Considerations When Choosing an Automotive Microcontroller (MCU)

What peripherals are necessary?
Certain applications require complex peripherals found on higher-end microcontrollers. A complex peripheral might be an ADC with enhanced features, such as multiple channel 12-bit continuous conversions with automatic compare, external triggers and channel wrap. A consideration might be the use of "smart" peripherals (e.g., eTPU, eMIOS+CTU, XGATE, DMA), which allow more of the CPU bandwidth to be used for the application rather than be used up by repetitive tasks. For less complex applications (e.g., dimmer switch) a lower-end microcontroller with single channel 8-bit conversion ADC might be suitable.

How much RAM or nonvolatile memory is required?
Storing lots of data is critical for some applications, especially those that have automobile presets, such as seats, steering and radio. Simple switch applications, such as lighting, are not RAM or memory intensive. RAM becomes critical when several communication busses are required.

How much space is available on the board and what package type/size is needed?
Packages costs and board space costs are often key determinants when choosing an MCU and its package type/size. The level of complexity for most automotive applications is increasing, which elevates physical space as a top consideration when choosing an MCU.

Is performance or low power more important for my application?
Freescale offers a broad portfolio of automotive microcontrollers so that customers have many options when weighing decisions between performance and low power. Our goal is to provide you exactly what you are looking for so that you don't have to spend more than what is required for your application. Generally, you can find Freescale's highest performance microcontrollers in the Power Architecture® families. Devices designed for low power are within the S08, S12 and S12X families.

Some applications have higher requirements for processing, such as airbags and engine control. In these two examples, it is mission critical that an airbag deploy at a precise time and that all parts of an engine maintain synchronization. So, high bus speeds are required to allow quick or complex burst of data to flow without failure.

Other applications are non-mission critical and can operate with a greater tolerance for error, such as seating and mirrors. In these cases, a lower bus speed will probably be suitable and operating at low power will be the priority.

What is the minimum number of I/O required?
General purpose I/Os are valuable for handling simplistic functions, such as turning things on/off or getting readings from a signal. They give you flexibility to adapt to the needs of an application.

What software and tools are available?
Freescale understands that time is money, so we provide you with a wide selection of software and tools to make the development process as short as possible. Development tools, connection interfaces and targets, and run-time software are all available through Freescale and its third-party partners. For more information, please refer to our Getting Started with Freescale Software and Tools for Automotive Microcontrollers brochure.

Will my application require scalability in the future?
Freescale understands scalability is key concern, which is why all of our micro families are designed with scalability in mind—package size, memory sizes, peripheral mix.
Once you establish your priorities, it is recommended that you consult with your local Freescale sales engineer to find the microcontroller that best meets your requirements.