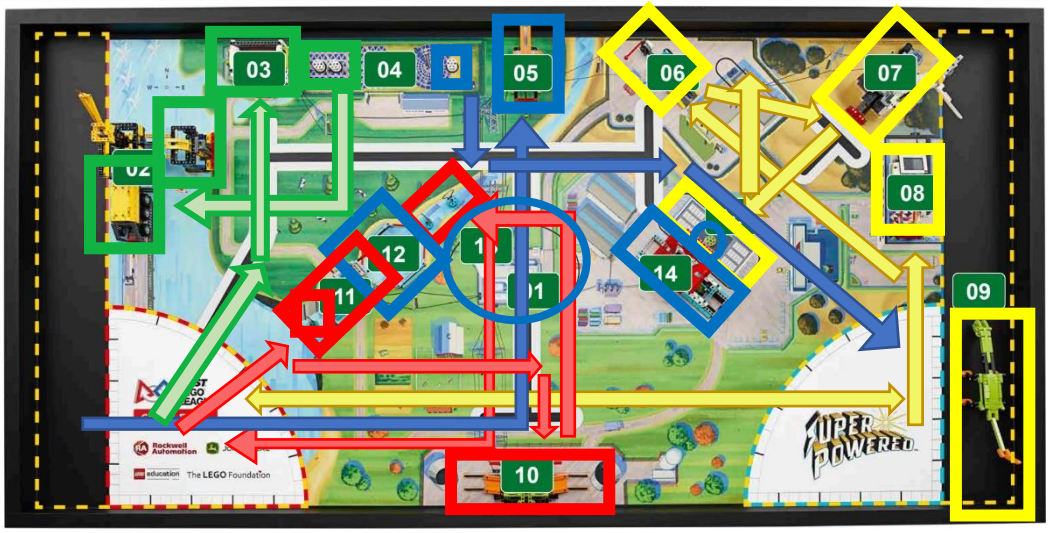
Full robot design documentation (80 pages) can be found at: FLL.EE

Robot Design Summary // Öökullid #23

FIRST ® LEGO ® League Challenge 2022/2023 Superpowered ℠

RG strategy



We gave each mission a value based on its simplicity, distance from the launch area and scoring. Each run and its addon ride have its own color, and its color shows robot's movements in the right-hand image.

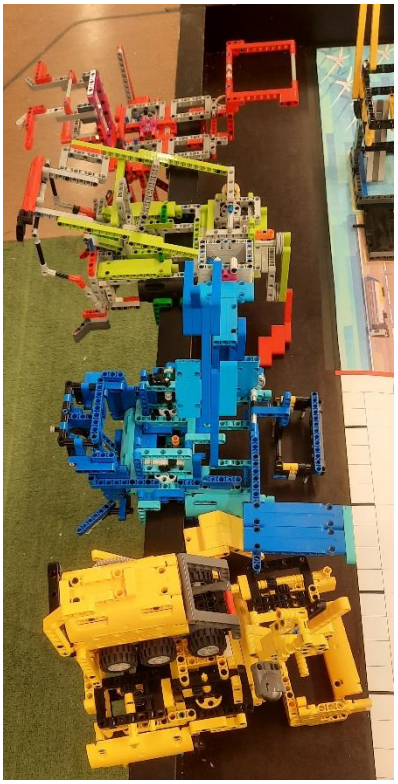
Run zero – a maximum of 70 points. The robot fits into the inspection area and does not lose precision discs on the table.

The first run - a maximum of 45 points – We collect three energy units by solving hydroelectric dam and power plant. We also collect all three looped water units.

The second run - a maximum of 60 points - we load three oils into the fuel truck, bring three energy units to the energy storage tank, and remove the tray. From the solar park, we grab two energies and, at the end of the ride, ram the fuel truck into the left home area.

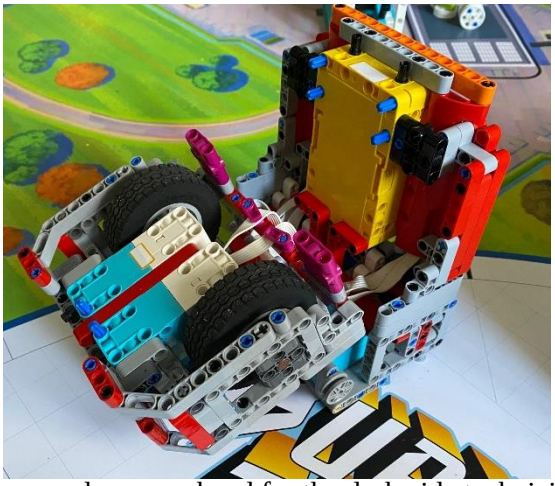
The third run - a maximum of 110 points - we lift the interconnector on our field, grab the last energy from the solar park, hang two waters on the red hooks and drop the last water into the water reservoir. Plus, we carry the innovation project model and two energy power-to-X circle, drop one energy unit into a toy factory and grab the rechargeable battery.

The fourth run - a maximum of 135 points - we drive the dinosaur to left home area and bring a fuel truck from left home area to the right. We then solve the TV, the hybrid car, and pick up three energy units from the windmill. We move these energies to the battery target circle and drop two more energies into the toy factory. We finish our fourth ride and robot game by parking over the fuel station target with the fuel truck.



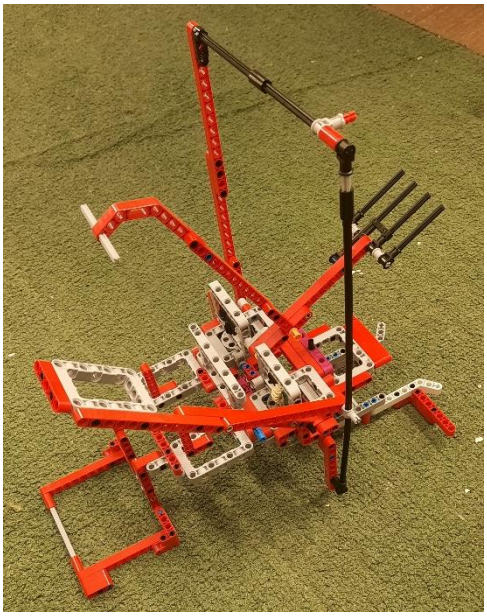
Robot

Our robot's name is Beast (left-hand image) and has two large motors and two medium motors to solve missions. Plus, the robot has two color sensors, one down and one on top. In total, Beast has 4 addon rides. Our robot can solve a maximum of the entire table, or 410 points. On average, we collect 390 p. We solve all 16 of the 16 missions (including M16 accuracy discs).

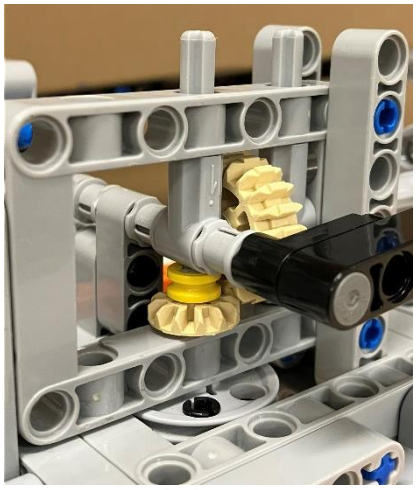


Innovative parts:

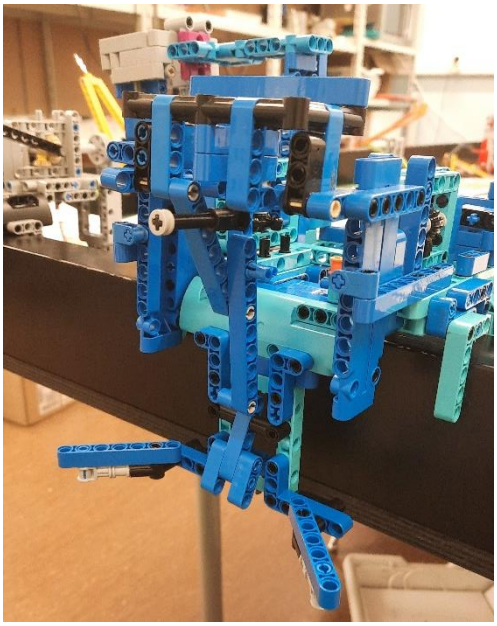
Innovative part about our main robot is the very easy interchangeability of its battery. The battery is replaceable in about ten seconds. This speedy shift is possible thanks to a structurally strong articulating point in the center of the robot. If a battery change is required, only two liftarms must be removed. The robot then opens in half, allowing access to the battery (picture bottom left). In terms of looks, the systematic hauling of robot wires on top of the robot is also exceptionally beautiful (Picture top left). Overall, ability of our rides to be stored on the edge of a robotic game board is innovative. That way, they don't fall to the ground or disappear and are always on hand for the desk-side technicians (Picture on the right).



On our red, or first ride, there is a cross-use of its mission motors, where several things are done with one motor. With motor C, we first lift off the water in front of the dam and then hit the power plant's release paw with the same motor. With motor D, we lift the fuse to prevent energy leaving the power plant. We then grab the other two looped water with this same motor (Picture top left).

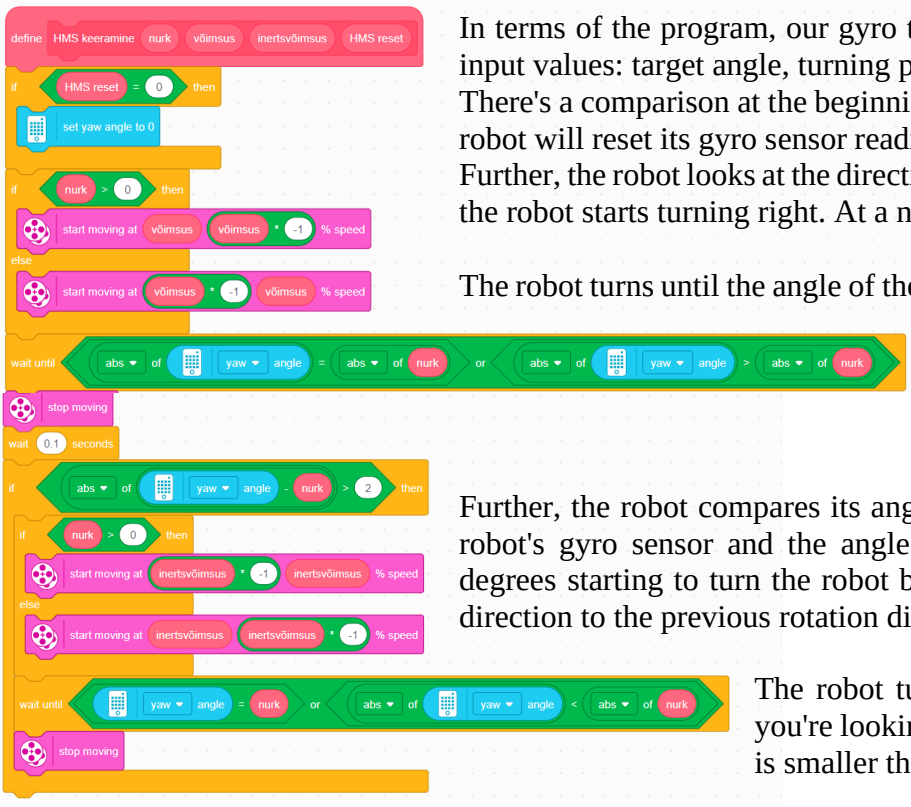


On our second, or green ride the density of its axles at motor D is innovative. Side by side, there are twisting axles in all three-axis side by side. This kind of transmission is needed so we can charge oil with one motor. While with the other, we solve the solar park and ram the fuel truck into the home area. (Picture top right)



Our third or blue ride has innovative solution to solving the looped waters. The solution to taking our waters is very innovative in the face of a blue or third race. We're taking two waters dangling and one water target ring just by driving into the target ring and reversing. This solution is based on two aligners. They guide the robot to the correct position and the target ring pushes the key when driving against the target ring. Pushing the key retracts the water storage box with loops so that their loops fall on the hooks and the third water falls straight around. In case something goes wrong, the water that has had to hang still falls around (Picture below right).

The cross-use of the basket in front of it is very innovative in the case of chicken yellow or the fourth ride. Thanks to this basket alone, we get 85 points on the robot game table. This basket solves four missions: the TV, windmill, energy to battery target and toy factory (Picture bottom left).



In terms of the program, our gyro turning MyBlock is interesting. It has four input values: target angle, turning power, rewind power, and reset.
There's a comparison at the beginning of the program. If the last value is 0, the robot will reset its gyro sensor reading and turn relative to the new zero angle. Further, the robot looks at the direction of its target angle, with a positive angle, the robot starts turning right. At a negative angle, the robot starts to turn left.

The robot turns until the angle of the robot is equal to or greater than the target, then stops turning. We use absolute value in because you don't need separate programs to turn left and right.

Further, the robot compares its angle when the gap between the angle of the robot's gyro sensor and the angle you are looking for is greater than two degrees starting to turn the robot back. The robot turns back in the opposite direction to the previous rotation direction.

The robot turns back until the robot and the angle you're looking for are equal, or the angle of the robot is smaller than what you're looking for.