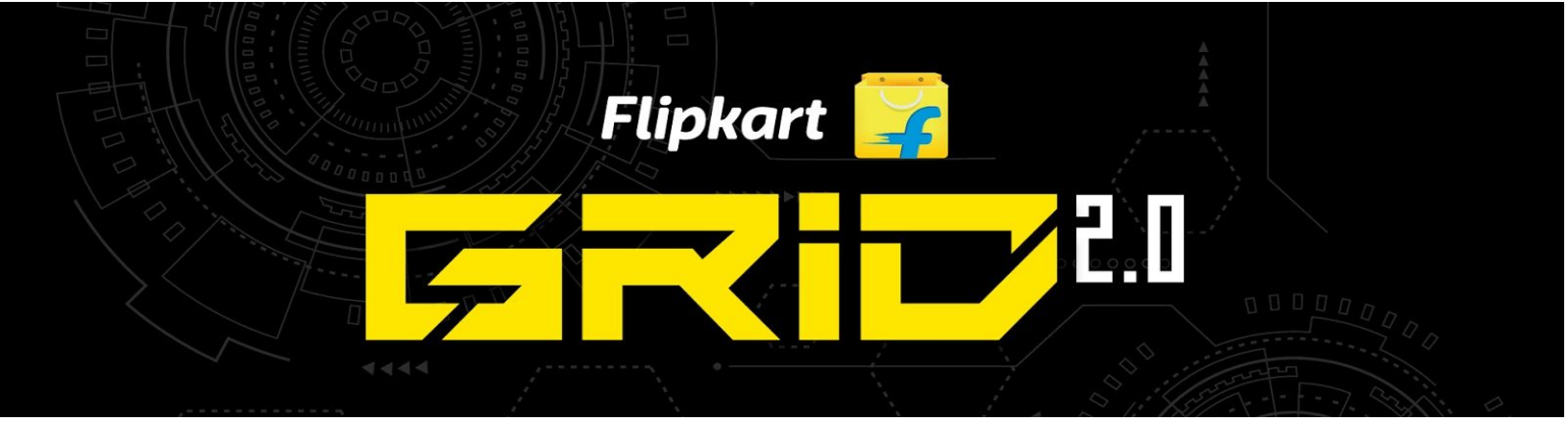


Autonomous Stair Climbing Robot

Brief

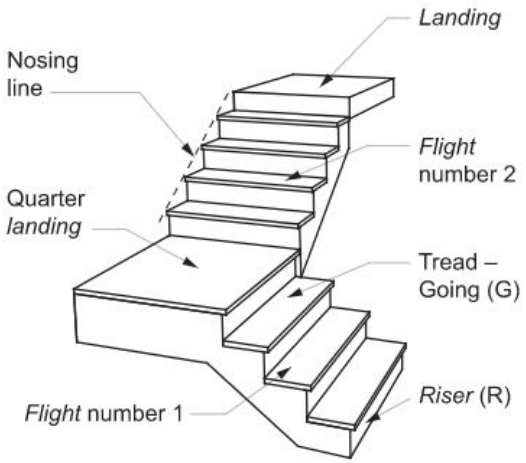
In an e-commerce scenario the last mile delivery is the phase where the customer experiences / receives his desired ordered item. Sophistication in Handling and delivery of the items will ensure customer confidence. Robots can be used to assist the ‘wish masters’ make deliveries ergonomical resulting in efficient delivery.

This kind of automation can make a really good case for delivery of large items like Fridges/Washing Machines etc. in multi-floor apartments without lifts. They can also find applications in good movements within the warehouse.

Details

1. **Objective :**
   The robot needs to demonstrate the following capabilities:
   a. It must be able to climb up and down a flight of stairs without dropping the package
   b. The robot must be able to turn on a quarter landing and re-align it to the next flight of stairs.

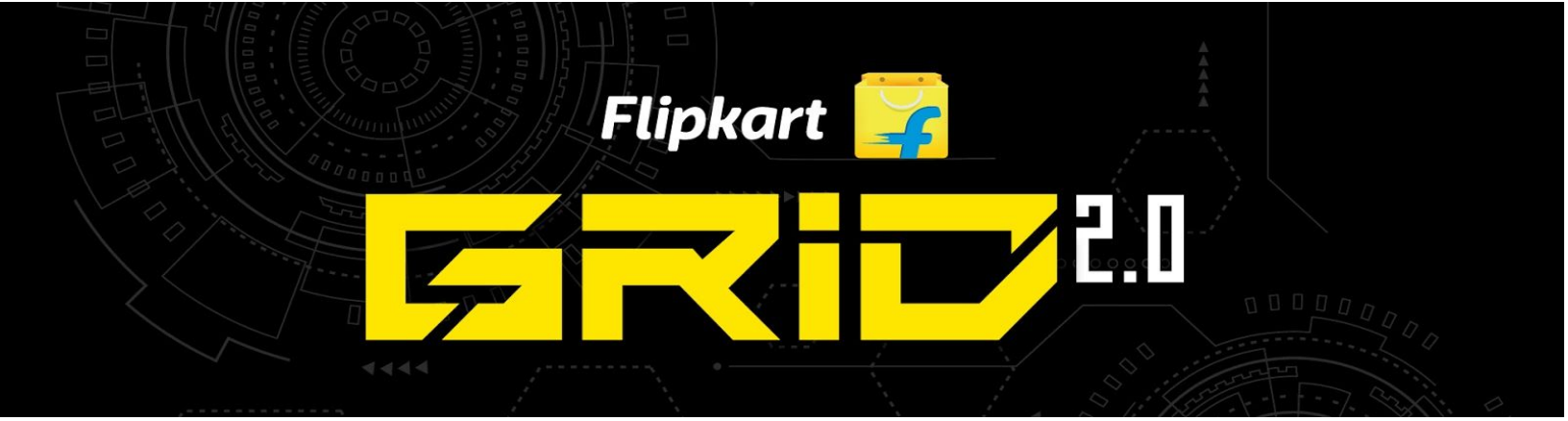
2. **Specifics of package and stairs:**
   a. The dimensions of the package may warry from 50x50x50mm to 600x400x400mm
   b. Weight of the package will be between 3-5 kgs
   c. Each stair will have riser around 150-200 mm (height) and a tread of around 240-300mm
   d. The robot must climb one flight of 15 steps then make a 90deg turn and climb another 15 steps then climb down the same stairs similarly.
   e. Turning radius should be as small as possible



Deliverables

Proposal Submission Phase I (Focus on this for Phase I)

1. 3D models, CAD drawings or even detailed hand drawn sketches on paper work if they are well thought out. The idea is to understand the solution at breadth and evaluate its feasibility.
2. If you are proposing a software/image processing based solution, share the references and research in brief that helped you arrive at the proposed solution.
3. Include the tentative execution plan with high level action items that helps us understand how you can reach from the whiteboard to a prototype and how your expertise enables you to do that.
4. Refer to the **Phase I proposal template** for further details.



Proposal Submission Phase II

1. Detailed 3D model, CAD drawings, Simulations of the robotic system you are trying to build along with the block diagrams of the different components you plan to use, such as cameras, motors, sensors, microcontrollers/PC. The more detailed the document the better.
2. List of components/software(s) required for the solution along with specifications and tentative cost (BOM & BOQ)
3. Details around the software aspects of the robot in terms of tech stack and algorithms used.
4. Detailed execution plan with timelines and requirements (if any).

Further details can be asked for on the basis of the proposed solution by the team.

Finale

1. The participants are expected to build their own robot (both hardware and software) which is able to meet the above objective. In case any third party hardware kit/software is being used, participants need to declare it.
2. The robot is expected to work in an autonomous way with no human assistance.

Judging Criteria

The solution will be judged on following aspects

1. Time taken to complete the above defined objective.
2. 60% scoring weightage is given to the manoeuvre mechanism, 20% to the autonomous aspects and the rest 20% on the speed of the robot in terms of travel and manoeuvre (both)
3. Robustness, stability and balancing of payload on the robot when moving over the staircase
4. Grip and steadiness of the robot while navigating the staircase with the load. There will be penalties awarded if packages fall off the robot.
5. Autonomous in detecting the staircase and initiating and disengaging climb manure.

-- End of Document--