# CS7CS3 Advanced Software Engineering Group Project

# Requirements/Use Cases

# Project Name: *Please enter here*

**Group: *<Group Number>***

***<List of Group Members>***

# 1. Use Case Diagram

Please include a UML Use Case Diagram (see slides on Blackboard) for the project.

*Diagram here.*

*<From <single use case description start> to <single use case description end> contains the structure of the information that should be here for* ***each*** *use case. Copy and fill all sections for* ***EACH******USE CASE****>*

*<single use case description start>*

### Use Case Name: Data Pipeline

1. Description

*Describe the goals and responsibilities of the Use Case*

*Goals:*

1. Every 5 minutes, retrieve the latest live Luas, Dublin Bus, Dublin Bikes and Events data from external data sources.
2. From this live data, predict the next 24 hours of data.
3. Live & predicted data is transformed into data suitable for visualization.
4. Statistics are calculated based on most recent live data and historical statistics kept in backend database.
5. Transformed data is passed to the Web Service Provider, which will publish data to all local databases on user devices.

*Responsibilities:*

1. The Data Pipeline is responsible for retrieving live data for all data indicators, using this data to generate predicted data for offline use, and converting (transforming) this data into geo-markers for vehicles, bus stop locations, bike station usage statistics etc., which is then passed to Firebase.

Actors

*List the actors that are involved, and their roles in the Use Case*

1. Live Data Handler – Every 5 minutes, it retrieves the live data for each data indicator and passes it to the Prediction Engine, beginning the Data Pipeline process.

Triggers and Inputs

*List and describe the triggers that start this use case executing, and the subsequent inputs*

Triggers:

* 1. Every 5 minutes, the Live Data Handler begins the process by retrieve the external live data and passing it to the Prediction Engine

Inputs:

No inputs. The Use Case will execute in the same manner each time.

2. Flow of Events

1. **Live Data Handler** validates the external APIs and retrieves the live data for each data indicator. This data is passed to the Prediction Engine.
2. **Prediction Engine** uses the live data to predict the next 24 hours of data, using a pre-trained prediction model. Live and predicted data is passed to the Data Transformer
3. **Data Transformer** converts live and predicted data to data that can be visualised in our UI (i.e. map markers). It also calculates statistics (e.g. CO2 emissions) from the live and predicted data **and** using previously calculated historical statistics kept in the **Backend DB**. All transformed data is pushed to the **Web Service Provider,** new statistics are pushed to the **Backend DB**.
4. On receiving new data, **Web Service Provider** will publish the updated data to registered devices.

3. Special Requirements

This data requires the existence of external live data sources for each of the data indicators

4. Preconditions

*Describe what must be have occurred previously for this use case to execute*

This use-case has no pre-conditions, as it is the basis of our systems. All other use cases will depend on the operation of this use case.

5. Postconditions

On completion, the Web Service Provider will contain transformed data for the current 5 minute window (from live data) and for every 5 minute window for the next 24 hours (from predicted data). This data will be pushed to all registered devices.

In the case that a user’s device is unable to connect to the Web Service Provider, each device will contain enough predicted data to operate the application for 24 hours from when they were last online.

*<single use case description end>*