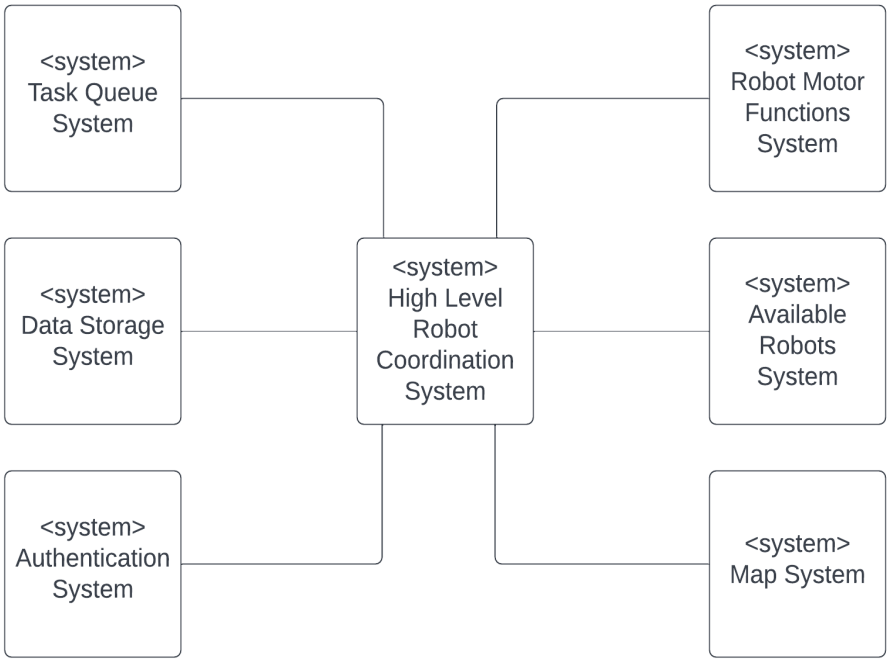
Robot Coordinate System Design

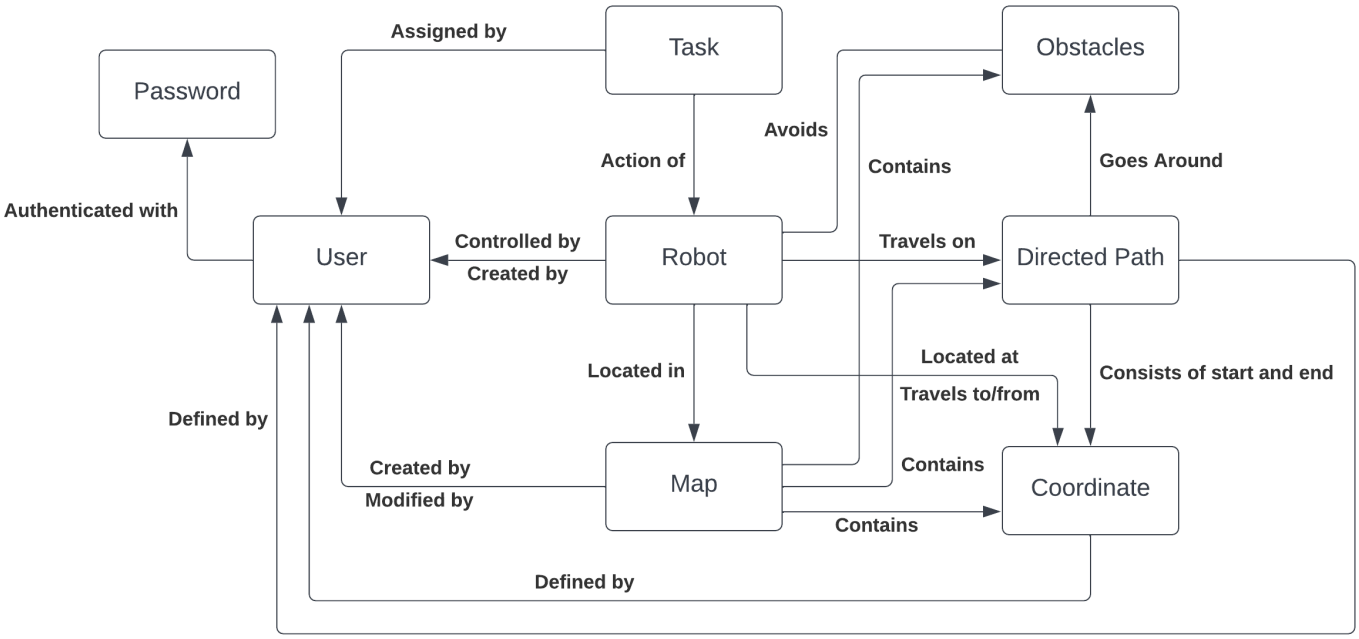
CS 3354.004 – Ethan Fischer

Context Model



- The Task Queue System manages the "to-do" list for the robots, the robot coordinate system can pull from this list and assign tasks to robots depending on their location on the map. This system is responsible for ensuring the non-functional requirement that the system must be reusable and flexible for many different use cases.
- The Data Storage System manages and stores all the user and robot data for the robot coordinate system and can be expanded to provide more memory for a robot coordinate system with massive amounts of robot and user data. This system is responsible for ensuring the non-functional requirement of pre-allocating the proper memory for better performance and scalability to allow for large maps.
- The Authentication System manages authentication so that only registered users can access and make changes to the robot coordinate system, keeping the system secure. This system is responsible for ensuring the non-functional requirement that the system is implemented with security to keep the users' data safe.
- The Map System manages all of the map data like map size, locations of obstacles to the robots, elevation change, etc. The robot coordinate system pulls this information when creating paths for the robots.
- The Available Robots System manages the list of all robots in the system and shows the robot coordinate system which robots are busy and which robots are available for a new task.
- The Robot Motor Functions System controls each robot's motor functions, allowing the robot coordinate system to move the robots to their destination. This system is responsible for ensuring the non-functional requirement that the system is backwards compatible with all hardware so that users don't run into any issues with their robots.

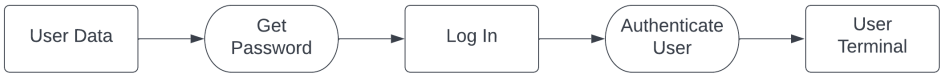
Structure Model



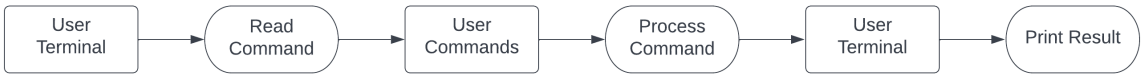
- The user controls and defines everything in the system and is authenticated with a password.
- A password is a key used to ensure the user is a registered user.
- The map is a layout for the coordinate system and contains user defined coordinates and directed paths between those coordinates, as well as immovable objects called obstacles.
- Tasks are assigned by the user and are actions to be done by the robots.
- Robots are located at a coordinate in the map and travel along directed paths, avoiding obstacles.
- Obstacles are objects on the map that the robots cannot pass through or over.
- A coordinate is a location on the map, a robot can be placed at this location and can travel to it if it is open.
- A directed path is a path between 2 coordinates, from point A to point B.

Dynamic Sequence Diagrams

Authentication Sequence



User Command Sequence



Move Robot Sequence