Elementary Physics Visualization App

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   - Projectile Motion
   - Cyclotron Motion
   - Kinetic Theory of gases
   - Motion of charged particles
   - Flow past an airfoil
   - Waves on a string

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Abstract

The aim of the project is to simulate interactively basic elementary physics problems using a GUI to show animations according to the inputs received.

List of problems being simulated

- Projectile Motion
- Cyclotron Motion
- Kinetic Theory of gases
- Motion of charged particles
- Flow past an airfoil
- Waves on a string

These are the problems being considered, more problems might be added as we go on and there might be some deletion or constrained problems to be chosen.

Brief Description

- Projectile Motion:

The user has to provide initial speed of the body, launching angle and the number of time steps (s)he wants the GUI to divide the time to be simulated.
Using these inputs, there will be an animation displayed on the screen showing the path of the point mass from the point of projection to the point where it will fall.

Brief Description

- Cyclotron Motion:

The user has to provide charge,initial position and initial velocity of the point charge along with the magnetic and electric field variations in space and time, time for which (s)he wants to simulate the motion along with the number of timesteps.
Using these inputs, there will be an animation displayed on the screen showing the path of the point charge for the time of simulation in different planes.

Brief Description

- Kinetic Theory of gases:

The user has to provide temperature and number of particles per volume. Using these inputs, there will be an animation displayed on the screen showing the path of the particles with time in a unit volume.

Brief Description

- Motion of charged particles:

The user has to provide number of charged particles, initial position,velocity of all the particles, charges of all the particles, time for which the simulation must be run and number of time steps for it to run. Using these inputs, there will be an animation displayed on the screen showing the path of the charged particles for the time of simulation.

Brief Description

- Flow past an airfoil:

The user has to provide velocity, angle of attack, airfoil from the available data or a new airfoil data file in the format specified ,Reynolds number and the time of simulation.
Using these inputs, there will be an animation displayed on the screen showing the flow over the airfoil.

Brief Description

- Waves on a string:

The user has to provide length of the string, Young's modulus, boundary conditions and the time of the simulation.
Using these inputs, there will be an animation displayed on the screen showing how the string oscillates under these conditions.

Project Plan

The work done will be updated regularly on the public git repository: `https://github.com/vikaskurapatibat/SDES_Project2.git`

Work Done

The functions of projectile motion, cyclotron motion, animation and the test cases for projectile motion are finished until now.

Work to be Done

Test cases for cyclotron motion, functions for other problems, their tests and GUI implementation, documentation are left over.

Work Plan

We will first check the implementation of the two problems finished in the GUI first and then implement other problems by regularly checking using the test cases and then updating the documentation till we finish the project.

Thank You! ☺