SPUG - Smart Purchasing and Guidance

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Abstract. Commercial buildings have become an essential part of modern city culture. Embedding IoT technology in places such as malls upgrades user experience and offers to provide proficiency. SPUG is devoted to increase the comfort, hygiene and safety, and also the efficiency of the store. This system, placed in a smart commercial space aims at providing comfort to shoppers by implementing an automated trolley movement in the interior of a store, navigating on the shortest path computed to all the sections that a shopper needs to go based on the user defined shopping list from their very phones. The trolley communicates with the central server and hence can also access the "shopper-density" in a section, which facilitates adequately to promote social distancing in the current scenario. This feature addresses health concern of the occupants in the store. The trolley also reads the products with a smart tag reader and bills them, with the store database to support it. With the billing done so fast, shoppers are essentially relieved from straining themselves from standing in long queues, and avoid coming in contact with others for hygienic reasons.

Keywords: Smart Shopping · Smart Trolley · Navigation · Quick Billing

1 System Introduction

The most common problem people face while shopping is to locate the section in which the product is, and to find the direction to that section, and after reaching there, and finding out that the product is sold out. Another issue is patiently waiting in a long queue to checkout even for a handful of items.

The SPUG system consists of three main components:

i. **Smart Trolley**: The trolley is integrated with sensors and actuators and an interface to communicate with the central server and the mobile application. A position sensor is used to detect the current position of the cart within the super market. An obstacle detection sensor is used to prevent collision during automated movement and finally an object identification sensor is used to identify the products purchased by the customer and to bill the amount.
ii. **Centralised Server**: The central server holds data corresponding to the number units of the product currently available, their price value, and maps the area on the floor plan in which the products are placed.

iii. **Mobile Application**: The application acts as an interface for the customer to connect to the SPUG and vice versa.

Once the customer enters the super market he connects to the smart trolley through the mobile application and enter the list of products which he intends to buy. The application contacts the centralised server and gets the current status of the products and informs the user if the product is out of stock and for the available products, the SPUG guides the user to the particular sections.

The trolley calculates its current position and communicates with centralised server to know the position of the products and guide the user to that location. The route is calculated based on the shortest path and avoids the sections which are crowded. Crowd density is calculated based on the number of the shopping carts in a particular area.

After the user has picked all the products he can bill it with the object identification sensor. The sensor communicates with the centralised server to get the prices of the products. Once the product is scanned the information is shown in the mobile application through which the user can pay the bill amount. Then these items are removed from the available set of products in the database.

2 System Analysis

Listed below are the major expectations of the user:

i. Finding directions to the desired product sections and getting to know the price and availability of the products beforehand.
ii. Avoiding the crowded section of the super market.
iii. Minimizing contact with shopping carts to prevent germ contamination.
iv. Avoiding long waits in queues for getting the products billed.

All the above expectations of the users are met with the SPUG system.

3 System Architecture Design

The figure **Fig. 1.** gives the system architecture of SPUG.

4 Conclusion

By this implementation, we desire to bring better user experience on shopping by increasing the comfort, hygiene and efficiency for the user using smart buildings, IoT, AI and connected devices.

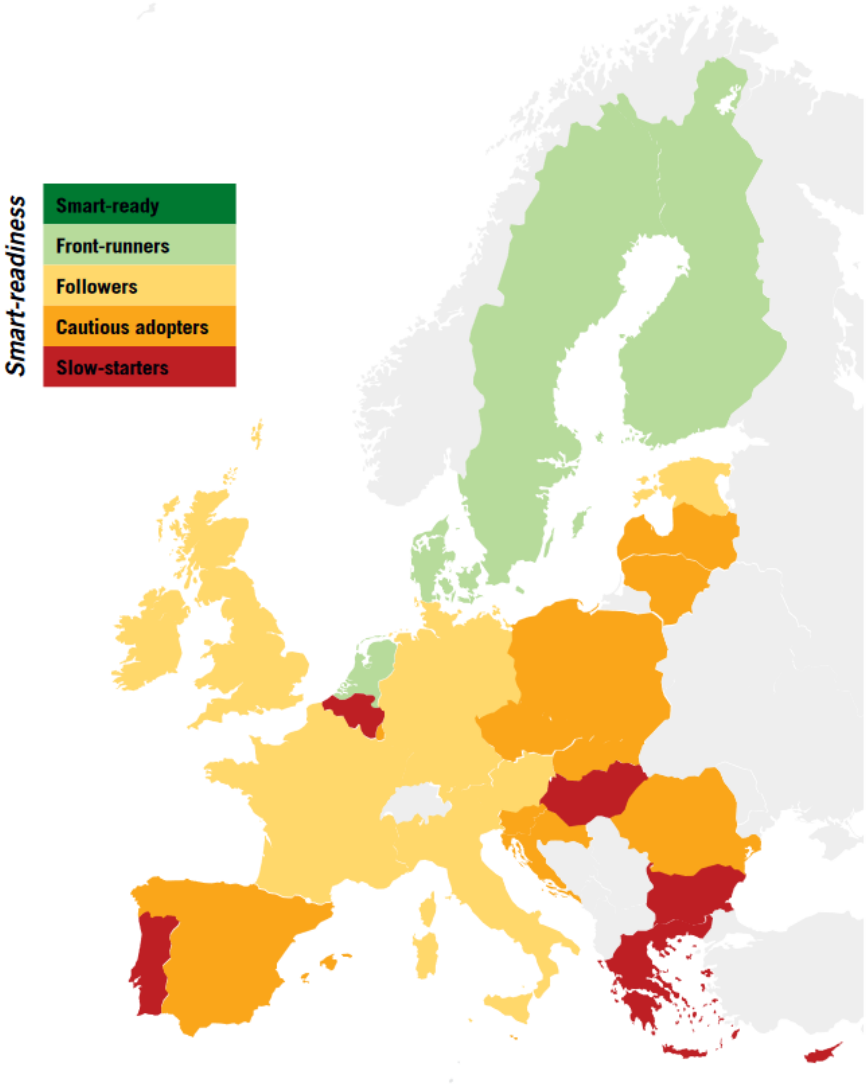

Fig. 1. System Architecture

5 Bibliography

1. A. Kumar, A. Gupta, S. Balamurugan, S. Balaji and R. Marimuthu, "Smart Shopping Cart," 2017 International conference on Microelectronic Devices, Circuits and Systems (ICMDCS), Vellore, 2017, pp. 1-4.

2. X. Liu, H. Zhang, J. Fang, G. Guan and Y. Huang, "Intelligent shopping cart with quick payment based on dynamic target tracking," 2016 4th International Conference on Cloud Computing and Intelligence Systems (CCIS), Beijing, 2016, pp. 88-93.

3. P. Chandrasekar and T. Sangeetha, "Smart shopping cart with automatic billing system through RFID and ZigBee" International Conference on Information Communication and Embedded Systems (ICICES2014), Chennai, 2014, pp. 1-4.