4.2

Manipulation with MoveIt!

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MoveIt! - What is it?

- Open source software library for manipulation [1]
  - easy integration with ROS.

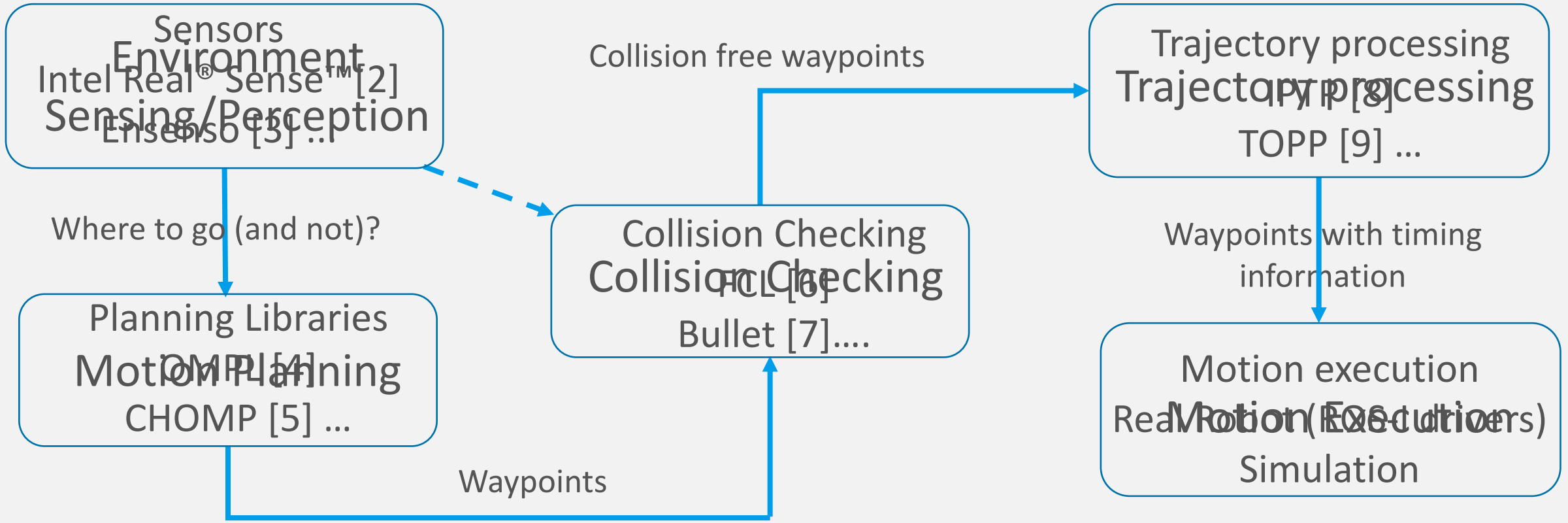
- $ sudo apt-get install ros-kinetic-moveit

- Mainly used to plan and execute motions for serial link manipulators (this course)
  - Integrate information from 2D and 3D sensors for functionalities such as perception and navigation (advanced).

- Platform to configure and use various functionalities associated with manipulation.

[1] https://moveit.ros.org/

Manipulation - functional modules



Typical functional modules associated with Manipulation

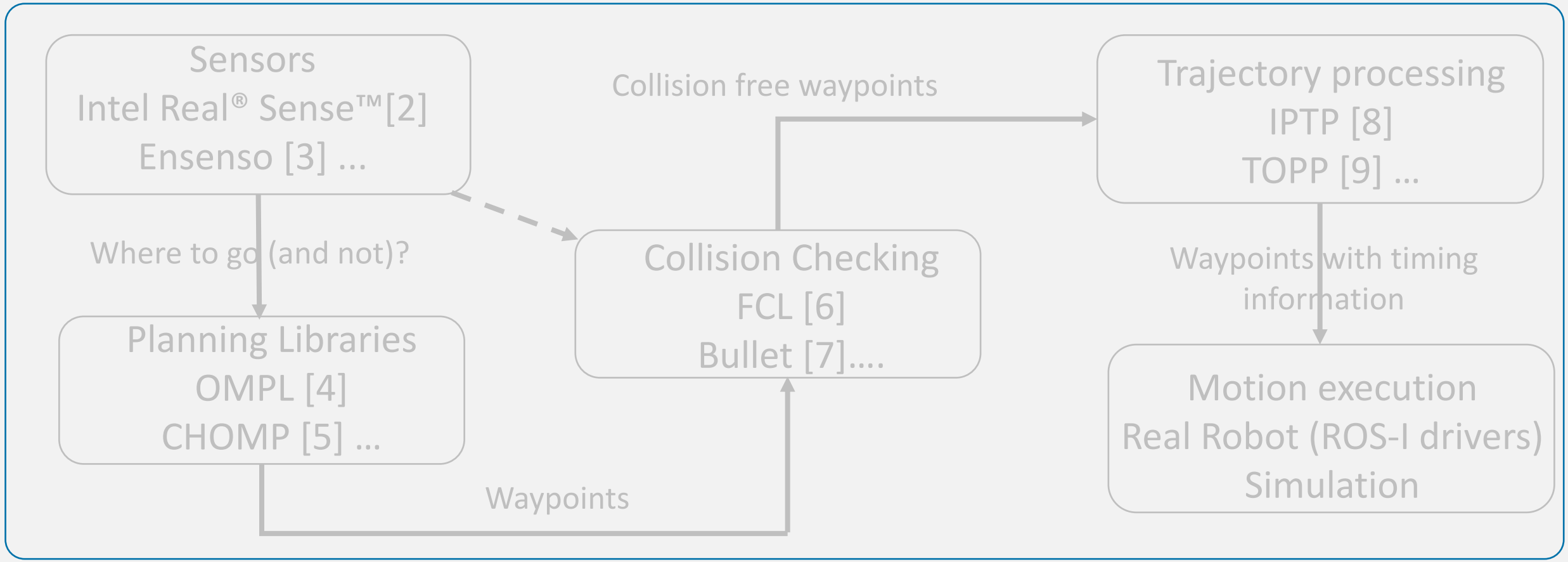
[2] http://wiki.ros.org/RealSense
[3] https://github.com/ensenso/ros_driver

[4] https://ompl.kavrakilab.org
[5] https://wiki.ros.org/chomp_motion_planner

[6] https://github.com/flexible-collision-library
[7] http://bulletphysics.org/Bullet/BulletFull/

[8] https://github.com/ros-planning/moveit
[9] https://github.com/quangounet/TOPP

MoveIt! - glues modules together



MoveIt!

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MoveIt! - A lot goes on under the hood

- Maintain information consistency.
- Integrate robot kinematic information with planning.
- Report and request alternative motion plans in case of collisions.
- Account for any hardware limitations such as joint limits.
- Keep track of the current state of the robot and its environment while performing a manipulation task.
- Talk to the robot hardware/simulation and notify the ROS application once a desired manipulation task is complete.

MoveIt! - from a user's perspective

- **move_group** ROS node
  - several ROS services and actions (APIs).

- Configuring the move_group node
  - robot description (URDF/XACRO)
  - robot semantic description (SRDF)
  - joint limits, planners, etc.

- **MoveIt! Setup Assistant**.