4.2 Robotics Framework

For a robotics framework to include tools for intelligent, AI based, autonomous robots it needs to have functionalities for implementing at least the three most important primitives described in chapter 4.3.1 in the AI Robotics book. These primitives are Sense, Plan and Act. However, to reach high levels of intelligence, as described by higher levels of autonomy in 4.4, tools for the Learning primitive is also important. As an example, we can look at two popular frameworks.

ROS contains options for specifically communicating with sensors connected to a robot and a seamless interfacing of tools for processing sensor data. There are advanced tools for mapping, path planning, pose estimation and diagnostics, among other things. Finally, there are multiple robot specific tools for movement and easy integration with other programming languages capable of filling potential gaps in tools. This displays tools and options for all the four primitives and allows for high intelligence development. The only downside is some lack of tools for creation of general machine learning algorithms for decision making, but it allows for this through easy integration with programming languages.

HOP provides options for internal communication and connection between sensors, actuators and higher-level programming languages. The higher-level programming language specifically intended is JavaScript, which allows for sensor processing and machine learning tools to be used. Thus all tools for filling the four primitives are there. However, locking the use to mostly JavaScript could create problems if processing large amounts of data are needed, as JavaScript tends to be slow compared to a lower-level language.

It is clear from these examples that these robotics frameworks allow for development of intelligent systems, but there are a wide range of frameworks, and not all of them provide tools for everything. These can still be used to create low intelligence or even just automatic systems. The frameworks were only tools for sensor interactions and controlling actuators are a good example of this. Without, or with limited tools for developing planning and learning algorithms, intelligence is not possible, but it is also not always needed.