Ideation assignment

Subteam 4C, Runestone 2020

Team members

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Interpretation of the problem domain

- Kind of warehouse: huge with massive number of goods in different categories
- Main problems that the customer wants to address:
    - The customer has to control the robot manually to place goods according to each condition of temperature and light.
    - The customer has to change the place of each type of good and rearrange them when the condition changes
    - The customer has to take in/out packages manually
- Important metrics:
    - Temperature
    - Light level
    - Humidity

Overview of the solution domain

- How to address the main problems of original system:
    - Server provides the information about temperature and light level of each area of the warehouse with sensor network.
    - Server will rearrange the location of each type of good in warehouse when the condition changes
    - Server provides position of the robots corresponding to the goods on demand
    - According to the location provided by server, the robots will place goods autonomously
- Aspects of original system that can be kept:
    - The way to arrange each type of good following temperature and light level
    - Keep the functions of controlling manually and prioritise them
- Changes need to apply to original system:
    - Navigate the warehouse
    - Network : should have multiple routers around the warehouse to assure realtime connection and communication between robots and server
- How can you measure improvements when comparing the new and old system?

- GUI application for administrator to manage warehouse's operation and analyse system performance

Details of the solution domain

- Used sensors:
  - Light, humid and temperature sensors: provide the information about light level and temperature as well as humidity of each area in warehouse
  - Ultrasonic sensor: helps the robot avoid obstacles and other robots
  - Color sensor: helps the robot follow the path to each area in warehouse
- Requirements for:
  - Navigation:
    - The warehouse must be navigated with color line in the ground
  - Collaboration between robots: There may be different types of robots for different types of task: delivery, picking, packaging…They should share with each other information of location to co-operate synchronously
  - Control: A realtime Web/App connected to the server so that administrator can monitor and control remotely. The application needs authen/author for security as well as analysis and statistic to measure system performance
- Communication protocol used between entities in the system:
  - Over Wifi
  - Protocols: TCP/IP, UDP, RTP, RTCP, RTSP
- Kinds of information need to be communicated:
  - Temperature
  - Light level
  - Humidity
  - Location
  - Type of good
  - Available slot of each area in warehouse