Redesign The Base of The Competition Robot

Smart Methods – الأساليب الذكية

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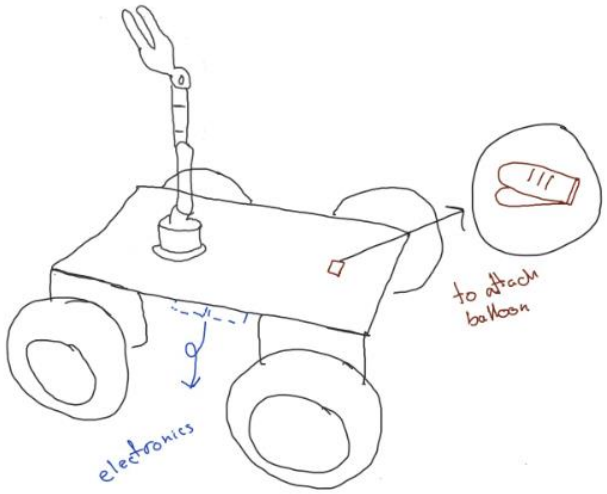
Morphological Analysis

for the competition robot's base

Components	A	B	C	D	E	F	G
Motor	Servo	Stepper	Brushless DC	brushed DC	Worm Gear	DC Linear Actuator	AC motor
Design of base with consideration electronic parts	hollow square	two layer	triangle	Rectangle box	octahedral box	Elliptical	board with holes
Material	Wood	plastic	printed 3D design	aluminum	iron	Stainless Steel	Acrylic
# of wheels	2	3	4	5	6	7	8
Type of wheels	Standard	Centered Orientable	Off-Centered Orientable	Omni	Tracks	Pololu	Mecanum

Designs description:

Design 1:

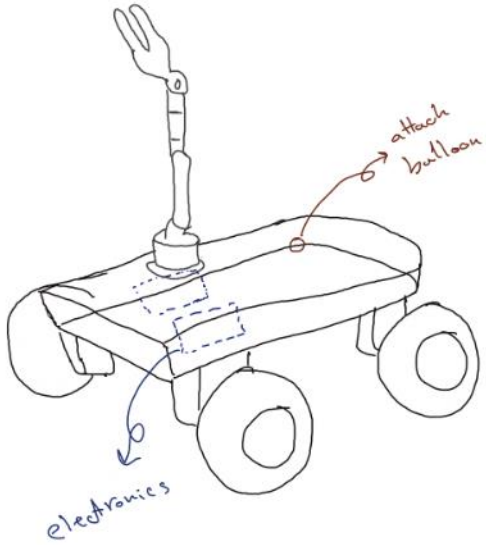


Components	Design 1
Motor	Stepper
Design of base with consideration electronic parts	board with holes
Material	Stainless Steel
# of wheels	4
Type of wheels	Standard

Description:

using a stepper motor in this design which is an open-loop motor gives this robot a high accuracy and speed, but this motor is a bit expensive. also, we will use a board made of stainless steel with holes so we can set the electronic parts under the board through these holes. the reason behind using standard wheels is to reduce the cost of this robot.

Design 2:

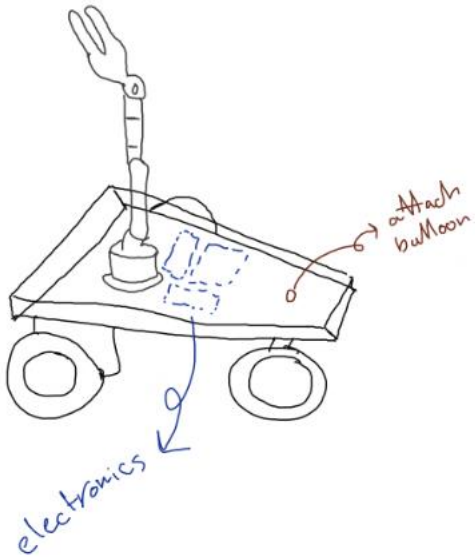


Components	Design 2
Motor	Brushless DC
Design of base with consideration electronic parts	Rectangle box + Elliptical
Material	Acrylic
# of wheels	4
Type of wheels	Mecanum

Description:

in this robot, we are focus on appearance and attractiveness, we are going to use a box of transparent material, such as acrylic, which contains inside it the electronic parts. Cutting the box in an elliptical shape may raise the cost, so choosing brushless DC, which is known for its low cost and a long lifetime, will equivalent the cost of this project. Also, the use of mecanum wheels will give the robot fluidity in movement.

Design 3:

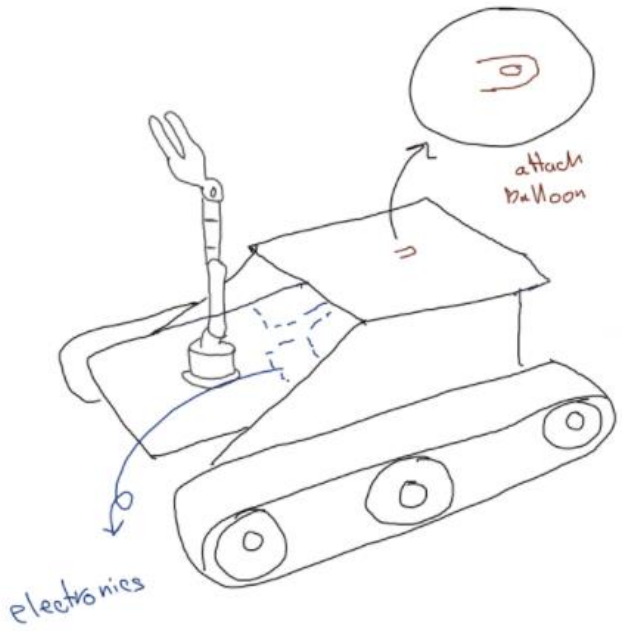


Components	Design 3
Motor	Servo
Design of base with consideration electronic parts	triangle
Material	aluminum
# of wheels	3
Type of wheels	Off-Centered Orientable + Pololu

Description:

The availability of servo motors in abundance and their appropriate price was the reason for choosing them in this design, and the triangular shape of the base and the use of light aluminum material may contribute to increasing the speed of the robot. We decided to use three wheels, the rear wheels are for the propulsion and the front wheel for the steering. This robot is differentiated by the compatibility between its capabilities, efficiency, and the low cost of its establishment.

Design 4:



Components	Design 4
Motor	Worm Gear motor
Design of base with consideration electronic parts	two layer
Material	Wood
# of wheels	2 track +6 wheels
Type of wheels	Tracks

Description:

using a two-layer of wood material and the tracks will give a different impression to this design. and this impression is about pretty and strong. the electronic parts will be hidden between these two layers. then to increase the torque we will use a worm gear motor, which is well-known for its high torque, low cost, availability, and ease of implementation, and the most important feature that the worm gear motor provides is self-locking Which may increase stability since we used tracks.