The diploma thesis extends software of the hexapod robot Scolopendra. The objectives of the software extension were:
1. Design of the software library for joint based robots management.
2. Design of the software package for hexapod Scolopendra.
3. The design of the virtual models i.e. digital twins in visualization and simulation.
4. Design graphical user interface for the remote control of the robot functionalities.

Implemented Technologies
1. Open3D library.
2. Webots simulation software.
3. .NET Framework WPF.
4. Socket interface.

Core Library
The Core library provides basic data structures for jointed the robots such as forward and inverse kinematics structure creation modules, visualization tools and client server based modules for making distributed architectures of the applications.

Software Package
The software package contains modules that extend Core library with modules, files and demo applications that are particularly designed for the Scolopendra hexapod. It also contains modules that provide interoperability with virtual model in the Webots simulator.

Applications Architectures
There are total of 10 combinations to establish communication between five application that the software package contains. Three architectures are simple connections between model and GUI three are the same but with the enabled multicast and the last four are combinations of multiple applications.

Performance tests
The aim of the tests was to determine which of these architectures has the highest impact on hardware performance of the desktop PC. Each test measures time of one computation cycle of the server application in milliseconds. Testing device parameters:
- CPU - Ryzen 7 3700X,
- GPU - Nvidia RTX 3070,
- RAM 32GB 3600MHz.

Visualization Model

Simulation Model

Physical Model

Graphical User Interface