Instructions For LaserTank Game

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CSS 450
Project Instructions
Goal
The goal of this game is to destroy all the RoboBugs. You use the laser on your LaserTank to shoot the RoboBugs, and they can spit fireballs at you. Currently the LaserTank can be damaged but not destroyed while RoboBugs disappear when destroyed.

Display
Drawable – Consists of three viewports.
   Game viewport – large viewport on the left where all movement and action takes place. The Laser tank is always centered in this viewport and movement is indicated by the viewport scrolling.

   Satellite viewport – Small viewport in lower right corner that shows world view. The world is surrounded by a wall preventing movement out of the world area.

   Satellite close-up viewport – Small viewport in upper right corner that shows the view delineated by a highlighting rectangle in the satellite view. Scale can be changed in by resizing rectangle in satellite view with MMB.

GUI – A separate window that can be moved. It has controls that duplicate mouse functions as well as additional controls.

Game Objects
Lasertank – The vehicle you control.
RoboBugs – They wander around and can target the LaserTank if it is in range, chasing it and spitting fireballs. They disappear when destroyed.
Rocks – Big square rocks litter this world.
Walls – The world area is surrounded by walls that prevent leaving.
Explosions – Indicate a hit. The LaserTank and RoboBugs are damaged, while rocks and walls are invulnerable.

Mouse
The game can be played almost entirely with the mouse.

LMB The LaserTank turns and moves towards mouse cursor. It does not move forward until it is finished changing direction (in order to make aiming easier).
RMB In Game view – fires laser. RoboBugs disappear when destroyed. Rocks and walls are indestructible.
   In satellite (world) view – moves the rectangle delineating the satellite close-up view.
MMB In satellite (world) view – changes size of rectangle delineating satellite close-up view, and so changes the scale of the satellite close-up view.
GUI
Buttons
Forward – LaserTank moves forward.
Back – LaserTank moves backward.
Turn right - LaserTank turns right.
Turn left - LaserTank turns left.
Fire – fires LaserTank laser.
Pause – pauses game.
Reset – Restarts game.
Quit – exits game.

Sliders
Laser Length – changes length of laser gun. This also increases range and decreases laser power (strength) as the gun length increases.
Laser Size – Changes both length and width of laser gun. This also increases both range and laser power (strength) as the gun size increases.
Rotate Laser – Rotates the laser turret in a new direction.

Indicators
Damage – amount of damage the laser tank has sustained.
Range – Range of laser, can be adjusted with Length and Size sliders.
Power – amount of damage laser does, can be adjusted with Length and Size sliders.

Keyboard
Currently only ‘q’ for quit is implemented.
Design For LaserTank Game

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Project Design
Collision detection
Complexity is $n^2$ for movable vs. moveable detection, but linear for moveable vs. static objects (broke into two loops).

Class Hierarchy for Drawable Objects

TgraphicsObject
  TObjectList
  TLaserTank
  TRobotInsect
  TdrawableObject
    Tline
    Tarc
    Tsparkler
    Tfillable
      Tcircle
    Trectangle
      TExplosion
    TRock

States
Timer loop
  move all movable objects
  check collisions
  timers inside functions increment for internal timing
  draw all objects

RMB down
GUI fire button down
  in game view: starts fire sequence, timing based on Timer loop
  in satellite view: moves highlighted rectangle
RMB up
GUI fire button up in game view: stops fire sequence

LMB down
GUI move, turn changes world location of LaserTank scrolls game view

MMB in satellite view: changes size of scale in satellite close-up

GUI Laser Length makes gun longer, changes range and power

GUI Laser Size Makes gun bigger, changes range and power

GUI Laser Rotate changes turret direction

GUI Pause on pauses game

GUI Pause off resumes game

GUI Reset Restarts game

GUI quit ends game

‘q’ key ends game

Future Features
LaserTank can be destroyed and game restarts
Texture maps for ground, rocks, and explosions
Sound for laser, movement, and explosions
Auto aiming by using the MMB to select a target
Save game
Victory/Defeat screens
Text labels on drawable for viewports
More efficient collision detection
smarter RoboBugs
animated tracks on LaserTank and RoboBugs
attach GUI to drawable
keyboard support
better movement
More accurate bounding boxes/collision detection
Weaknesses
The main weakness is not implementing the “future features” (due to lack of time). Testing the game, I encountered no crashes. Both RoboBug and LaserTank movement has quirks like spinning the long way around (sometimes), but movement is functional. The GUI forward and back movement is choppy compared to mouse movement. Other than that, I noticed to other defects in implemented features.