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Assignment - 1

Introduction:

The aim of this project is to develop a simulation of four wheeled robot and avoid objects while the robot is in motion. The simulation of the 3-D object has been created with webots software and programmed with python programming language. The obstacle avoidance feature works via the real time data of the laser sensor which is placed in the front end of the robot.

Design and Development stage:

Double-clicking on the icon launches Webots. By selecting wizards from the menu, a new project directory is created. By changing my project with Four_wheeled_robot, the project directory is named Four_wheeled_robot, and the world file is named Four_wheel_robot.wbt instead of the default empty.wbt. Furthermore, select the rectangle arena check box and hit the finish button to start designing the simulation.

When the rectangle arena node option is clicked twice on the scene tree, the nodes and fields in it will be displayed. The size of the floor tile is chosen and modified from 0.5 to 0.25. As soon as the values are entered, the changes are visible in the 3D image of the rectangle arena. The value of the wall height field is altered from 0.1 to 0.05 after selecting it. The rectangle arena's wall height has been reduced.

The '+' symbol is clicked to add a new node, and the base node offers a number of alternatives from which Robot is selected and added to the scene tree. When Robot is clicked on the scene tree, a number of nodes appear, among which Children is picked, the '+' symbol is clicked to add the base node, and form is selected under the base nodes options. The base node is added as PBR Appearance, the base colour is selected, and the values are modified to R=0, G=1, B=0 under shape. The colour of the robot changes in real time as the values are entered. The roughness is set to one, while the metalness values are set to zero. The base node is added as Box after clicking Geometry Null. When the size of the box is clicked under geometry Box, the dimensions of the box are adjusted to x=0, y=0.05, and z=0.2. Then, on the scene tree, Shape is selected, and the DEF name is set to body. Binding object Null is clicked, and Use is selected under Use body(Shape) is added to add a bounding object. The root node Physics is added after clicking Physics Null.

The DEF is used to attach the wheels to the robot under the supervision of children. Hinge joints is clicked and added when the body shape is selected in the basic nodes. Hinge joints are now visible in the scene tree, and when the null button for hinge joints is pressed, the base node is picked as the Hinge joint parameter and inserted. The base node is selected as a rotational motor and inserted, with the name "wheel1" given to the motor. The base node is selected as solid and added in end point Null. Children is clicked under end point null solid, and the base node is selected as shape and inserted. Under form, choose appearance null, then select PBR appearance for the base node and add it. The base node is selected as cylinder and added after clicking the geometry null. The dimensions of the geometry cylinder are