



# AAA CENTER FOR DRIVING SAFETY & TECHNOLOGY



2017 AUDI Q7 PREMIUM PLUS

## INFOTAINMENT SYSTEM\* DEMAND RATING

Very High Demand



The Audi Q7 Premium Plus' MMI® infotainment system\* version 443 created very high demand on drivers in the study. Of note, the navigation system allows drivers to search for nearby destinations and input addresses while the car is in motion, creating very high levels of demand.

Standard and Optional Features in the 2017 Audi Q7

	Premium	Premium Plus	Prestige
○ Optional			
● Standard			
Android Auto		●	●
Apple CarPlay		●	●
Mobile App Support		●	●
Text Messaging	●	●	●
Navigation		●	●
Touch Screen			
Gesture Control			
Heads-Up Display			
Voice Commands	●	●	●
Console Control	●	●	●

### STRENGTHS

- Drivers are able to keep their eyes on the road when using the voice system to place calls, adjust audio, and program navigation.

### ABOUT THE STUDY

Researchers evaluated 30 new 2017 vehicles' infotainment systems\* to measure overall demand\*\* placed on a driver when using voice command, touch screen and other interactive technologies to make a call, send a text message, tune the radio or program navigation, all while driving down the road.

### WEAKNESSES

- No phone calling functions are locked out while the vehicle is in motion.
- The center console control is error-prone and difficult to use.
- Accessing any aspect of the Q7's infotainment system using the center console generates very high levels of mental demand for long periods of time.
- Organization of the menus is confusing and difficult to learn.

\* Infotainment System: Vehicle system that combines entertainment and information content

\*\*Overall demand measured: visual (eyes-off road), cognitive (mental), and time-on-task

# VEHICLE OVERVIEW: CONTROLS AND DISPLAYS



VOICE COMMANDS



STEERING WHEEL COMMANDS



INSTRUMENT CLUSTER



CENTER STACK



CENTER CONSOLE

# INFOTAINMENT SYSTEM

The MMI® In-Vehicle Infotainment System offers the following features:

## CALLING AND DIALING



Drivers can pair a phone with the Q7's MMI® infotainment system using the center console controller to access menus presented on the center stack display. The Q7's system will automatically prompt the user to pair a new phone if a previously-paired phone is not detected. The Q7 allows drivers to pair a new device while driving. Once the pairing is completed, drivers can place calls and dial phone numbers using the center console or voice commands. Steering wheel buttons can be used to answer incoming calls and end calls. No phone functions are locked out while the vehicle is in motion.

Using the Q7's calling system placed very high overall demand on drivers in our study. It took drivers an excessive amount of time to place calls using either the center console or voice command system, though using voice commands did allow drivers to keep their eyes on the road. The center display shows available commands, which match the system-specific phone menu options available through the center stack display.

The phone menu is overly complex and difficult to navigate using the center console controller. Drivers were confused by the variety of methods provided to search for contacts and dial phone numbers including: the on-screen alphabet search ribbon for spelling out names, the center console touch pad for drawing out numbers and letters, and the center console rotary wheel to scroll through the contacts list or number ribbon. Researchers<sup>^</sup> noted the touch pad was particularly difficult to use as the system can only process one letter or number at a time, slowing down the process, especially with its low accuracy. Using the center console controller requires long durations of very high levels of cognitive (mental) and visual (eyes-off-road) demand to place calls.

## TEXT MESSAGING



Drivers can send new messages by selecting from 10 predefined phrases using the center stack display and console control. The voice system can only be used to have message contents read aloud. Replying to a message in the inbox and customizing the predefined messages can be done only while the vehicle is in park. If the user attempts to load a message on the display while driving, a lengthy message appears, explaining that viewing text messages while the vehicle is in motion is unsafe. Researchers<sup>^</sup> noted the occasional glitch where the body of the message could actually be viewed while driving.

Overall, accessing text messages using the center stack screen controlled by the center console was very highly demanding and took far too long. Similar to the menus for other functions in the Q7's system, the text messaging menu structure is dense with text and offers unconventional ways of accessing hidden submenus and options. Furthermore, the touch pad, which is used to draw out letters of a contact's name or a number to dial, frequently misinterprets user input, leading to a high error rate. Researchers<sup>^</sup> remarked positively on the lockout function that hides message contents while driving, but they suggest blocking out the text messaging feature entirely due to the very high cognitive (mental) and visual (eyes-off-road) demand levels.

Drivers experienced high levels of cognitive (mental) and visual (eyes-off-road) demand for an extended length of time when using voice commands to have messages read aloud. Available texting voice commands are not displayed on the center stack display unless a text has already been selected using the center console. Oddly, navigation commands appear on the screen when the voice system is activated when in the telephone menu.

<sup>^</sup>Researchers with expertise about how humans interact with technology evaluated the usability of the infotainment system in stationary vehicles.

## AUDIO ENTERTAINMENT



The Q7's audio entertainment system offers: AM, FM and XM radio; auxiliary, USB and Bluetooth input; WiFi; CD; Apple CarPlay; and Android Auto. The CD drive can also play DVDs on the center stack display while the vehicle is parked. Audio entertainment is accessible through the voice commands, center console control, center stack and steering wheel instrument cluster.

Learning how to navigate through and access all of the different audio options available can be very difficult, as demonstrated by the very high cognitive (mental) demand seen in the on-road data. Indeed, even performing the simplest of tasks, such as tuning the radio, led to very high visual (eyes-off-road) demand for significant periods of time. Despite the several audio shortcuts offered to speed up interactions, such as the list of favorite stations and the radio and media quick access buttons, drivers were unable to efficiently make audio selections. Furthermore, the rotary wheel and touch pad buttons perform different functions within different menus, an inconsistency that makes learning how to use the system difficult.

Drivers were able to use the voice system to make audio selections while keeping their eyes on the road. However, the process was associated with high cognitive (mental) demand. The voice command system accepts a range of conversational commands in different formats, yet the processing time and accuracy of user input are highly variable when commands given are not those suggested on the display. Researchers<sup>^</sup> noted the system frequently attempted to interpret audio commands as destination addresses for navigation.

## TURN-BY-TURN NAVIGATION



Drivers can access the Q7's turn-by-turn navigation system via voice commands, steering wheel controls, or the center console controls. Users can search for nearby destinations and input addresses without any in-motion restrictions.

Consistent with the Q7's other infotainment menus, the navigation system produced very high demand among the drivers in our study. Searching through the extensive point of interest categories and writing out an address using the touch pad are time-consuming. This task led to very high cognitive (mental) demand and high visual (eyes-off-road) demand. Researchers<sup>^</sup> recommend navigation programming be blocked out while driving. The system organizes nearby points of interest into 50 frequently used categories, such as gas stations and grocery stores. This excessive number of categories creates an overly complex and multi-step search process, increasing the time it takes to find the desired destination. Furthermore, when a driver writes out addresses or searches for a nearby point of interest, the system misinterprets similar looking letters and numbers, such as confusing "a" with "o."

Using the voice command system to search for and set destinations generated high cognitive (mental) demand and moderate visual (eyes-off-road) demand. Navigation prompts are listed on the center stack display. However, the system requires commands to be spoken in a highly specific format that may be difficult to remember. Furthermore, only select national businesses are searchable by name when using voice commands. A user must search through multiple menus and categories to search for local and smaller businesses, reducing the efficiency of voice commands for the navigation system.

<sup>^</sup> Researchers with expertise about how humans interact with technology evaluated the usability of the infotainment system in stationary vehicles.

## VEHICLE CONTROLS AND DISPLAYS

### VOICE COMMANDS



The Audi Q7 includes a voice system that allows drivers to access phone functions, text messaging, audio entertainment and turn-by-turn navigation via voice commands. The voice system is activated using a button on the steering wheel and plays back a female voice. When active, suggested voice commands relevant to the current menu are displayed on the center stack display.

### INSTRUMENT CLUSTER



The cluster display, located behind the steering wheel, features a 7-inch LCD full-color display between two physical gauges. Drivers can access vehicle status information, audio entertainment, phone functions and navigation on the display using steering wheel buttons.

### STEERING WHEEL CONTROLS



The steering wheel contains 14 buttons and two dials that give access to the cluster display, turn-by-turn navigation and the voice command system.

### CENTER CONSOLE AND CENTER STACK



The center console controls the center stack display, an 8.3-inch full-color LCD display set high up on the dashboard that gives access to the MMI® infotainment system's core functions: audio entertainment, phone, navigation, system applications, and settings. The display is not touch-sensitive. Twelve buttons and three dials below give access to climate control.



The Q7 has a unique console design, with a multifunction rotary wheel used in conjunction with a touch pad and two switches next to the gear shift. The wheel can be rotated; moved up, down, left, and right; and pressed to move between different menus on the center display and make selections. The touch pad can be used to draw letters or make selections and contains 13 touch- and pressure-sensitive buttons.

## VEHICLE SALES SUMMARY

The 2017 Audi Q7 is the 131st best-selling vehicle in the United States, with 30,563 vehicles sold during 2016<sup>1</sup>.

<sup>1</sup> Source: Automotive News at [autonews.com](http://autonews.com); Wall Street Journal at [wsj.com](http://wsj.com) – data updated to 2/25/2017.