

Project Report*

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Abstract—

INTRODUCTION

A. Mechanical structure

The design of the robot is influenced by the LEGO®Mindstorms®EV3 set CITATION!. While the original set has a movable base it was too small and without an arm with a manipulator. It also does not incorporate the Dynamixel AX-12A Smart Servos used in the final design so the decision to redesign the robot while taking design inspiration from the LEGO®EV3 design. By developing and designing a new platform it gives the possibility to adapt the dimensions and fastenings for manufacturing methods such as 3D-printing and Laser cutting. Consisting of seven Dynamixel®AX-12A Smart Servos, two on the base for locomotion and four on the arm and one for the gripping tool. The main advantage of using the AX-12As is the possibility of connecting them in series which enables parallel control of all the joints. Additionally with the built in sensors the motors return feedback of the joint angles, angular speed, current draw etc.

B. Electrical components

While the mechanical components are those visible it's the underlying electrical components that play the biggest role. The internals in the AX-12As give feedback on the state of the motors, the 1000mAh LiPo battery supplies power to the motors and surrounding electronics. For the computations the NVIDIA®Jetson Nano is used as it runs Ubuntu natively which makes the ROS-implementation