Software engineers write code and design software, but a robotics software engineer has a more specific role. Robotics software engineers write and design software for robotics systems, which can require years of training and specialized skills. Understanding those skills and the training and education you need can help you plan your career path as a robotics software engineer.

What is a robotics software engineer?

A robotics software engineer is a specialized software engineer who works directly with robotics systems. Robotics systems can include manufacturing tools or machines, medical equipment, military equipment or vehicle robotics systems. The engineer helps design and write the code for the system that tells the hardware how to operate given specific inputs. For example, an engineer might write software for a vehicle robotics system that automatically corrects the vehicle if it drifts into another lane. The engineer tells the robotics system how to respond to the input of the car veering and ensures a proper response.

Robotics software engineers have many duties, including:

1. Writing and editing code
2. Testing software and hardware compatibility
3. Creating project maps, mock-ups and progress reports
4. Coordinating with other engineers and designers
5. Writing software manuals

Skills for robotics software engineers

Robotics software engineers typically have a strong set of core skills to help them in their role. These skills can include:

Programming skills: Robotics software engineers have strong programming skills and understand one or more programming languages. Robotics systems often require complex programming, making this a core skill for engineers and something they consistently work to improve.

Teamwork skills: Another crucial skill for robotics software engineers is the ability to work well with others and collaborate on projects. Since engineers are almost always part of a larger team, they need good communication skills to communicate expectations and project inputs.

Computer skills: Robotics software engineers spend much of their time working on computers or with computer systems, requiring proficiency in basic and advanced software, hardware troubleshooting and operating system navigation.

Attention to detail: Software for robotics systems can perform complex functions, which means the code for those systems can also be complex. Robotics software engineers have a strong sense of detail and know what to look for in their code to ensure software functionality.

Planning skills: Robotics software engineers typically help brainstorm project maps and timelines, so they need strong planning skills. They might also plan how to use their time during the day for maximum productivity.

Increasingly, challenging domains employ robotic applications. Yet, Robotics still is one of the most challenging domains for software engineering. Deploying robotics applications requires integrating solutions from experts in various domains, including navigation, path planning, manipulation, localization, human-robot interaction, etc. Integration of modules contributed by respective domain experts is one of the key challenges in engineering software-centric systems, yet only one of the cross-cutting software concerns crucial to robotics. As robots often operate in dynamic, partially observable environments additional challenges include adaptability, robustness, safety, and security.