Team Number: Group 32

Project Title: Multiple Drones Coordination System

Report Date: 2/3/2025

Part one:

All team members have detailed tasks listed on Teams Planner: YES or NO; if NO, explain.

No, we currently have tasks for short-term, mid-term, and long-term, we are just waiting to confirm deadlines that are reasonable and sufficient for each member.

Please answer the following questions:

1.   Have you met as a team this past week? If yes, give date/time, and the members attended the meeting. If no, explain.

No, we have finally been able to get in contact with everyone and set a meeting for this upcoming week.

2.   Have you met with the sponsor as a team? If yes, give date/time, and the member attended the meeting. If no, explain.

Not yet, we haven't had a meeting scheduled from the sponsor this semester yet.

3.   Describe verbally the tasks completed the past week and the challenges faced.

In the past week, we have collaborated on the project demo for the live

presentation on 2/10. We face challenges of not being able to have everyone present

but have since then rectified these issues.

4.   Describe the tasks to be completed the coming week.

Brenden M. (Simulation Management Subsystem)

- Complete the dynamic weather simulator implemented into our 3D Environment.
- Present for the live project demo presentation.

Matthew P.(User Interface)

- Start planning for the implementation for real-time data updates from AirSim.
- Optimize UI performance to handle large-scale simulation data smoothly.
- Conduct further testing to ensure synchronization between UI components and real-time drone operations.

Tutku Gizem G. (Target Detection Subsystem)

- Refining the Target Detection Subsystem

  Improving the accuracy and speed of the machine learning model for real-time data processing.

Matthew Wyatt (Data Management and Communications Subsystems)

- Sync data with AirSim and work to bring communications between other subsystems.
- Coordinate with other subsystem teams to align and integrate all components smoothly.

Student Name	# Tasks completed past week	# Tasks not completed	# Tasks for next week
Brenden Martins	1	1	2
Matthew Paternoster	1	0	3
Matthew Wyatt	1	2	2
Tarek Kayali	N/A	N/A	N/A
Tutku Gizem	1	1	1

Name of the Member: Brenden Martins

Report Date: 02/02/2025

List the following:

1.   All tasks completed the past week (in this example template, tasks between 1/20 and 1/26) (completion date in parenthesis) <mark style="background-color:#00ff00">Highlight these tasks headers in green.</mark>

<mark style="background-color:#00ff00">**Finished Working on Demo Presentation (2/9/2025)**</mark>

- Description:

    - The large majority of this week was spent preparing for the demo presentation on 2/10.
    - Collaborated on a powerpoint presentation for the demo.

- Outcome:
    - Created a powerpoint presentation to showcase our progress with the project so far.

2.   Tasks you attempted but did not get to complete due to time constraints or other factors in the week (in this example template, tasks between 1/20 and 1/26).

<mark style="background-color:red">**Integration of Dynamic Weather System (02/02/25)**</mark>

- Description:

- ○ Able to implement a rudimentary weather system.

- ○ Have to figure out how to get the weather to properly render from the start point of said weather.

- ○ Did not complete fully due to time spent working on getting the demo straightened away.

- ○ Attempted to implement AirSim's built-in weather system to introduce rain, wind, and fog variations dynamically.

- ● Outcome:

  - ○ Identified the core issue related to UE4's volumetric fog rendering affecting visibility calculations in AirSim.

  - ○ Next steps involve adjusting lighting settings and testing weather interpolation effects for smooth transitions.

Name of the Member: **Matthew Paternoster**

Report Date: **02/02/2025**

List the following:

1.   All tasks completed the past week (in this example template, tasks between 1/20 and 1/26) (completion date in parenthesis) <mark style="background-color:#00ff00">Highlight these tasks headers in green.</mark>

2.   Tasks you attempted but did not get to complete due to time constraints or other factors in the week (in this example template, tasks between 1/20 and 1/26). <mark style="background-color:red">Highlight these tasks in red.</mark> (attempt date in parenthesis)

<mark style="background-color:#00ff00">For **each** task you have completed **during the past week**:</mark> **Avoid leaving filler or template text in your reports**

1.   <mark style="background-color:#00ff00">Task #1/Completion of MDCS Press Release Document</mark>

2.   Short description – these descriptions form the basis of the final project report

> a.   Implementation:
>
> > - <mark style="background-color:#00ff00">Made UI enhancements to improve the usability of the platform for first responders.</mark>
> > - <mark style="background-color:#8b0000">Finalizing improvements to AI coordination.</mark>
> > - <mark style="background-color:#8b0000">Additional debugging was required to ensure seamless communication between multiple drones.</mark>
> > - <mark style="background-color:#8b0000">Integrate UI with AirSim for Real-time data updates.</mark>
>
> b.   Results:
>
> > Initial testing provided valuable feedback on coordination challenges, particularly in obstacle avoidance and multi-drone synchronization.

3.   Outcome of the task activity

> **Identifying Optimization Needs:** Testing revealed areas requiring further refinement, particularly in large-scale disaster simulations.
>
> **Improving User Experience:** UI enhancements made the system more intuitive for disaster management teams.

Providing a Roadmap for Next Steps: This week's work set the foundation for scaling up test scenarios and refining.

Next Steps:

- Continue refining target detection and obstacle avoidance.
- Integrate UI with AirSim and real-time data updates.

Name of the Member: Tutku Gizem Guder

Report Date: 2/2/2025

1. All tasks completed the past week (in this example template, tasks between 1/26 and 2/2) (completion date in parenthesis)

I managed to implement object detection and maintained a safe distance to the object or person. I was also able to ensure object following with the addition to clearing one object to follow the next one. I think this could still use some calibration but so far, this was one of the most resultful weeks.

2. Tasks you attempted but did not get to complete due to time constraints or other factors in the week (in this example template, tasks between 1/26 and 2/2).

Developing Complex Scenarios and Testing:

I still need to fine-tune the model and add complex real-life scenarios for testing before deploying it in real-life.

Name of the Member: Matthew Wyatt

Report Date: 2/3/2025

List the following:

1.   All tasks completed the week before the past week (completion date in parenthesis). This is copied from the last report, and if this report is the first one, skip.

    a. (1/26/2025) <mark>Requirement Analysis</mark>

    Description: Analyzed the project requirements based on the proposal. This involved understanding the scope, objectives, and deliverables of the project. Outcome: Established a clear understanding of the project requirements, which will guide the subsequent phases of the project.

    b. (1/26/2025) <mark>Database Review Part I</mark>

    Description: Reviewed the MySQL database that was already created to ensure it meets the project requirements. This involved checking the schema, data integrity, and relevance of the data.
    Outcome: Confirmed that the MySQL database itself is suitable for the project, ensuring that we have access to the necessary data. However, we may need to migrate the location of the server.

    c. (2/2/2025) <mark>Database Review Part II</mark>

    Description: Continued evaluation and optimization of the MySQL database to ensure data quality and performance.
    Outcome: Optimized the MySQL database for better performance and confirmed its readiness for integration with AirSim.

    d. (2/2/2025) <mark>API Review</mark>

    Description: Reviewed the existing API created to sync data between the UI and MySQL.
    Outcome: Confirmed that the API is suitable for syncing data between the UI and MySQL, ensuring seamless data flow and integration.

2.   All tasks completed the past week (completion date in parenthesis)

    a. <mark>MySQL Server Migration</mark>

    Description: Migrated the MySQL server from lamp.cse.fau.edu to Freesqldatabase.com to work outside of the internal network. This will allow for easier collaboration and demonstration for the final project.

Outcome: The MySQL server is now accessible from outside the internal network, facilitating collaboration and demonstration.

Sample Code:

```javascript
JS index.js > ...
26
27     // Create a new record via direct link with URL parameters
28     app.get('/records/create/:name/:latitude/:longitude', (req, res) => {
29         const record = {
30             name: req.params.name,
31             description: `Location: Latitude ${req.params.latitude}, Longitude ${req.params.longitude}`
32         };
33         connection.query('INSERT INTO records SET ?', record, (err, results) => {
34             if (err) {
35                 console.error('Error inserting record:', err);
36                 res.status(500).json({ error: 'Error inserting record', details: err });
37                 return;
38             }
39             console.log('Record inserted via link');
40             res.status(201).json({ message: 'Record inserted via link', id: results.insertId });
41         });
42     });
43
44     // Create a new record
45     app.post('/records', (req, res) => {
46         const record = req.body;
47         connection.query('INSERT INTO records SET ?', record, (err, results) => {
48             if (err) {
49                 console.error('Error inserting record:', err);
50                 res.status(500).json({ error: 'Error inserting record', details: err });
51                 return;
52             }
53             console.log('Record inserted');
54             res.status(201).json({ message: 'Record inserted', id: results.insertId });
55         });
56     });
57
```

Sample API Output:

localhost:3000/records/create/Drone1/34.0522/-118.2437

Pretty-print ☐

`"message":"Record inserted via link","id":3}`

localhost:3000/records

Pretty-print ☐

`[{"id":1,"name":"AirSim Sample 1","description":"Sample data for AirSim 1","created_at":"2025-02-10T08:00:06.000Z"},{"id":2,"name":"AirSim Sample 2","description":"Sample data for AirSim 2","created_at":"2025-02-10T08:00:06.000Z"},{"id":3,"name":"Drone1","description":"Location: Latitude 34.0522, Longitude -118.2437","created_at":"2025-02-10T10:26:41.000Z"},{"id":4,"name":"Drone2","description":"Location: Latitude 37.7749, Longitude -122.4194","created_at":"2025-02-10T10:27:35.000Z"},{"id":5,"name":"Drone3","description":"Location: Latitude 40.7128, Longitude -74.0060","created_at":"2025-02-10T10:27:40.000Z"}]`

Sample Database:

				id	name	description
☐	Edit	Copy	⊖ Delete	1	AirSim Sample 1	Sample data for AirSim 1
☐	Edit	Copy	⊖ Delete	2	AirSim Sample 2	Sample data for AirSim 2
☐	Edit	Copy	⊖ Delete	3	Drone1	Location: Latitude 34.0522, Longitude -118.2437
☐	Edit	Copy	⊖ Delete	4	Drone2	Location: Latitude 37.7749, Longitude -122.4194
☐	Edit	Copy	⊖ Delete	5	Drone3	Location: Latitude 40.7128, Longitude -74.0060

3.   All tasks you are currently working on or planned for this coming week (completion date in parenthesis)

     a. (2/9/2025) Subsystem Data Integration (multiple weeks)

        Description: Integrate the MySQL database with AirSim using identified APIs as well as meet up with the other subsystem components (UI, AirSim, etc.) to coordinate and advance the integration efforts.
        Desired outcome: Enable the simulation to use real-world data and ensure all subsystems are aligned and integrated smoothly to progress the project effectively.

     b. (2/9/2025) Data Syncing

        Description: Ensure that the data between the MySQL database and AirSim remains synchronized.
        Desired outcome: Maintain data consistency between the database and the simulation environment.