

# ZENSE PROJECT



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# IDEA

This project comprises of two simulations on Simple Harmonic Motion of Vertical and Horizontal Spring Mass System respectively. Also Project contains one website containing blogs, this is done using Django Framework.

## TECHNOLOGY USED AND IMPLEMENTATION DETAILS

The simulation part of the project is done using VPython. VPython is simple rendering tool for 3-D objects and graphs. This makes easy to create navigable 3D displays and animations. Thus using features of VPython and using concepts of Physics both the simulations of Vertical and Horizontal spring system are done.

VPython has option of choosing a 3D object such as cylinder, cone, ellipsoid, ring, sphere etc. And to work with these 3D objects we can adjust their colors, textures , animation speed,

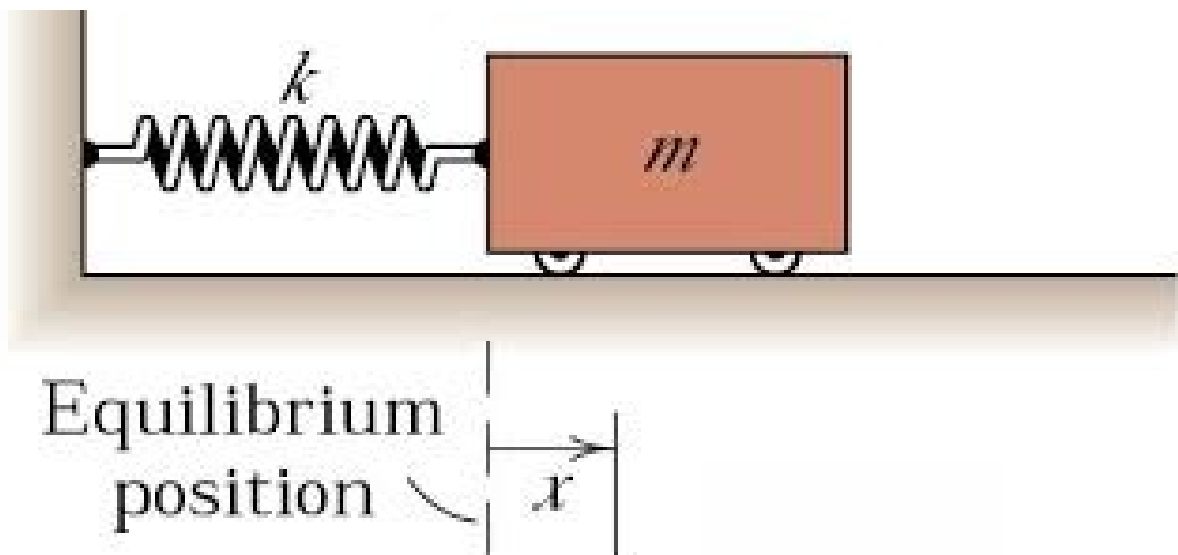
vector operations and various other things on that 3-D object.

Such as for placing the object in particular position vector( $x, y, z$ ) is used.

For example,  $\text{pos} = \text{vector}(1, 2, 3)$

Similarly for adjusting size also.

After setting the position of wall, spring and block, the SHM concept of physics is being used such that equilibrium position is defined and also following equations of motion in physics is applied.



From Second Law of Motion-

Force = Mass\*Acceleration

Here , Mass =  $m$ , acceleration =  $a$ , Spring constant =  $k$  , position from equilibrium position =  $x$ , velocity =  $v$  and time =  $t$ .

$$kx = ma$$

$$a = kx/m$$

$$v = v + at$$

$$x = x + vt$$

Thus on the following principles, both horizontal and vertical spring system works.

Now, the name of website created using Django Framework is being named Local Library. For this first the skeleton of website is created using the following command

```
$ django-admin startproject locallibrary
```

Then to create catalog application in local library run the following command

```
$ python3 manage.py startapp catalog
```

Hence, this will create further structure of website.

For registering catalog application we have update settings.py in locallibrary.

Django uses an Object-Relational-Mapper to map model definitions to data structures. Thus everytime when we make changes and want structure of data to be stored we have run following commands.

```
$ python3 manage.py makemigrations  
$ python3 manage.py migrate
```

Now in models.py after importing models, reverse, User and date classes are defined with necessary methods that has to performed by them. The classes which are defined are Genre, Book, BookInstance and Author.

Then we register this modules in admin.py. After registerin we can create a superuser which has full access to site. To create superuser and restart development server following commands are used:

```
$ python3 manage.py createsuperuser  
$ python3 manage.py runserver
```

Thus after this we can add Authors, Books, Book Instances and Genres. Also as a superuser we can create new users and groups . Here in groups only one group has been created that is Library.

Then changes are made in view.py accordingly .A view is a function that processes an HTTP request, fetches the required data from the database, renders the data in an HTML page using an HTML template, and then returns the generated HTML in an HTTP response to display the page to the user. The index view follows this model — it fetches information about the number of Book, BookInstance, available BookInstance and Author records that we have in the database, and passes that information to a template for display.

Then templates folder is being created which contains various HTML templates for structure and layout of the file.

In views.py pagination is also inserted so as to maintain hundreds of records.

For keeping track state between client and particular browser sessions are being used. Thus sessions were already enabled while skeleton website was created.

Then for user Authentication, templates containing login.html, logged\_out.html, password\_reset\_complete.html, password\_reset\_confirm.html, password\_reset\_done.html, password\_reset\_form.html are created.

To navigate to login page go to <http://127.0.0.1:8000/accounts/login/>

To navigate to logout URL go to <http://127.0.0.1:8000/accounts/logout/>

After login a user can view the list of borrowed books by going to My Borrowed link at the sidebar.

Various features of HTML form and form fields are being used in this.

First, log in to the site with an account that has whatever permissions you decided are needed to access the author editing pages.

Then navigate to the author create page:

<http://127.0.0.1:8000/catalog/author/create/>.

Thus by this features , user interactive website is being created using Django framework.

## LEARNING SOURCE

For Simulations part, I learnt VPython basic concepts through the following link

<http://www.glowscript.org/docs/VPythonDocs/index.html>

And for Django I referred to the following tutorial

<https://developer.mozilla.org/en-US/docs/Learn/Server-side/Django>



## FUTURE SCOPE OF YOUR PROJECT

Horizontal and Vertical spring system o simulations differ by changing mass of box or spring constant of spring. Thus, we can analyse SHM concepts by observing the change in motion by changing these quantities.

Local Library Website can be used by users to save the book and author name. It allows user to maintain record of books in systematic way by providing various options. Hence it is user interactive website which can help you to manage the data properly.

## OVERALL EXPERIENCE

While creating this project I learnt many things and also gained experience on how should we start to learn a particular thing. I have not applied many changes apart from what was taught in tutorial. So that was the part which I thought could have been improved. While

learning simulations I also came to know about other modules in python such as turtle, matplotlib etc.