



AAA CENTER FOR DRIVING SAFETY & TECHNOLOGY



2017 TOYOTA RAV4 XLE



INFOTAINMENT SYSTEM* DEMAND RATING

High Demand



The 2017 Toyota RAV4 XLE Entune™ infotainment system generated overall high demand in the study. While the RAV4's center stack allowed drivers to quickly place calls to favorite contacts and make audio selections, the system was hindered by often slow processing times.

Standard and Optional Features in the 2017 Toyota RAV4

	LE	XLE	SE	Limited	Platinum
○ Optional					
● Standard					
Android Auto					
Apple CarPlay					
Mobile App Support		○	○	●	●
Text Messaging	●	●	●	●	●
Navigation			○	●	●
Touch Screen	●	●	●	●	●
Gesture Control					
Heads-Up Display					
Voice Commands	●	●	●	●	●
Console Control					●

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.

Additional trim levels are available.

STRENGTHS

- The voice command system accepts conversational commands.
- The center stack is a convenient and efficient way to place calls.

WEAKNESSES

- The screen size is inadequate for the layout of menus. Buttons are small and difficult to press.
- Sending text messages via voice commands is overly time-consuming and mentally taxing.
- Using voice commands to make audio selections is time-consuming and highly demanding, while using the center stack takes less time but is even more cognitively (mentally) and visually (eyes-off-road) demanding.

* 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

INFOTAINMENT SYSTEM

The Toyota Entune™ In-Vehicle Infotainment System offers the following features:

CALLING AND DIALING



The Toyota RAV4 Entune™ system offers calling and dialing functions accessible via the center stack and voice recognition, with limited access via steering wheel buttons. After initiating the Bluetooth pairing process on the touch screen while the vehicle is stopped, users can follow the on-screen instructions to easily complete the pairing. The touch screen can only be used to place calls to favorite contacts, as the phonebook and dial pad are inaccessible while the vehicle is in motion.

The phone system generates an overall moderate level of demand. Drivers are only allowed to access favorite contacts, leading to short interaction times with the center stack. Despite this shortcut, drivers are briefly subjected to very high levels of visual (eyes-off-road) demand. While the system is quick to use, it required full visual attention in order to make a selection, perhaps due to its small screen size and text-dense menu. Researchers[^] praised lockouts to the phonebook and dial pad, which helped to streamline the calling task while the vehicle is in motion.

The voice system accepted common commands, though the slow processing time of the system likely increased the time it took to complete a task and contributed to the high cognitive (mental) and visual (eyes-off-road) demand. However, should a user require additional help, examples are displayed on the touch screen.

TEXT MESSAGING



Text messaging functions are available via voice commands and the center stack, with few limitations while driving. Drivers can use the voice command system to send new messages to stored contacts or a new phone number. Messages in the inbox will automatically be read aloud when selected on the touch screen. Fifteen predefined reply messages, which can be customized while the vehicle is stopped, are available either via voice or touch screen. In-motion restrictions prevent the user from viewing a message on the touch screen, but the user can still scroll through the list of responses to choose a reply.

Overall, text messaging created high demand on drivers in the on-road study.

Using the center stack to send messages imposed high levels of cognitive (mental) demand and pulled drivers' eyes away from the road for 24 seconds[♦] on average. The steps to send a message are clear in the easily navigable messaging menu, but the layout of the buttons may make it difficult to search for desired options and difficult to accurately make selections.

The voice command system helped keep drivers' eyes on the road, even as task times climbed up to 40 seconds[♦] on average. Conversational commands can be used to start the messaging process, after which the system guides the user effectively through the remaining steps. Despite the visual on-screen prompts and voice guidance, the process proved to be highly cognitively (mentally) demanding.

[^] Researchers with expertise about how humans interact with technology evaluated the usability of the infotainment system in stationary vehicles.

[♦] Compared to a recommended maximum of 24 seconds.



The audio entertainment system includes: AM, FM and XM radio; CD; USB; Bluetooth; and auxiliary input. Audio is accessible via the center stack and voice command system, with a few limited options using steering wheel buttons. When an audio menu is not currently loaded, any audio-related changes are conveniently displayed in a temporary dropdown ribbon along the top of the screen.

Overall, tuning the radio and making audio selections were highly demanding on drivers in the on-road study. Specifically, using the center stack required very high cognitive (mental) and visual (eyes-off-road) demand, though for short periods of time. The structure of the audio menu is easy to navigate, but could be simplified with fewer graphics and icons on the small screen.

The voice system required high levels of visual (eyes-off-road) and cognitive (mental) demand for an average of 21 seconds[♦]. Available commands are flexible and easy to guess, though not as conversational as the phone commands. The slow processing time of the system may make the center stack more appealing to drivers when adjusting audio.

[♦] Compared to a recommended maximum of 24 seconds.

VEHICLE CONTROLS AND DISPLAYS

VOICE COMMANDS



The RAV4 includes a voice command system that gives access to phone functions, text messaging and audio entertainment. The voice system is activated using the designated voice command button located on the steering wheel. An automated female voice provides drivers with step-by-step guidance on how to use the voice system, such as offering suggested commands and indicating when to speak.

INSTRUMENT CLUSTER



The RAV4's instrument cluster, located behind the steering wheel, features a 4.2-inch LCD screen that gives access to a variety of vehicle menus, including vehicle settings and performance information, advanced driver-assistance system status and audio entertainment. Familiar gauges on either side of the screen inform the driver about vehicle status.

STEERING WHEEL CONTROLS



The steering wheel contains 16 buttons with eight buttons on the left controlling audio entertainment, the voice command system and some phone functions. The eight buttons on the right provide access to the instrument cluster display.

CENTER STACK



The center stack includes the 6.1-inch full-color touch screen and eight buttons. The home screen can be customized to offer shortcuts to different IVIS components, such as audio entertainment and favorite phone contacts. Below the screen are 12 buttons and two dials that offer access to climate control, with current climate displayed on a small monochromatic display.

VEHICLE SALES SUMMARY

The 2017 Toyota RAV4 is the eighth best-selling vehicle in the United States, with 352,154 vehicles sold during 2016¹.

¹Source: Automotive News at autonews.com; Wall Street Journal at wsj.com – data updated to 2/25/2017.