Robot Club Toulon : Mechanical Presentation 2023

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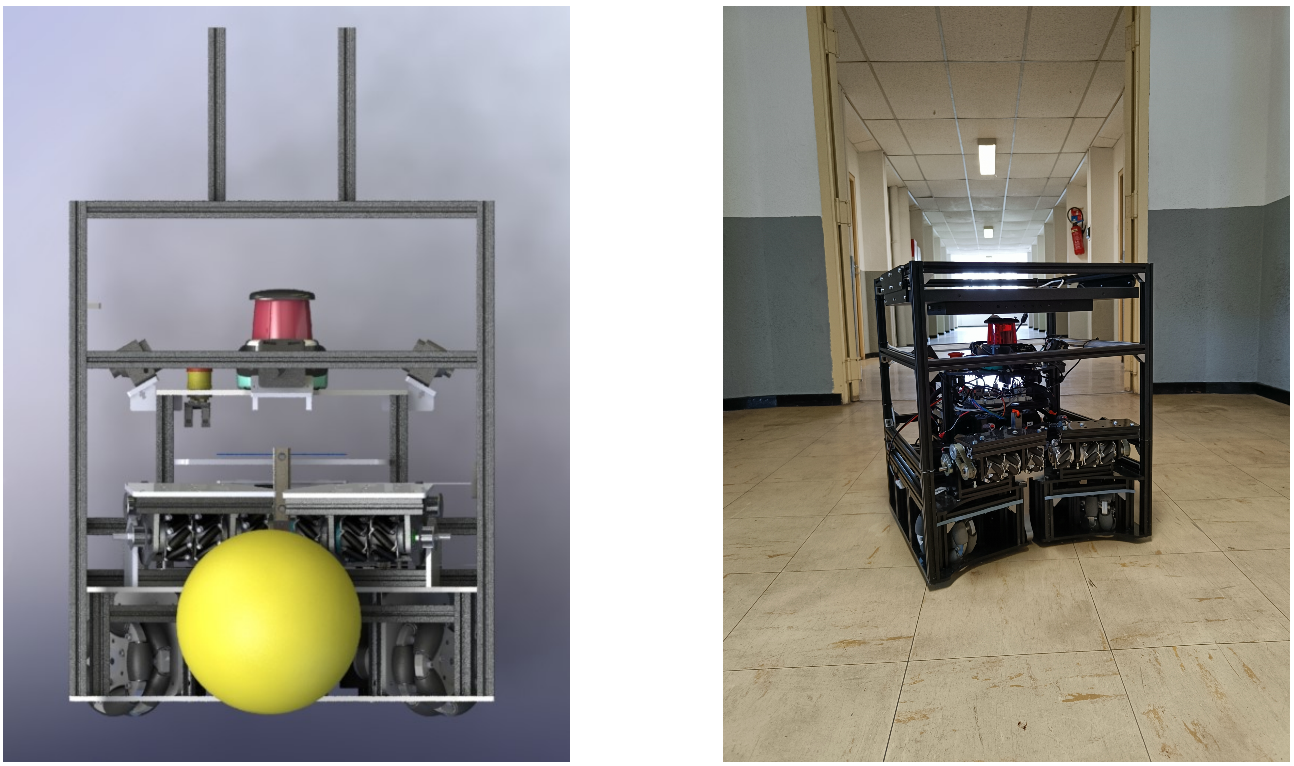

Fig. 1. Computer generated image and picture of the 2023 robot of Robot Club Toulon Team

Mechanical design of RCT robots is a 4-wheel omnidirectional robot driven by independent 220w Robotmaster M3508 motors having a gearbox ratio of 1:19. This platform is described in details in this document.

Compared with other teams, our robots are based on a 4 wheels platform, with its wheels placed at four out of five vertex of a regular pentagon.

This evolution has been decided considering during a strong acceleration, most of the robot weight is pushed on the rear wheel as shown on this slow motion YouTube video featuring our robots. If acceleration is important, the front wheels will not be always in contact with the ground. In this case, using a 3 wheels robot is a real issue because the rear wheel doesn't transmit any strength and the robot can be out of control. Using a 4 wheels platform allows to keep control of the robot in any situation with always 2 rear wheels transmitting strength in contact with the ground. As shown on the video, even when the robot front wheels are not in contact with the ground, the robot is still under control and continues to accelerate.

This year, we decided to change our motors. This decision came from a desire to improve our precision because we will no longer need a chain to transmit the movement from the motor to the wheel because

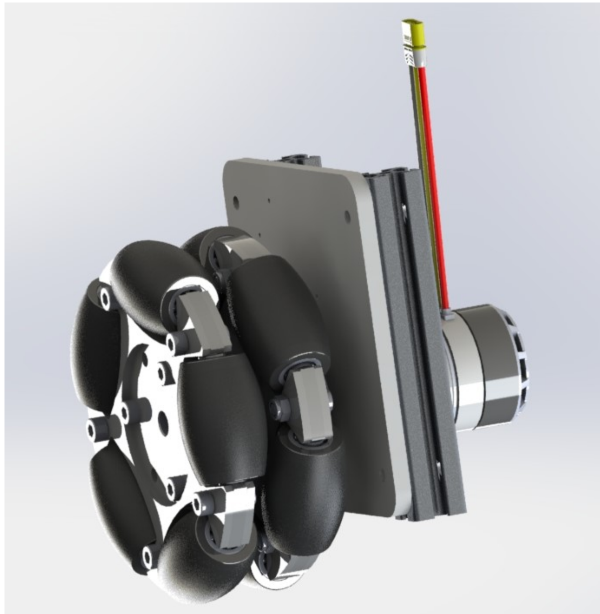

Fig. 2. RCT propulsion element

motor are shorter and fit between wheel and kicking system. On our new motor block the wheels are directly attached to the engine axle. This solution increase reactivity and discard the mechanical slack thus allowing the clean stop.

Moves done with this solution are much more reactive.

RCT four wheels mechanical base is showed in details in figure 3.

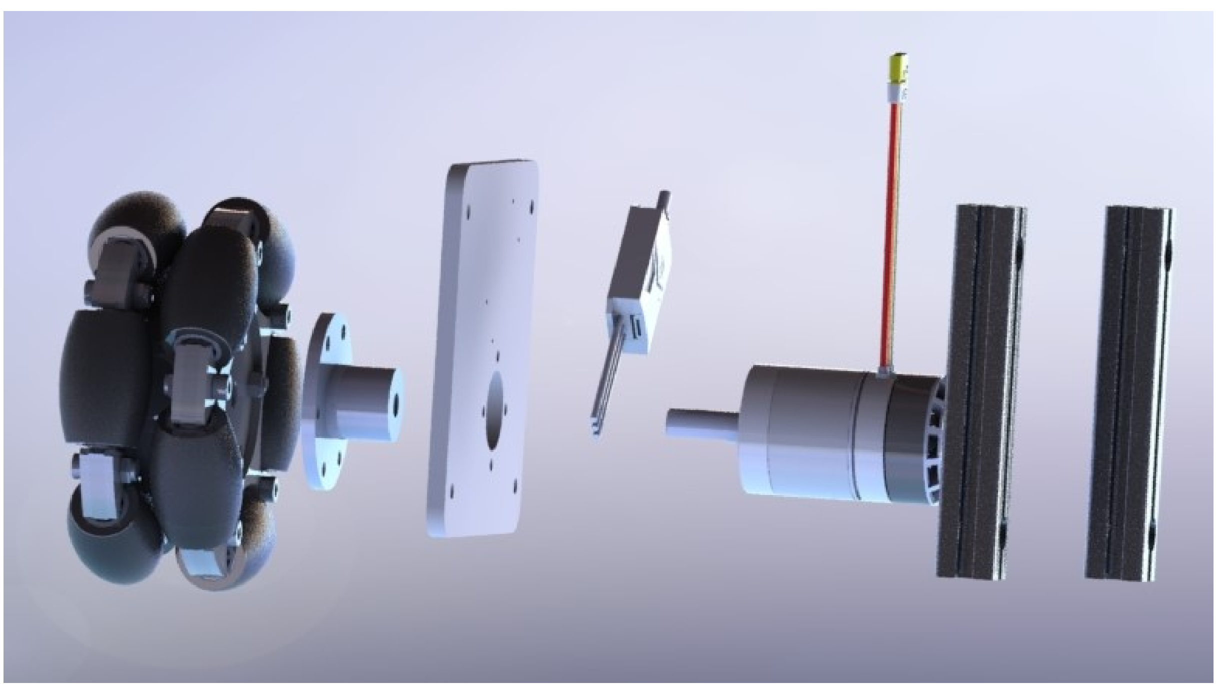

Fig. 3. Propulsion block including a Robotmaster M3508 motor with a C620 speed encoder

Fig. 4. RCT omnidirectional base view showing motor blocks, power distribution and control board card and bottom chassis

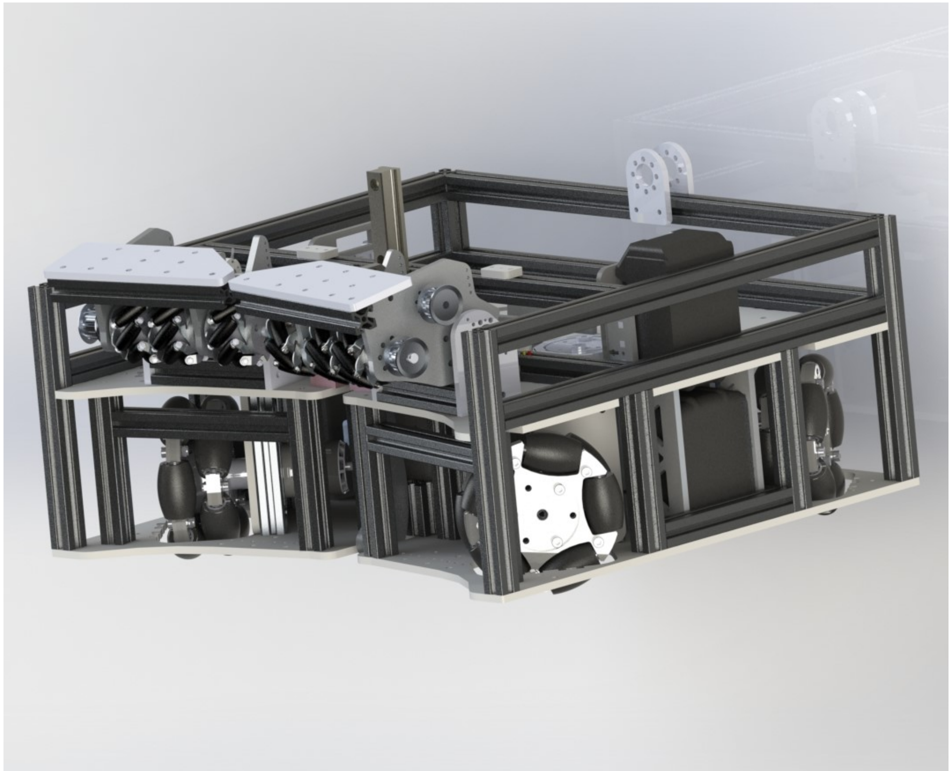

Fig. 5. RCT omnidirectional base with kicking and ball handling systems

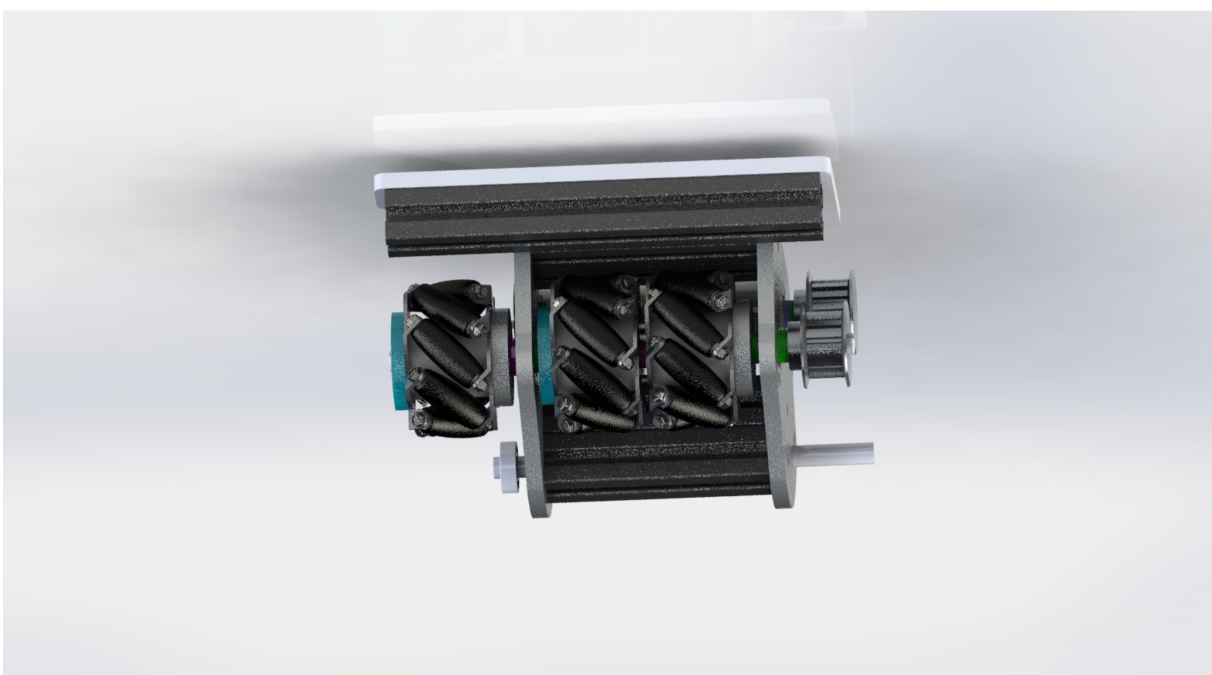

Fig. 6. Left part of the ball handling system composed of 3 mecanum wheels driven by a Maxon DCX26 motor.

The ball handling system of 5 little aluminium profiles, one axle which is link whith the motor thank to a courroie and 2 longer aluminium profiles with a plate of delrin to protect the wheels. In back of handling system they are damplers to make them stronger and ball doesn't bounce back when she come fast.

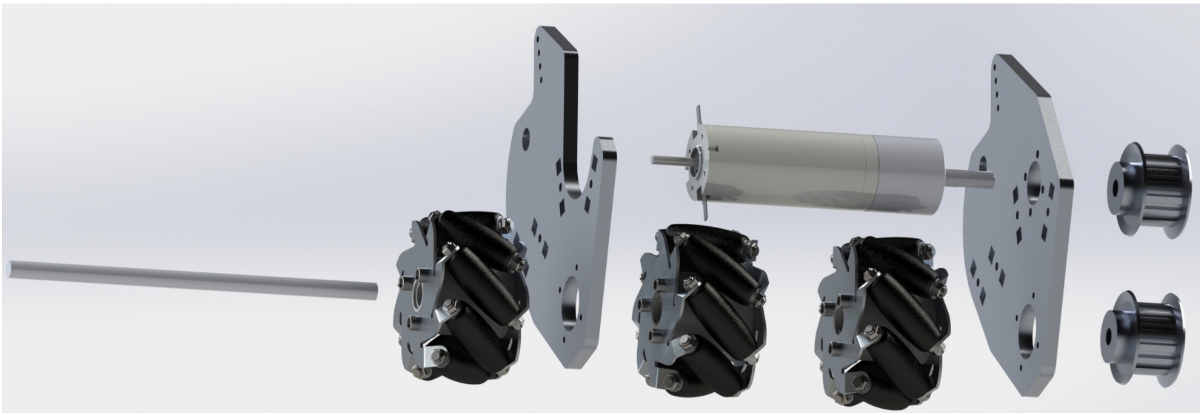

Fig. 7. Exploded view of the left part of the ball handling system.

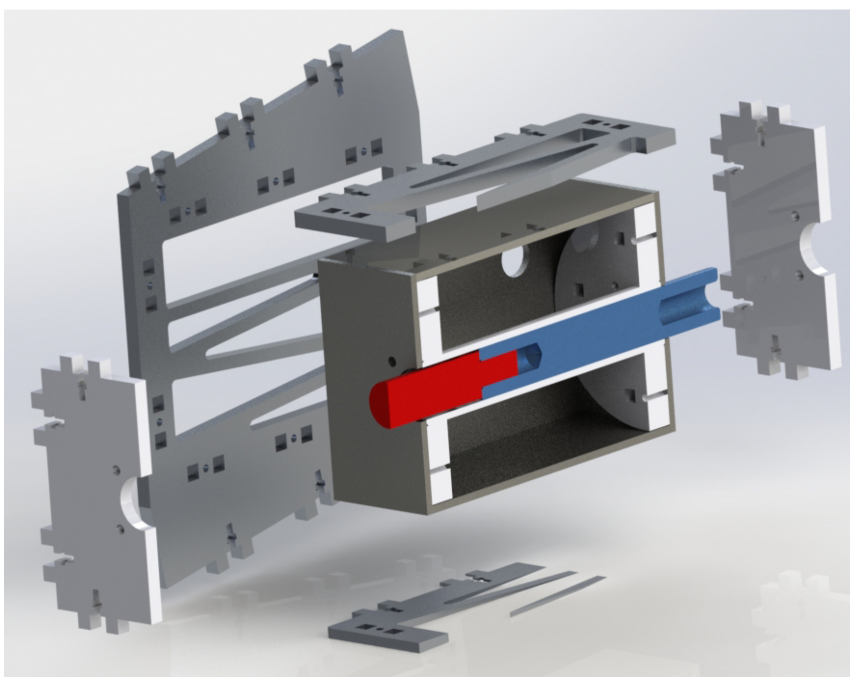

Fig. 8. Kicking system

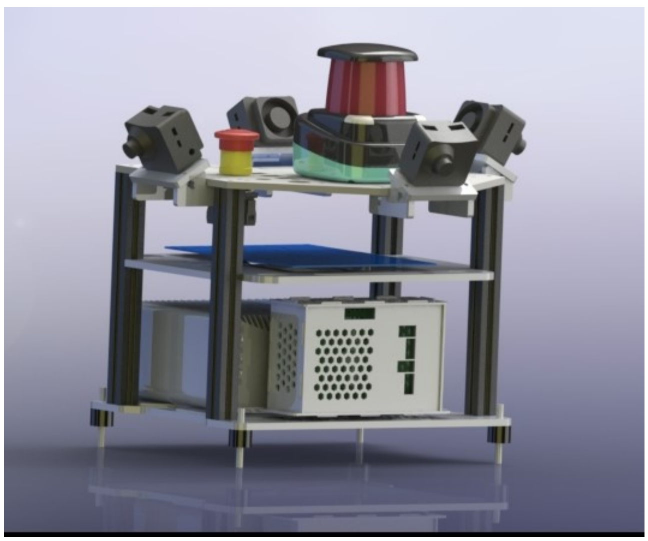

Fig. 9. Top assembly of the robot including the embedded PC and the motor controller board for driving motors and managing quadrature encoders. This assembly can be removed form the robot by removing 4 screws for transportation. A Pepperl+Fuchs R2000 lidar is present as well as four JeVois Pro smart cameras.