for the native system, however the fact they run in a letterbox within the larger screen is somewhat disappointing.



Effective and feature-rich ADAS

The ADAS is effectively implemented with a simple and intuitive interface that focuses on what's important without overwhelming the user with unnecessary visual or auditory information. Additionally, a strong functionality set includes traffic light recognition: the car can sometimes stop autonomously at traffic lights, then give an alert to the user to start when the light turns green. Additionally, the system will recommend an active lane change in some cases.



System unresponsive and reboot

1. System stability

On some occasions, especially when switching between Expression modes or when downloading data in the background (e.g., when loading a user profile), the system became very laggy and unresponsive. In one instance, no menus or pictures loaded at all, the system was completely unresponsiveness and unusable. After a few minutes in this state, the system rebooted on its own, even showing the BMW logo instead of the MINI logo. A more detailed explanation of the various stability issues can be found [here](#).

Frequency	Low	Medium	High
Severity	Minor	Major	Critical





Key positive and negative points – FAPA

System usage:

- Does not detect parallel or perpendicular parking accurately.
- Within the parking view on the camera screen the user is not able to see the selected parking spot before starting FAPA.

Negative

System turn ON:

- Parking Assistant is not triggered by speed.

Major

System usage:

- Reverse Assistant feature as part of FAPA is convenient and is an effective feature for niche use cases.

Positive

System turn ON:

- The search for a parking spot is activated when pressing the Parking Assist button on the center panel, via dedicated app or when changing to reverse.

System usage:

- The driver can adapt the speed during the parking maneuver in order to feel comfortable with the brake without cancelling the FAPA.
- Trajectory lines provided.
- Space type is clearly shown.
- 'Park-out' feature offered when possible.
- Clear labelling and icons at every step.

Minor

System cancellation/turn OFF:

- Via hard braking or steering the user can cancel the procedure. It is very easy to restart it from there. The parking process can be cancelled at any time.

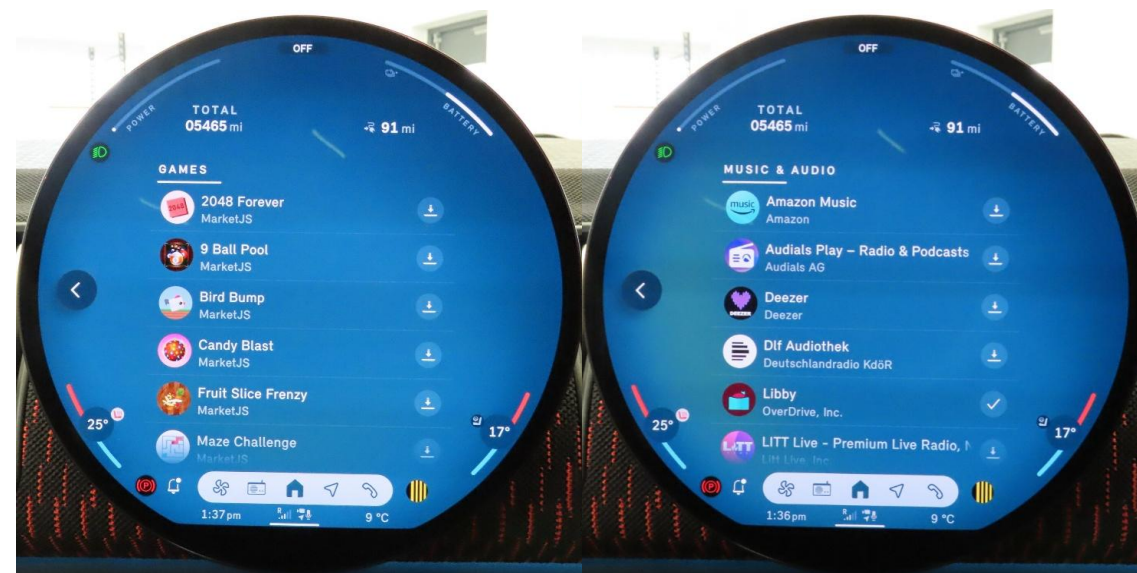
Good level of entertainment offered

SBD
viewpoint

MINI in-vehicle app store offers a range of entertainment apps, including games, music, and video streaming apps.

- Games can be played either using touch input or smartphone(s) as the controller.
- 16 music/audio apps are available to download from the app store including Amazon Music and Spotify.
- Popular video streaming apps like Netflix, YouTube and Amazon Prime are not available in the app list. Only a few video streaming apps are listed, some of which are German.

Although having this many entertainment apps available in the store is a strong point for MINI, it seems that regional considerations for the available apps needs improvement. Since the test vehicle was from the UK, more English apps, especially in the video streaming section, would have been better.



Some of the games (left) and audio apps (right) available in the in-vehicle app store



Well implemented Multi-Stop-Route-Guidance

MINI has implemented a sophisticated Multi-Stop-Route-Guidance system that automatically detects if the vehicle can't reach the destination within its current range and adds charging stops along the route automatically.

- A positive aspect is that route calculation is reasonably fast, and users can choose between different route options. Regardless of which option the user selects, the charging stations appear immediately. European OEMs (including historically BMW) often calculate charging stops in a separate step, which can be frustrating. MINI's approach is more streamlined and simpler.
- Additionally, users can set limits to ensure they reach charging stations with a certain buffer or arrive at the final destination with a desired charge level.
- When calculating a route that is out of range, it is clearly visible via a range map. This visual support is helpful but could be improved by implementing a dynamic range map that also considers topography, weather, and other factors (usually indicated by a jagged range map).
- Another positive feature is that the availability of free charging spots is indicated, as well as the SoC upon arrival, when leaving, and the predicted time to charge. This information helps to plan stops better.
- It's also very easy to send a planned destination to the vehicle via the app.

Even though MINI can improve their Multi-Stop-Route-Guidance in some areas, the current integration is already sophisticated, well-integrated, and offers a decent amount of functionality.

SBD
viewpoint

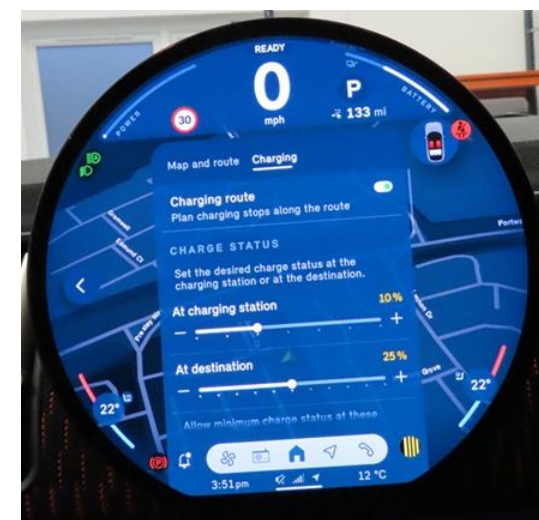
UX impact

Major negative

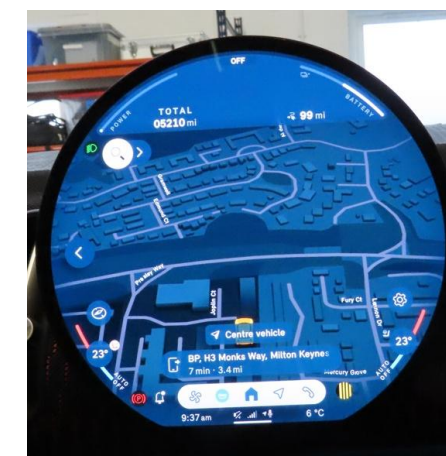
Minor negative

Minor positive

Major positive



Charging stops are added automatically when the destination can't be reached within the current range



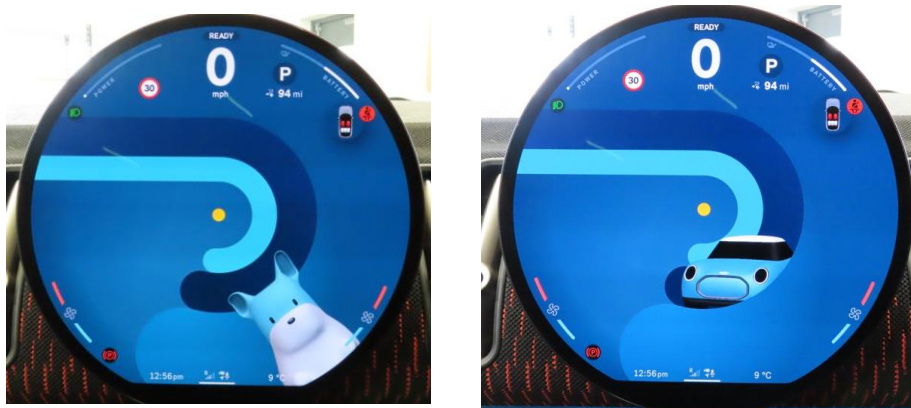
A destination can be easily sent to the vehicle, and the user can see the most relevant information, such as charging time and SoC at arrival, on the overview screen



SBD recognition score: D+

Recognition results are based on the rate of utterance recognition of the solution. Currently the solution is scored as "D+" overall for performance.

- At 30% overall positive recognition score, the system is rated as "D+" for recognition. With unsupported use cases removed from the recognition stack, the rate of accuracy increases to 90%, which is a significant improvement in the recognition rate.
- When looking at all possible SBD use cases, most recognition failures occur within inferred meaning, with all positional awareness use cases failing.
 - More than 20 percent of the tested use cases showed an incorrect result, which was often due to a lack of full understanding. For example, when asking for a route avoiding motorways, the system showed motorway services instead, or when asking for an Italian restaurant, it searched for tiny restaurants.
 - Around 30% of supported use cases asked for confirmation and a second step, which was often unnecessary.
 - When showing results on the map, additional information such as distance to the location or position on the map was missing.
 - MINI supports two avatars: "Spike", a British bulldog and a MINI vehicle.





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