



## Smart Human Following Trolley

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### ABSTRACT :

In recent years, the evolution of technology has revolutionized various aspects of our daily lives, including the way we shop. One such innovation is the development of smart shopping carts, which integrate advanced sensors, computing capabilities, and connectivity to enhance the traditional shopping experience. This literature on smart shopping cart technologies, implementation strategies, and their potential impact on retail operations and consumer behavior. Various aspects such as sensor technologies, data analytics techniques, user interface design, and security considerations are explored. Additionally, case studies and real-world implementations of smart shopping carts are analyzed to provide insights into their effectiveness and practical implications. The paper concludes with future research directions and recommendations for retailers looking to adopt smart shopping cart solutions.

### INTRODUCTION :

In the era of technological advancements and the Internet of Things (IoT), traditional shopping experiences are undergoing significant transformations. One such innovation is the development of Human-Following Smart Shopping Carts, which revolutionize the way people navigate and shop in retail environments. These cutting-edge carts utilize a combination of sensors, cameras, and artificial intelligence to autonomously follow shoppers as they move through stores, providing a seamless and convenient shopping experience.

The concept of Human-Following Smart Shopping Carts addresses several challenges commonly encountered in retail environments. Traditional shopping carts can be cumbersome to maneuver, especially in crowded aisles or when carrying heavy items. Moreover, shoppers may find it difficult to keep track of their carts while browsing or retrieving products from shelves. Human-Following Smart Shopping Carts alleviate these issues by eliminating the need for manual pushing or steering, allowing shoppers to move freely while their carts autonomously follow them.

Key features of Human-Following Smart Shopping Carts include:

- Autonomous Navigation:** Equipped with sensors and cameras, these carts can detect and track the movements of shoppers in real-time. Advanced algorithms enable the carts to navigate safely through store environments, avoiding obstacles and adjusting their speed and direction as needed.
- Convenience and Efficiency:** By eliminating the need for manual pushing or steering, Human-Following Smart Shopping Carts enhance convenience and efficiency for shoppers. They can focus more on selecting products and less on managing their carts, resulting in a smoother and more enjoyable shopping experience.
- Customizable Preferences:** Some smart shopping carts allow users to customize their preferences, such as following distance or speed, to suit their individual needs and preferences. This flexibility enhances the user experience and accommodates a wide range of shopping styles.
- Integration with Retail Systems:** These smart carts can be integrated with retail systems, such as inventory management and checkout systems, to provide additional functionalities. For example, they can help shoppers locate specific products within the store or provide real-time promotions and recommendations based on their browsing history.
- Improved Accessibility:** Human-Following Smart Shopping Carts can also improve, allowing them to navigate retail environments more easily and independently.

### FUTURE RESEARCH DIRECTION :

Despite their promise, smart human-following shopping carts face several challenges, including privacy concerns, technical limitations, and regulatory compliance. Addressing these challenges necessitates interdisciplinary collaboration and on going innovation. Looking ahead, the evolution of these carts may encompass features such as personalized recommendations, mobile payment integration, and environmental sustainability initiatives.

### Challenges:

- Privacy Concerns:** The utilization of sophisticated tracking technologies raises concerns regarding consumer privacy and data security. Retailers must implement robust privacy policies and encryption protocols to safeguard sensitive information collected by these carts.

- **Technical Limitations:** Despite advancements, current iterations of smart human-following shopping carts may face limitations in complex environments such as crowded or dynamically changing spaces. Overcoming these technical challenges requires continual refinement of algorithms and sensor fusion techniques.

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### Future Directions:

- **Personalized Shopping Experience:** Future iterations of smart human-following shopping carts may incorporate machine learning algorithms to analyze individual shopping preferences and offer personalized product recommendations in real-time. This customization enhances the overall shopping experience and promotes customer engagement.
- **Mobile Payment Integration:** Integration with mobile payment platforms enables seamless checkout experiences, eliminating the need for traditional cash registers or self-checkout terminals. By streamlining the payment process, smart shopping carts further expedite transactions and enhance convenience for shoppers.

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### Software

In which we are using an Arduino IDE software to perform and execute the task of coding, an Arduino is Integrated development environment is a cross platform which gives a platform to execute a code for electronics project specially in Arduino based project.

In which we use various codes to perform a task like c, c++ and Embedded C languages which use in this software to perform a task which we required in an project.

We Humanoid robot project we use Embedded language to perform a task like Human following, Obstacle detecting, Display temperature and Detecting fire we execute such type of work by apply code on these Arduino IDE software.

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### Technological Framework

The foundation of smart human-following shopping carts lies in their sophisticated technological framework. Computer vision algorithms enable the carts to identify and track human subjects in real-time. Concurrently, sensors embedded within the carts ensure obstacle avoidance and navigation optimization. Furthermore, artificial intelligence algorithms govern decision-making processes, enabling adaptability to diverse environments and user behaviors.

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### Components :

The required component are :

1. Arduino Uno
2. L293D Motor driver
3. Ultrasonic Sensor
4. DHT 11
5. Four DC Geared Motors
6. Four wheels
7. Pvc Board
8. Jumper wires
9. 18650 Lithium ion-batteries
10. Switch
11. Fire Sensor
12. buzzer
13. I2C Display

### *Arduino Uno*

#### Tools Needed

Some tools names are given below:

1. Soldering Iron
2. Glue gun
3. Cutter
4. Knife
5. Screwdriver
6. Tweezer
7. Wire Strippers
8. Needle nose Pliers

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## RESULTS :

We successfully made the human following robot which is used to follow objects as well as humans. This robot uses ultrasonic range sensors. The test was performed on the ultrasonic sensor and that the sensor was working accurately within the range of 50cm. An ultrasonic sensor is used to move the robot forward, backward. Left and right direction accordingly.



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## CONCLUSION :

Smart human-following shopping carts represent a paradigm shift in retail assistance, redefining the shopping experience through the fusion of technology and consumer-centric design. As retailers increasingly embrace digital transformation, these carts stand poised to become integral components of future retail ecosystems, empowering both shoppers and businesses alike to thrive in an ever-evolving market landscape.

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