AAA CENTER FOR DRIVING SAFETY & TECHNOLOGY

2018 BMW 430I XDRIVE CONVERTIBLE

Standard and Optional Features in the 2018 BMW 4 Series

○ Optional ● Standard	430i Convertible	430i xDrive Convertible	440i Convertible	440i xDrive Convertible
Android Auto				
Apple CarPlay	○	○	○	○
Mobile App Support				
Text Messaging				
Navigation	○	○	○	○
Touch Screen				
Gesture Control				
Heads-Up Display	○	○	○	○
Voice Commands	●	●	●	●
Console Control	●	●	●	●

Additional trim levels available.

STRENGTHS

- The system quickly interprets voice commands when used for audio and calling and dialing features.

INFOTAINMENT SYSTEM* DEMAND RATING

Very High Demand

The 2018 BMW 430i xDrive infotainment system* placed very high demand on drivers in the study. While the voice system interpreted commands for audio entertainment and phone functions easily and quickly, the center stack rotary wheel imposed very high demand levels on drivers when used for navigation.

ABOUT THE STUDY

Researchers evaluated 40 new 2017/2018 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, program audio entertainment or program navigation, all while driving down the road.

WEAKNESSES

- Using the navigation system, whether by voice commands or the center console, placed very high overall demand on drivers and took on average 36 and 38 seconds◊, respectively, to complete the task.
- All calling and dialing features are available while the vehicle is in motion.
- The center console's rotary wheel placed high to very high demand on drivers visually (eyes-off-road) and cognitively (mentally) when used to adjust audio and program navigation.
- The unconventional menu design of the center stack display contained hidden submenus and options that were difficult to navigate.

* Infotainment System: Vehicle system that combines entertainment and information content.
** Overall demand measured: visual (eyes-off road), cognitive (mental) and time-on-task.
◊ Compared to a recommended maximum of 24 seconds.

VEHICLE OVERVIEW: CONTROLS AND DISPLAYS

VOICE COMMANDS

STEERING WHEEL COMMANDS

INSTRUMENT CLUSTER

CENTER STACK

CENTER CONSOLE

INFOTAINMENT SYSTEM

The BMW iDrive In-Vehicle Infotainment System offers the following features:

CALLING AND DIALING

The 2018 BMW 430i iDrive infotainment system* allows drivers to place phone calls and dial phone numbers using the voice command system or the center stack display in conjunction with the center console rotary wheel. When no phone is paired, the system prompts the user to do so using the center stack. Multiple Bluetooth devices can be paired and accessed while the vehicle is in motion. All calling and dialing features are available while the vehicle is in motion. However, limited phone functions are available through the phone button on the steering wheel.

Placing phone calls using the system subjected drivers to moderate levels of demand overall. Using the center stack rotary wheel took drivers an average of 23 seconds◊, during which users experienced very high levels of cognitive (mental) demand and high levels of visual (eyes-off-road) demand.

Researchers‡ noted the BMW utilized a uniquely layered submenu structure with uncommon categories, like “Businesses and Services” or “Places to Stop,” making the submenu navigation difficult. Additionally, drivers have full access to the contacts list, the search feature and the dial pad while the car is in motion. Researchers‡ found that dialing a phone number can be a difficult process as users must write out numbers on the draw pad and/or scroll through and select numbers on a rotary dial pad layout one at a time. The system is highly accurate and context-dependent when interpreting user input on the draw pad, interpreting letters when searching through the contact list and interpreting numbers when accessed through the dial pad function. However, it is extremely sensitive: any slight touches to the draw pad — even while scrolling — were interpreted as numbers or letters.

Drivers experienced moderate demand when placing phone calls to contacts and dialing numbers using the voice command system. The process averaged 21 seconds◊, likely due to the fast processing speed of commands and the single step it takes to place a call to a contact. On-screen prompts offering a list of suggested commands appeared on the center stack display, resulting in high cognitive and visual demand levels. The voice system was highly flexible and accepted a wide variety of commands, allowing drivers to use natural language. Users also had the convenient option of creating iDrive-specific nicknames for contacts (e.g. “sister” or “grandpa”). The center console rotary wheel could also be used to navigate content on the center stack display while a voice command session is active.

AUDIO ENTERTAINMENT

The BMW 430i audio entertainment system provides access to the following sources: FM, AM and XM radio; Bluetooth and USB connectivity; CD; and third-party applications when available on a user’s connected device. These sources can be accessed via voice commands, the center console controller and the instrument cluster display controlled by steering wheel buttons. All audio functions are available while driving.

Making audio selections imposed high demand overall on drivers, although using the voice command system proved to be easier for drivers than the center console rotary wheel. Making selections with the voice command system took an average of 17 seconds◊ and drivers could keep their visual attention on the forward roadway the entire duration of the task. While the audio-related commands accepted by the system were intuitive, flexible and short, researchers‡ noted the confirmation feedback from the system was often verbose. Although adjusting the music allowed users to focus their visual attention on the forward roadway, and interactions were fairly short, high cognitive demand was still required to interact with the voice command system.

* Infotainment System: Vehicle system that combines entertainment and information content.
◊ Compared to a recommended maximum of 24 seconds.
‡ Researchers with expertise about how humans interact with technology evaluated the usability of the infotainment system in stationary vehicles.

The very high cognitive and visual demand experienced by drivers when using the center console rotary wheel led to very high overall demand. Researchers‡ attribute this to menu structure design. The back button does not take the user back through each layer of the menu structure, but instead acts similarly to the back button on an internet browser, going backward through recently visited submenus. Moreover, when searching for media using either the draw pad on the center console rotary wheel or the alphabet wheel, matches are organized by category, rather than the conventional design, which lists suggestions by the best fit to search criteria from top to bottom. Lastly, when using the number wheel function on the rotary wheel controller to choose a station, the system acts inconsistently by either playing the selected frequency or setting it as a preset.

TURN-BY-TURN NAVIGATION SYSTEM

The BMW 430i iDrive includes a turn-by-turn navigation system accessible via the center console rotary wheel and voice commands. It allows drivers to search for points of interest and browse various destination categories shown on the center stack display while driving. Additionally, the draw pad on top of the rotary wheel allows drivers to write addresses, categories and specific destination names. After setting a destination, route guidance is shown on the center stack display and vocalized through the voice command system.

Setting navigation destinations using iDrive imposed very high overall demand on drivers. When using the voice command system, drivers engaged for a lengthy 39 seconds◊ on average to select a destination. Although they were able to keep their visual attention on the road while doing so, drivers were subjected to high levels of cognitive demand. Researchers‡ noted that the process could be completed in as little as two steps, and the system is capable of parsing long strings of commands into meaningful individual pieces. However, system confirmations and instructions were verbose and demanded the driver's attention. The system provided on-screen examples of available commands for additional assistance.

Using the center console rotary wheel to search for and set navigation guidance proved to be a very highly demanding task, both visually and cognitively. Drivers took an average of 36 seconds◊ to complete tasks using this interface as they attempted to sort through the numerous navigation options and menus. While researchers‡ found that categories are grouped intuitively, the complex menu structure and high number of categories made it difficult for drivers to find a target destination, end guidance or change guidance settings. Furthermore, the search parameters for "Online Search" and "Keyword Search" were overly broad, showing results for destinations all over the world rather than those nearby the vehicle's location. Lastly, the center console's navigation shortcut button is located out of sight behind the rotary wheel, negating its potential benefit.

VEHICLE CONTROLS AND DISPLAYS

VOICE COMMANDS

The 2018 BMW 430i comes equipped with a highly accurate and prompt voice command system that allows drivers to access phone calling, navigation, audio entertainment and system settings. After activating the voice command system via the dedicated button on the steering wheel, users can interrupt the system at any time by speaking a command. Upon activation, useful commands are listed on the center stack display. Users can ask for help within the menu of any function for examples of menu-specific commands.

◊ Compared to a recommended maximum of 24 seconds.
‡ Researchers with expertise about how humans interact with technology evaluated the usability of the infotainment system in stationary vehicles.

INSTRUMENT CLUSTER

The instrument cluster located behind the steering wheel contains a small black-and-white LCD screen between standard gauges, such as the speedometer and tachometer. The cluster display shows a range of vehicle state information and gives access to limited audio entertainment and phone functions.

STEERING WHEEL CONTROLS

The steering wheel contains 10 buttons that provide access to cruise control, the instrument cluster display, audio entertainment features, the voice command system and phone functions. The uncluttered layout includes large, responsive buttons grouped by function within easy reach.

CENTER STACK

The center stack is equipped with a 6.5-inch full-color LCD (non-touch) display positioned high on the dashboard and controlled by the center console controller (see below). Two dials, six buttons and eight touch-sensitive buttons below the display provide alternative methods to access menus. Three main menu tiles provide access to audio entertainment, phone functions, and navigation. Other features, such as BMW's Connected Drive app and vehicle settings, can be accessed by scrolling right to other menus. The menu layout is fully customizable to the user and can be adjusted when the vehicle is parked.

HVAC is controlled by 12 buttons located below the center stack display with current settings shown on a small LCD display.

CENTER CONSOLE

The center console controller lies between the passenger and driver seats. It is comprised of a small draw pad on top of a rotary wheel and surrounded by seven function shortcuts and menu navigation buttons. The controller can be rotated and pushed in different directions to navigate through the center stack display menus, or to make a selection, users can press down on the controller. The draw pad can be utilized to draw letters, numbers, and symbols one at a time to aid in search queries within specific menus.

VEHICLE SALES SUMMARY

The 2018 BMW 4 Series is the 110th bestselling vehicle in the United States, with 39,634 sold during 2017 YTD.[§]

[§] Source: *GoodCarBadCar* at goodcarbadcar.net — data updated to Dec. 6, 2017.