Library Autonomous Robot Service (L.A.R.S.)

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Problem Statement

Automating the organization of books in a library takes a lot of effort. Checking for items whether they are present around to be organized can be a challenging task while finding the best paths in a dynamic environment. This requires a solution that is optimal to improve efficiency and makes a librarian's life easier.

Motivation

Imagine you are a librarian and your job is to re-organize all the books people leave lying around randomly after they are done.You need to pickup the book and put it in its place. You also need to keep track of any new books being randomly left around. You need to also make sure you take the best path to place the book in its place. Using robots, we can automate the system to make the process less cumbersome.

Approach

Environment: Library with books lying around, bins(for placing books), random book spawner and book organizing bot (TurtleBot).

Algorithms: Determining the best path for the robot towards a book and then to the designated bins. An ideal path avoids any obstacles in the form of randomly spawned books and travels from the source to destination in the shortest time. In cases when there is no viable path, we introduce a wait state. Use Searching algorithms like (A*, BFS and others) and also develop heuristics to select the best path to the destination.

Metrics to check:

- Books are picked and placed in an efficient order
- Time effective
- Places all books and avoid starvation
- Smartly calculates path

Task Assignment

1. Simulating efficient dynamic spawning of books (Arpith and Khalid)
2. Designing new services (Arpith)
3. Design a priority metric to pick and place books (Manish)
4. Create new .sdf files for books and .srv files for new services (Manish)
5. Dynamic path recalculation for obstructed paths (Tanush)
6. Allow spawning of books only at integer points on the grid (Khalid)
7. Developing the path-finding algorithm (Tanush)
8. Creating data structures to dynamically allocate object information efficiently (Khalid)