





Software Engineering for Robotics

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Structure

- Robot software development overview
- ► Software development essentials









Robot Software Development Overview







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- Programming is simply a process of writing a program for a specific purpose
- Software development is more than writing programs it is a process of developing individual programs and combining those together into a coherent set that works in unison for achieving a concrete goal
- Particularly in large domains such as robotics, software development is commonly done by teams rather than by individuals
 - > Management is thus an essential element of the software development process









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Network-based communication

A modern robot is a distributed system, which sometimes complicates the use of well-established software paradigms, such as object-oriented programming









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- ▶ The question then becomes: Can the developed software be reused on different robots?
- In some cases, reusability is not possible due to major hardware differences (e.g. software developed for a flying robot is likely to have limited usability for a wheeled robot)
- More often than not, robots have many physical similarities though; it should then, in principle, be possible to adapt the software from one platform for another one
 - ► Reusability is often achieved by creating reconfigurable components (at design or runtime)









Software Development Essentials









Essential Steps in Software Development

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In practice, these are not performed just once in a sequential order, but instead need to inform each other and may need to be performed in an iterative process







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Requirements elicitation is a process of identifying the objectives and expectations of a software system **before the software development process starts**









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The translation of requirements into software components is a process of **conceptually designing components and their APIs** so that the objectives defined by the requirements can be satisfied

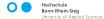








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Components need to be developed based on their agreed upon design and by following the development guidelines of the overall software project









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Software testing is a process of ensuring that developed components or the system as a whole comply with their actual requirements







