MATES Computer Science

Senior Capstone Project Bi-Weekly Progress Report

Project Title	TerrapinTracker
Team Members	Angelo Amato, Aidan Henbest, Lisa Hunt
Dates Covered by Report	April 1, 2023 - April 28, 2023
Link to Github	https://github.com/henbestaj/senior-capstone

1. **Summary of Project** **(Provide a one paragraph summary of your project. You can largely copy/paste this from one progress report to the next, unless there are significant changes.)**

   Our plan is to create a website for Project Terrapin that regularly updates the statistics on the growth of the hatchlings cared for both at MATES and other affiliated schools. We will use the measurement data for the growing terrapins and, using Python and JavaScript, create different graphs to display the data. This website will be public and linked to the main Project Terrapin website. The site will update automatically when new data is added from recent measurements. Our project will help to raise awareness of the dangers that face the Northern Diamondback Terrapin species. They are a keystone species in the Barnegat Bay, meaning they are essential to the survival of the ecosystem. Our website will hopefully inspire others to get involved in the protection of terrapins, and potentially let them track the growth of hatchlings they may have found, giving them a more personal connection to the turtle(s) they helped to save.

2. **Summary of Progress this Period** **(Provide a high-level, one paragraph overview of what was accomplished this progress period collectively by the team.)**

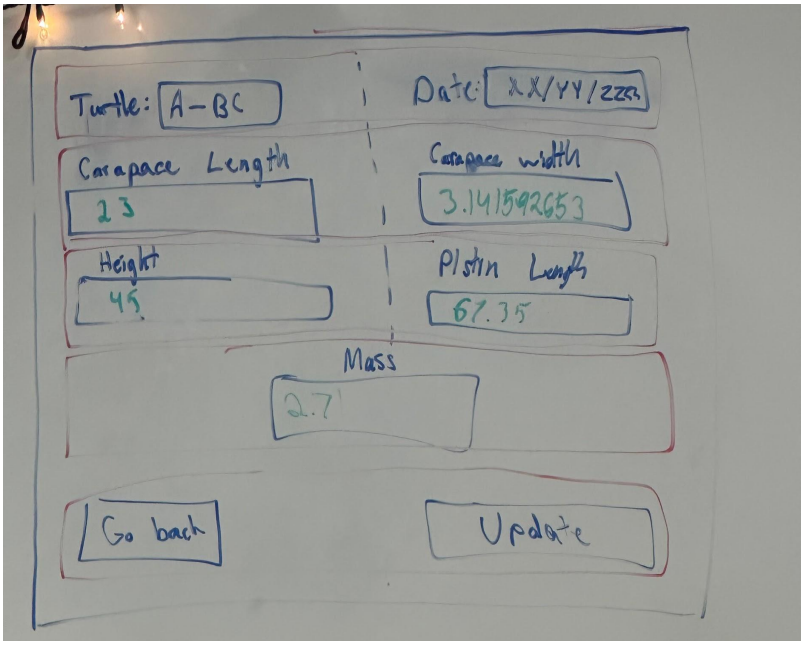
   Our first objective this period was to add sign in capabilities, create graphs for the R groups, and work on the archive page. For the sign in page, users can enter a username and password and it will check if they are valid. When signed in, users can interact with the measurement and turtle edit buttons. If the user is not signed in and clicks the buttons, they will be redirected to the login page. We also

continued working on the current turtles page. The buttons and tables are now styled with CSS, and we have just started styling the edit forms as well. Various graphs (8 total) for each R group are displayed when users click on the R group link.

3. **Detailed Progress this Period, separated by Team Member** **(Provide detailed information on the progress that you made in the reporting weeks. Include screenshots of code, your game or website, etc. Each team member should have a separate subsection covering their accomplishments. Not including screenshots, this section should be 1-2 pages.)**

- **Angelo (Block 2)**

  Over the past few weeks I have primarily worked on styling the pages. I started off by making the sign in page actually work (changed from a blank page). I used Django's functionality for creating a login system. Aidan helped me with getting the actual page to work with the buttons (Django has a built in URL path that I did not know how to integrate). I then had to figure out how to style the input boxes even though they are not correlated with actual HTML in the file. All Django forms are given a specific ID that can be found by inspecting the page. I used these to style the actual log-in page. I added a white background box to both the log-in and contact forms to make them stand out. I then moved on to working with the forms that actually log the turtle's measurements and created new turtles. I have completed working on the "create turtle" page but still need to work on the measurements (I have the design I just need to put it into CSS). I will be using the grid method to do this. The red boxes in the picture below are from divs that I was originally going to use before I remembered that Django forms are a thing.



- **Aidan (Block 3)**

  Over these past few weeks I have primarily worked on the matplotlib graphs and the login page. While we initially tried to use D3.js, this was not working very well so I

suggested we pivot to something we already knew: matplotlib and seaborn. The way that these graphs now work is that everytime a user loads a page with a graph, the graph is created based on the current items in the database and saved to the folder in which all images are saved. Initially, we had a simple file path that was used for all graphs, but I adjusted this so each graph has a different file name.

I also spent lots of time figuring out the login page. Django has a built-in page called "/admin" that allows admin users to edit tables directly, so we are currently using this to create users, as we do not have a sign up page. However, once a user is created, they can now log in easily on the website. Additionally, I worked on making sure the "Log in" button turns into a "Log out" button when the user is logged in. Furthermore, users are now greeted on the homepage with their name when they are logged in.

Besides the login function, I also started working on creating the archived turtles page. I haven't progressed too far as of yet, but I was able to successfully add a column to the database that auto-populates with the year that the turtle was archived. This will make grouping the turtles on the archived page possible.

Finally, I want to go over some smaller things that I've worked on. On the built-in Django "/admin" page, nothing is editable unless you register it to the admin.py file. I figured out how to do this and registered all of our tables, including the Turtle and Measurement tables. This makes it easy for administrators to see all of the rows in these tables and edit whatever they want. Lastly, I made an edit to the about page. I added the college I'll be attending: Worcester Polytechnic Institute!

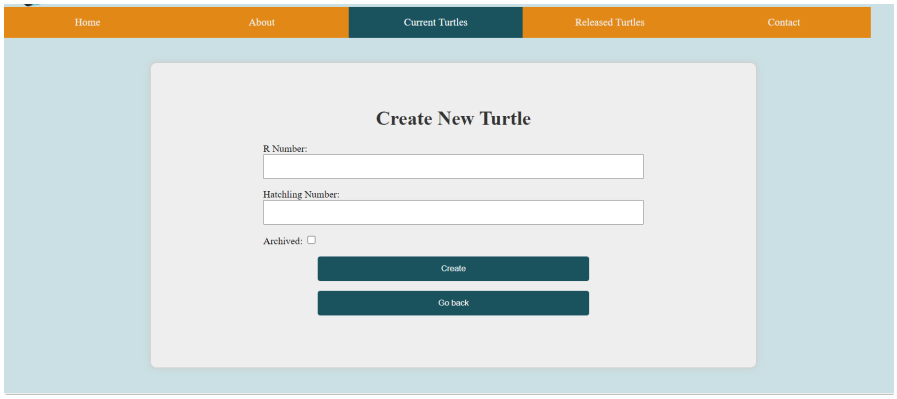
- **Lisa (Block 3)**

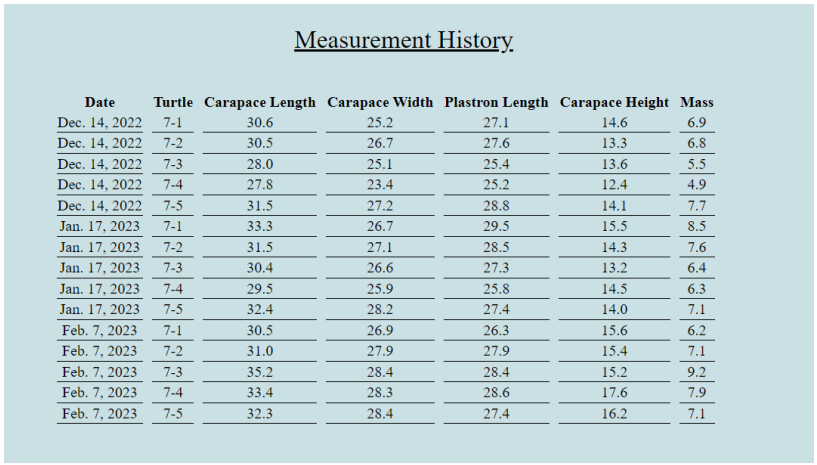
  In the past few weeks, I worked mostly on the current turtles page. We were originally planning on using D3 for graphs, but we switched to seaborn. The data for the graphs is the measurement data sorted by R number and put into lists. I first graphed carapace length and width, using a scatter plot and kde plot. I then did the same for plastron length and carapace height. I then made box plots for carapace length and height over time. I made a histogram showing the mass distribution and then a bar plot of average mass by turtle number.

  I saved all of the graphs to their own file path, which I could save to the static folder and add to the html page. I then went back and styled all the graphs, changing size, color, and labels. I am planning on adding a similar set of graphs to the home page. These graphs will pull all of the turtle data, where I can plot by R group to compare all of the turtle groups in one graph.

  Lastly, I styled the measurement history table and a few other minor elements such as the welcome message, contact sent page, edit buttons, and back buttons.

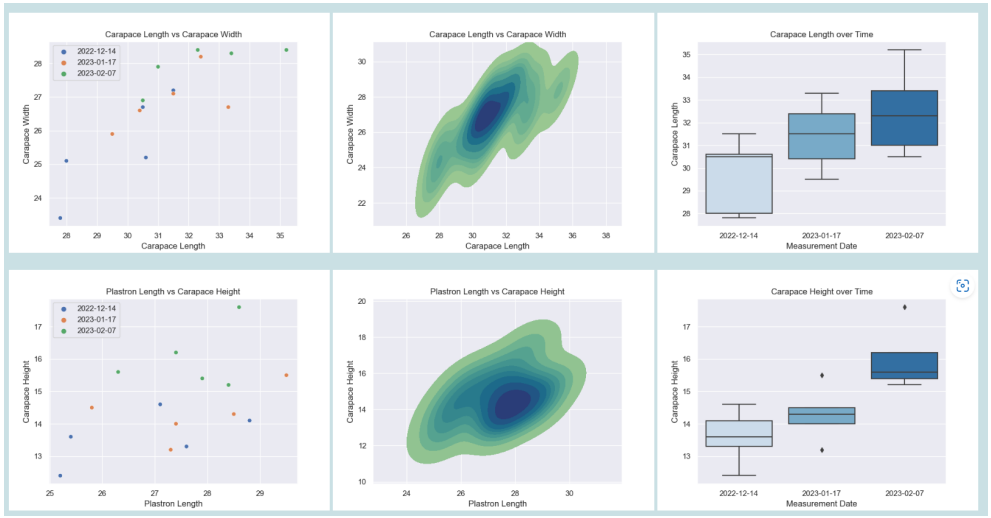
Website:

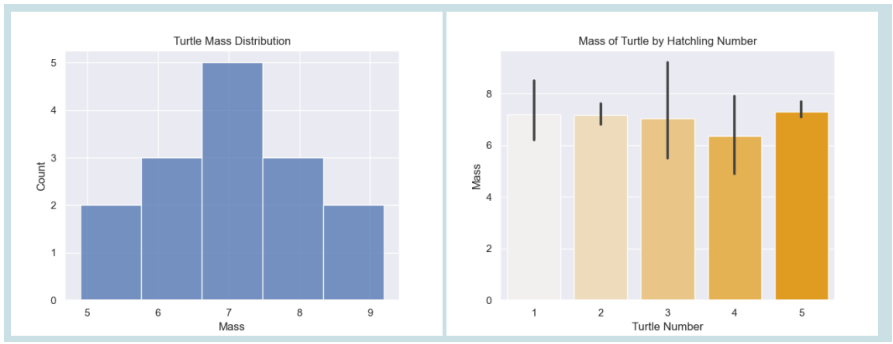


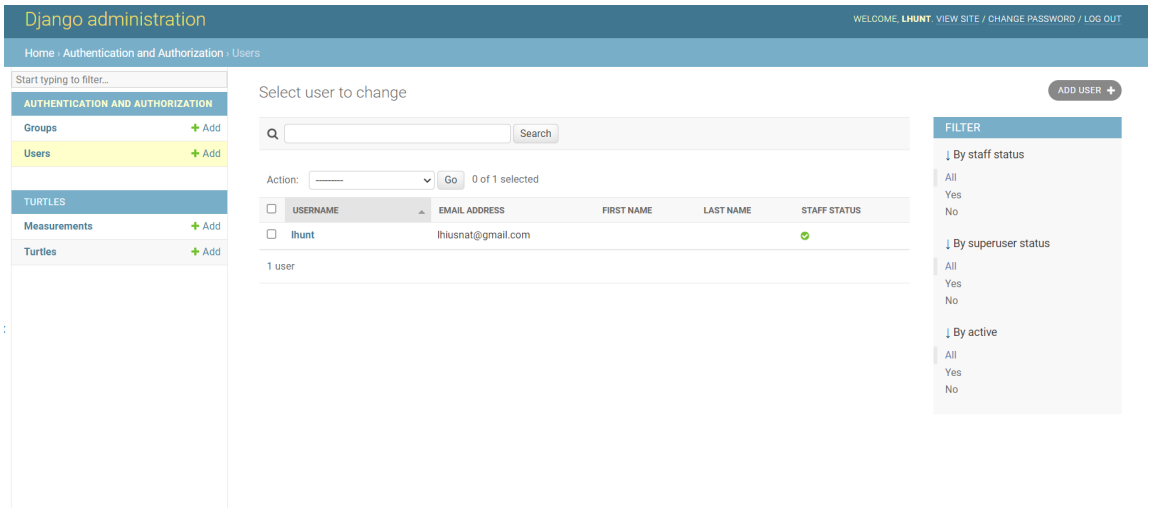


Measurement History

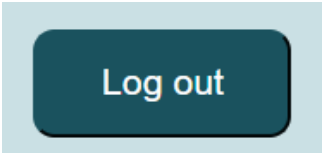
Date	Turtle	Carapace Length	Carapace Width	Plastron Length	Carapace Height	Mass
Dec. 14, 2022	7-1	30.6	25.2	27.1	14.6	6.9
Dec. 14, 2022	7-2	30.5	26.7	27.6	13.3	6.8
Dec. 14, 2022	7-3	28.0	25.1	25.4	13.6	5.5
Dec. 14, 2022	7-4	27.8	23.4	25.2	12.4	4.9
Dec. 14, 2022	7-5	31.5	27.2	28.8	14.1	7.7
Jan. 17, 2023	7-1	33.3	26.7	29.5	15.5	8.5
Jan. 17, 2023	7-2	31.5	27.1	28.5	14.3	7.6
Jan. 17, 2023	7-3	30.4	26.6	27.3	13.2	6.4
Jan. 17, 2023	7-4	29.5	25.9	25.8	14.5	6.3
Jan. 17, 2023	7-5	32.4	28.2	27.4	14.0	7.1
Feb. 7, 2023	7-1	30.5	26.9	26.3	15.6	6.2
Feb. 7, 2023	7-2	31.0	27.9	27.9	15.4	7.1
Feb. 7, 2023	7-3	35.2	28.4	28.4	15.2	9.2
Feb. 7, 2023	7-4	33.4	28.3	28.6	17.6	7.9
Feb. 7, 2023	7-5	32.3	28.4	27.4	16.2	7.1




Turtle Mass Distribution
Count
Mass
0
1
2
3
4
5
6
7
8
9
Mass of Turtle by Hatchling Number
Mass
Turtle Number
1
2
3
4
5

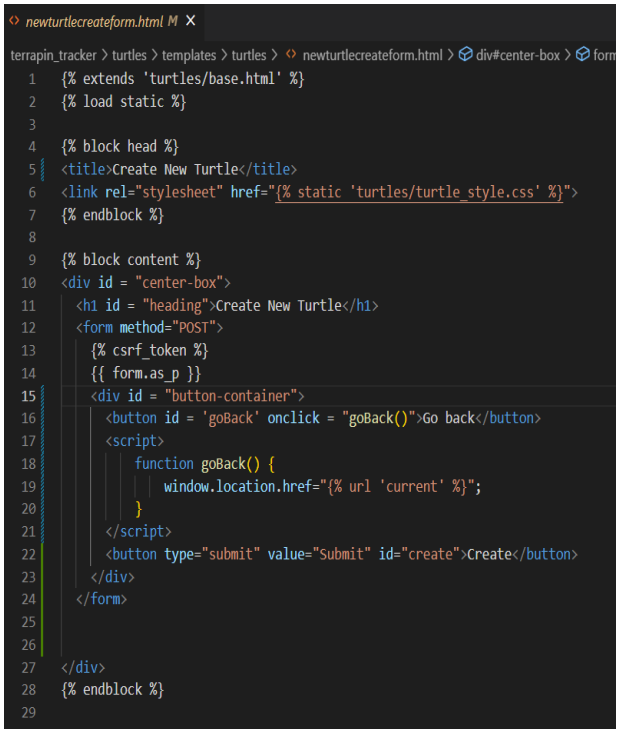

Django administration
WELCOME, LHUNT. VIEW SITE / CHANGE PASSWORD / LOG OUT
Home › Authentication and Authorization › Users
Start typing to filter...
AUTHENTICATION AND AUTHORIZATION
Groups + Add
Users + Add
TURTLES
Measurements + Add
Turtles + Add
Select user to change
ADD USER +
Search
Action: --------- Go 0 of 1 selected
USERNAME
EMAIL ADDRESS
FIRST NAME
LAST NAME
STAFF STATUS
lhunt
lhiusnat@gmail.com
1 user
FILTER
By staff status
All
Yes
No
By superuser status
All
Yes
No
By active
All
Yes
No


Home
Hello Lisa!


Log out

Code:

newturtlecreateform.html



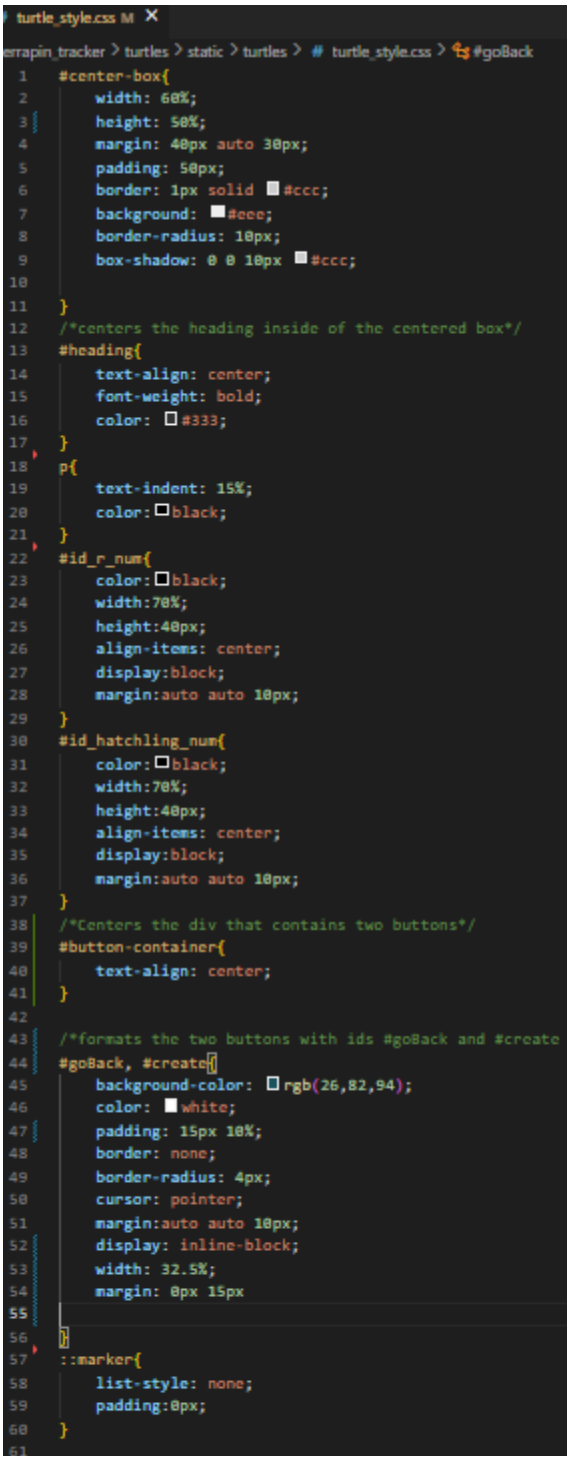
```
{% extends 'turtles/base.html' %}
{% load static %}

{% block head %}
<title>Create New Turtle</title>
<link rel="stylesheet" href="{% static 'turtles/turtle_style.css' %}">
{% endblock %}

{% block content %}
<div id = "center-box">
  <h1 id = "heading">Create New Turtle</h1>
  <form method="POST">
    {% csrf_token %}
    {{ form.as_p }}
    <div id = "button-container">
      <button id = 'goBack' onclick = "goBack()">Go back</button>
      <script>
          function goBack() {
              window.location.href="{% url 'current' %}";
          }
      </script>
      <button type="submit" value="Submit" id="create">Create</button>
    </div>
  </form>


</div>
{% endblock %}
```

turtle_style.css



```
#center-box{
    width: 60%;
    height: 50%;
    margin: 40px auto 30px;
    padding: 50px;
    border: 1px solid #ccc;
    background: #eee;
    border-radius: 10px;
    box-shadow: 0 0 10px #ccc;

}
/*centers the heading inside of the centered box*/
#heading{
    text-align: center;
    font-weight: bold;
    color: #333;
}
p{
    text-indent: 15%;
    color:black;
}
#id_r_num{
    color:black;
    width:70%;
    height:40px;
    align-items: center;
    display:block;
    margin:auto auto 10px;
}
#id_hatchling_num{
    color:black;
    width:70%;
    height:40px;
    align-items: center;
    display:block;
    margin:auto auto 10px;
}
/*Centers the div that contains two buttons*/
#button-container{
    text-align: center;
}

/*formats the two buttons with ids #goBack and #create
#goBack, #create{
    background-color: rgb(26,82,94);
    color: white;
    padding: 15px 10%;
    border: none;
    border-radius: 4px;
    cursor: pointer;
    margin:auto auto 10px;
    display: inline-block;
    width: 32.5%;
    margin: 0px 15px

}
::marker{
    list-style: none;
    padding:0px;
}
```

Graph code:

```
def current_r(request, r_num):
  if r_num != 'script.js':
    r_num = int(r_num)
    date = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num:
        date.append(measurement.date)
    turtle = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num and r_num<=9:
        turtle.append(measurement.display_turtle[2:])
      elif measurement.turtle.r_num == r_num and r_num>9:
        turtle.append(measurement.display_turtle[3:])
    carapace_length = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num:
        carapace_length.append(measurement.carapace_length)
    carapace_width = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num:
        carapace_width.append(measurement.carapace_width)
    plastron_length = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num:
        plastron_length.append(measurement.plastron_length)
    carapace_height = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num:
        carapace_height.append(measurement.carapace_height)
    mass = []
    for measurement in Measurement.objects.all():
      if measurement.turtle.r_num == r_num:
        mass.append(measurement.mass)
```

```
fig, ax = plt.subplots()
sns_plot = sns.scatterplot(ax=ax, x=carapace_length, y=carapace_width, hue=date).set_title('Carapace Length vs Carapace Width')
ax.set_xlabel( "Carapace Length" , size = 12 )
ax.set_ylabel( "Carapace Width" , size = 12 )
file_path = './turtles/static/turtles/plot_r' + str(r_num) + 'lengthvswidthscatter.png'
fig = sns_plot.get_figure()
fig.savefig(file_path)
plt.clf()

fig, ax = plt.subplots()
sns_plot = sns.kdeplot(ax=ax, x=carapace_length, y=carapace_width, fill=True, cmap="crest").set_title('Carapace Length vs Carapac
ax.set_xlabel( "Carapace Length" , size = 12 )
ax.set_ylabel( "Carapace Width" , size = 12 )
file_path = './turtles/static/turtles/plot_r' + str(r_num) + 'lengthvswidthkde.png'
fig = sns_plot.get_figure()
fig.savefig(file_path)
plt.clf()

fig, ax = plt.subplots()
sns_plot = sns.boxplot(ax=ax, x=date, y=carapace_length, palette='Blues').set_title('Carapace Length over Time')
ax.set_xlabel( "Measurement Date" , size = 12 )
ax.set_ylabel( "Carapace Length" , size = 12 )
file_path = './turtles/static/turtles/plot_r' + str(r_num) + 'datevslengthbar.png'
fig = sns_plot.get_figure()
fig.savefig(file_path)
plt.clf()
```

```
#goback {
  background-color: rgb(26,82,94);
  border-radius: 10px;
  height: 15px;
  width: 60px;
  display: block;
  text-align: center;
  text-justify: center;
  border-color: rgb(26,82,94);
  color:white;
  font-size: 15px;
  margin-top:10px;
  /* margin-left: auto;
  margin-right: auto; */
  padding: 10px;
  text-decoration: none;
}

#goback:hover {
    cursor:pointer;
    background-color:rgb(45, 125, 143);
    text-decoration: underline;

  }
#goback:active {
    background-color:rgb(65, 145, 163);
    color: black;
    text-decoration: none;
  }
```

```
4   {% block head %}
5   <title>New Turtle</title>
6   <link rel="stylesheet" href="{% static 'turtles/current_s
7   {% endblock %}
8
9   {% block content %}
10  <h1>New Measurement</h1>
11  <form method="POST">
12    {% csrf_token %}
13    {{ form.as_p }}
14    <input type="submit" value="Submit"/>
15  </form>
16  <a href="{% url 'current' %}" id="goback">Go back</a>
17  {% endblock %}
```

```
.table-box {
  margin-top: 40px;
  margin-left: 350px;
  text-align: center;
  background-color: none;
}
.measurement-table {
  border-spacing: 10px 1px;
}
.measurement-table td {
  margin: 1px 10px 1px 10px;
  align-items: center;
  align-content: center;
  border-bottom: 1px black solid;
  text-align: center;
}
.turtle-button:hover {
    cursor:pointer;
    background-color:rgb(45, 125, 143);
    text-decoration: underline;
    color: black;
  }
.turtle-button:active {
    background-color:rgb(65, 145, 163);
    color: black;
    text-decoration: none;
  }
```

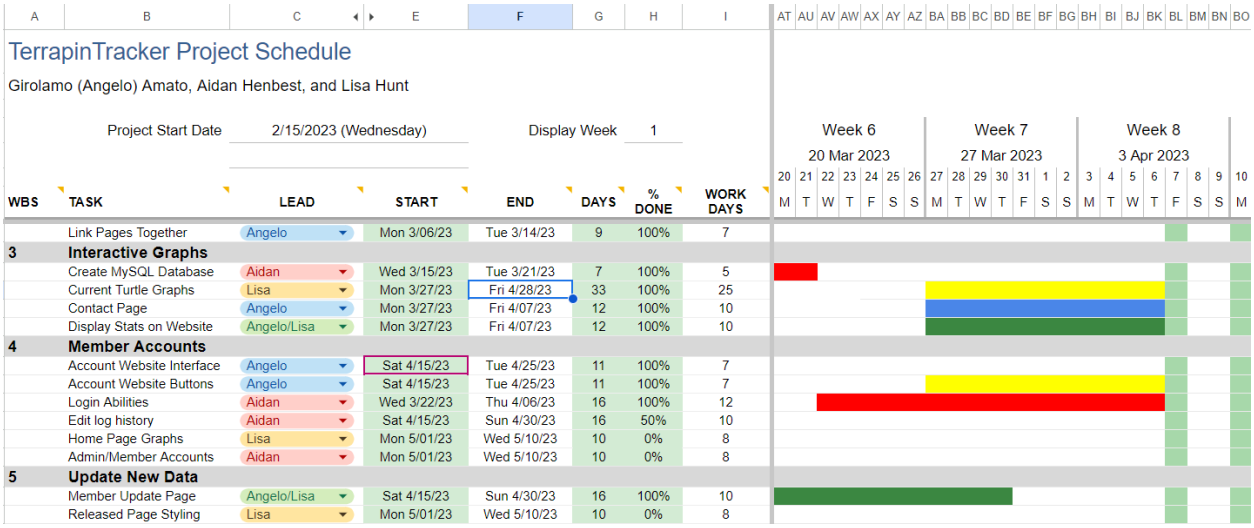
4. **Difficulties Encountered this Progress Period** **(Provide detailed information on the difficulties and issues that you encountered in the reporting weeks. Discuss mitigation strategies for how you got around or plan to get around these issues.)**

   One difficulty we faced this period was using D3 to create the current turtle graphs. We spent a few days trying to get it to work, but the graphs never displayed on the website. We ended up switching to matplotlib at that point. With matplotlib, there were issues with using datetime: any time we tried to make a graph using date an error would happen. To fix this, we switched to seaborn for all of the graphs. Another problem that we had to fix was with using R group general data rather than individual turtle data. We found out from Project Terrapin members that when they measure the turtles, they only ID them within their R groups: individual turtle numbers could change from week to week. Because of this, we had to change the graphs to plot R group data and not a specific turtle's measurements: data would display 'R group 3 mass distribution' rather than 'turtle 3-1 mass distribution'. We had another small error within the r group loop, where the value of r number took a default value of 'script.js,' but we were able to fix it with a simple if statement. Django will automatically create HTML elements for forms. The issue with this comes into play when it needs to be styled using CSS. I could not figure out what tag to use for formatting. We figured it out using inspect that they all have an id that is "id_columnName." Another difficulty we encountered was that we initially forgot to include plt.close() after creating each graph, which caused errors, but we eventually determined this was the issue and fixed it. Additionally, matplotlib defaults to trying to open the graph as a pop-up on the computer, which would also create errors, since this was not possible. To solve this problem we added a line of code after we imported matplotlib: matplotlib.use('Agg').

5. **Updated Gantt Chart and Discussion** **(Provide screenshot of and link to updated Gantt Chart. Discuss any changes made to chart since last progress report and why.)**

   Link:
   https://docs.google.com/spreadsheets/d/1oi-GrYyScA3wGwhdOlGVoMxVTLk26KTI/edit?usp=sharing&ouid=117504571525022214060&rtpof=true&cd=true

   We did a lot of tasks out of order so some dates were swapped around. Also, we deleted some tasks from the table since we ended up completing them while working on other tasks; they should have been a combined task. We also added some new tasks and changed around who completed each task.

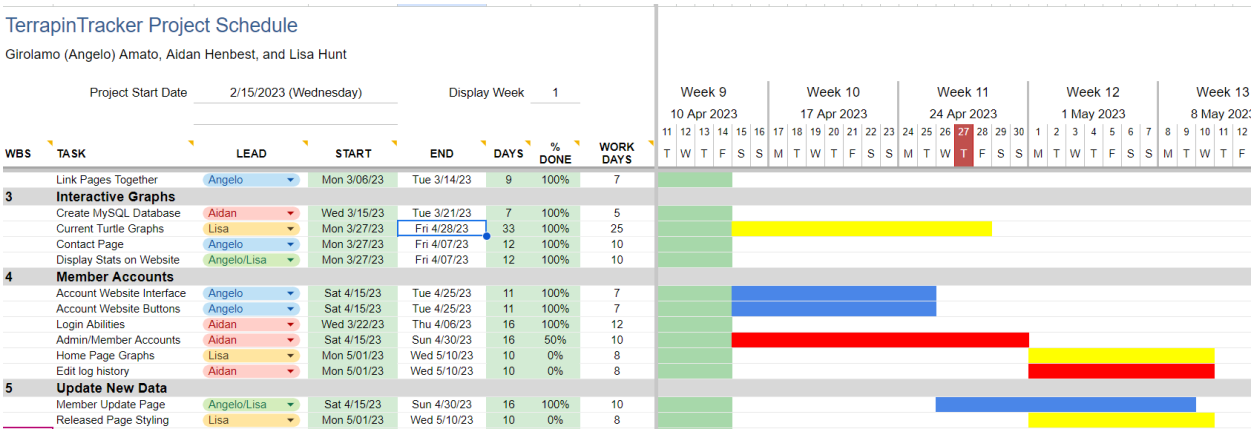


TerrapinTracker Project Schedule

Girolamo (Angelo) Amato, Aidan Henbest, and Lisa Hunt

Project Start Date: 2/15/2023 (Wednesday) — Display Week: 1

WBS	TASK	LEAD	START	END	DAYS	% DONE	WORK DAYS
	Link Pages Together	Angelo	Mon 3/06/23	Tue 3/14/23	9	100%	7
3	**Interactive Graphs**						
	Create MySQL Database	Aidan	Wed 3/15/23	Tue 3/21/23	7	100%	5
	Current Turtle Graphs	Lisa	Mon 3/27/23	Fri 4/28/23	33	100%	25
	Contact Page	Angelo	Mon 3/27/23	Fri 4/07/23	12	100%	10
	Display Stats on Website	Angelo/Lisa	Mon 3/27/23	Fri 4/07/23	12	100%	10
4	**Member Accounts**						
	Account Website Interface	Angelo	Sat 4/15/23	Tue 4/25/23	11	100%	7
	Account Website Buttons	Angelo	Sat 4/15/23	Tue 4/25/23	11	100%	7
	Login Abilities	Aidan	Wed 3/22/23	Thu 4/06/23	16	100%	12
	Edit log history	Aidan	Sat 4/15/23	Sun 4/30/23	16	50%	10
	Home Page Graphs	Lisa	Mon 5/01/23	Wed 5/10/23	10	0%	8
	Admin/Member Accounts	Aidan	Mon 5/01/23	Wed 5/10/23	10	0%	8
5	**Update New Data**						
	Member Update Page	Angelo/Lisa	Sat 4/15/23	Sun 4/30/23	16	100%	10
	Released Page Styling	Lisa	Mon 5/01/23	Wed 5/10/23	10	0%	8



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	Create MySQL Database	Aidan	Wed 3/15/23	Tue 3/21/23	7	100%	5
	Current Turtle Graphs	Lisa	Mon 3/27/23	Fri 4/28/23	33	100%	25
	Contact Page	Angelo	Mon 3/27/23	Fri 4/07/23	12	100%	10
	Display Stats on Website	Angelo/Lisa	Mon 3/27/23	Fri 4/07/23	12	100%	10
4	**Member Accounts**						
	Account Website Interface	Angelo	Sat 4/15/23	Tue 4/25/23	11	100%	7
	Account Website Buttons	Angelo	Sat 4/15/23	Tue 4/25/23	11	100%	7
	Login Abilities	Aidan	Wed 3/22/23	Thu 4/06/23	16	100%	12
	Admin/Member Accounts	Aidan	Sat 4/15/23	Sun 4/30/23	16	50%	10
	Home Page Graphs	Lisa	Mon 5/01/23	Wed 5/10/23	10	0%	8
	Edit log history	Aidan	Mon 5/01/23	Wed 5/10/23	10	0%	8
5	**Update New Data**						
	Member Update Page	Angelo/Lisa	Sat 4/15/23	Sun 4/30/23	16	100%	10
	Released Page Styling	Lisa	Mon 5/01/23	Wed 5/10/23	10	0%	8

6. Tasks to Be Worked on in Next Progress Period (Discuss the tasks to be worked on in the following two weeks. Discuss who is working on each.)

Angelo	Aidan	Lisa

• Finish measurements page
• Change <a> tags on "current" page to <button> tags (makes it so you can click on the whole thing and not just the text to get to the page)
• Talk to Project Terrapin Leaders about integrating
• misc. styling through website
• add media queries
• form validation
	• Complete archive page backend
	  ○ Sort archived turtles by year, r number, and turtle number
	  ○ Prevent archived turtles from displaying on the current turtle page
	• Create search function
	• Start working on the measurement edit history
		• Create general graphs for the home page
		  ○ Display by R group
		• Style archive page and display released turtles by year
		• Change individual turtle buttons on current page
		  ○ Replace with R group buttons
		• Change graph example and change wording
		  ○ change titles

	○ Allow users to click on any measurement to see the edit history of that measurement	

7. **Additional Information** **(Provide any additional information that you want to provide in this section; for example, one of your teammates is going away next week, your Github account is gone, etc. It could be good news as well.)**

   Lisa and Aidan will be out for the robotics trip on 05/17/2023 to the BlueClaws. This is the same kind of trip that many people were out for this past week, but we are doing it again.