6. SUMMARY

This thesis sought out to provide a proper curriculum on teaching ROS-I for bachelor's level students. The primary idea was to create practical exercises that they would need to follow, which would provide a fundamental understanding of how this operating system works. This work also explains the general workflow of ROS, and why ROS-I was chosen.

ROS is an operating system that works on subscribe and publish semantics, meaning it sends and receives data that is only relevant to specific nodes. ROS-I is a set of libraries that organizes ROS, such that the creation of configuration files is universal across different industrial robot models. This simplifies the workflow and points out its usefulness in the field, which proves its viability in being taught in a more academical environment. Many manufactories continuously implement Industry 4.0 and even now, 5.0 aspects, which are exemplified by this thesis' broad topic. As such, by teaching more people as to how these concepts may be applied, the efficiency of these entities may be improved greatly. The primary goal is to provide an overview as to how one may implement such systems starting from the ground up. This means that the exercises provided could be a starting point for an entire manufacturing system.

The exercises started off by showing how the initial configuration setup process is done. This showed how a digital twin of the desired robot model could be simulated. Next, additional modifications were made to be able to manipulate the simulated robot while keeping the movements logical and realistic. Then, the setup was modified further by the creation of a python program. This would create a simple coordinate goal for the end-effector, whereby the simulation would move the joints in a plausible manner. Finally, all of the aforementioned exercises were applied on a physical model by establishing a network connection. The python program was also modified for additional demonstration. The resulting solution moved the simulation and the physical model to the desired path.

The thesis outlined simple enough exercises that could be done by students, but could be modified to provide better understanding of the tool. This could be done by applying the exercises on a different robot model, or adding additional functions to the programming part.