Smart Shopping Cart

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Motivation

Problem Statement

Traditional shopping involves:

- Manually pushing carts
- Picking items by hand
- Long queues at billing counters
- No real-time tracking of price

- This causes:
  - Inconvenience and delay
  - Difficulty for elderly or physically-disabled customers
  - Slow checkout experience

💡 Our Smart Solution

A **Smart Shopping Cart** that:

- **Follows the user**
- **Receives item codes** (simulated scanning)
- **Calculates and displays total cost** instantly
- **Shows info on an LCD screen** in real-time

🎯 Significance

- **Increased Demand for Convenience**
  Shoppers expect **faster, more efficient** shopping experiences in today's fast-paced world.
- **Time and Accessibility Challenges**
  Long lines and the physical effort of pushing carts can be **exhausting**, especially for elderly or differently-abled individuals.
- **Retail Efficiency**
  Retailers can improve their **checkout process**, reduce human error, and increase **customer satisfaction**.
- **A Step Towards Automation**
  This project **explores automation** in everyday shopping, providing a glimpse into a **future of smarter retail technology**.

Personal Interest

- **Recognizing the Problem**
  While shopping in stores, I noticed how long queues and the effort of physically pushing carts can cause inconvenience, especially during peak hours. This sparked my desire to **find a solution** to make the shopping experience smoother.
- **Drive for Innovation**
  The opportunity to combine **Bluetooth technology, automation**, and **embedded systems** to develop a **smart, autonomous system** is exciting. It allows me to experiment with cutting-edge tech while addressing a problem people face every day.
- **Learning Through Problem Solving**
  Tackling this problem not only enhances my skills in **IoT** and **smart device applications** but also gives me a sense of **purpose** — making a difference through innovation.

Equipment List

Arduino Uno

- It provides enough I/O pins and is easy to program.

DC Motor (x4)

- These will drive the wheels for our **autonomous cart** movement.

Servo Motor

- Servo motors can rotate to **exact angles** (like 0°, 90°, 180°), allowing us to control small mechanisms with accuracy.

Motor Driver

- To control the DC motors' speed and direction.

Equipment List

Wheels (x4)

- To give our cart the ability to move. We will need a caster wheel for stability at the front.

IR Sensor

- A basic **obstacle detection feature.**Prevent the cart from **bumping into objects**

Ultrasonic Sensor

- Ultrasonic sensor can **accurately measure distance** in cm.

Bluetooth Module

- For communication between the Arduino and our smartphone, sending item codes and controlling the cart.

Equipment List

LCD Display

- To display the **item name**, **price**, and **total cost** in real-time.

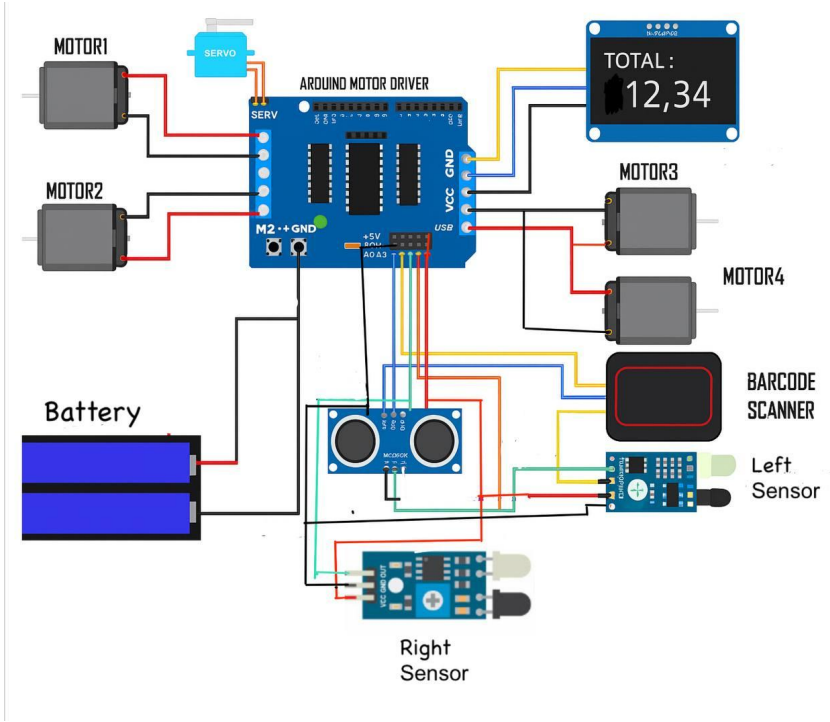
Li-ion Battery(2x)

- Powers the **Arduino**, **motors**, and other components. Make sure it’s sufficient to handle the motor's power demands (usually around 7.4V or 11.1V, depending on your motor).

MH-ET Live Barcode Scanner V3

- For scanning products for their price and other details.

Diagram


MOTOR1
SERVO
ARDUINO MOTOR DRIVER
SERV
TOTAL :
12,34
MOTOR2
M2 - + GND
VCC GND
USB
MOTOR3
MOTOR4
BARCODE
SCANNER
Battery
Left
Sensor
Right
Sensor

Process

Expected Outcome :

At the end of the project , we want to build a fully functioning smart shopping cart that will provide hands-free convenience and effortlessly follow the shopper to reduce effort.

Step by step plan

Step 1: Gather Components

Step 2: Build the Base Robot

Step 3: Connect the Bluetooth module

Step 4: Connect the Display

Step 5: Combine Scanner + Display

Step 6: Integrate with Robot Movement

Step 7: Finalize Code & Upload

Step 8: Test the Full System

Step 9: Secure Wiring + Power

Step 10: Final Demo

Use of other microcontroller

⚡ **Faster Development & Testing**

- Easy USB programming, no extra hardware needed.

. 📚 **Extensive Library Support**

- Ready-made code for sensors, motors, Bluetooth, AI.

. 🔧 **Simplified Hardware Setup**

- Built-in voltage regulator & USB interface included.

. 🌐 **Easy Wireless Integration**

- Plug-and-play Bluetooth/Wi-Fi modules with libraries.

. 🐞 **Convenient Debugging**

- Real-time Serial Monitor for testing & tuning.

Challenges and Future Directions

Potential Challenges:

Sensor Calibration

Sensors must be set correctly. If not, the cart may move in the wrong direction or hit obstacles.

Battery Usage

The cart uses many electronic parts. This can drain the battery fast, so we need good power management.

Obstacle Detection Problems

In busy or noisy environments, sensors might not work properly and can give wrong data.

Barcode Scanning Issues

Barcodes may be damaged or not scanned properly due to poor lighting or fast movement.

Live Price Updates

The system must connect to a database to show real-time prices. Internet problems can cause delays or errors

Future Scope:

. **Scalable** – Can be used in malls, stores, warehouses
. **Add Features** – Voice control, auto-billing, mobile sync
- Smart shopping list tracking via app
- Load sensors to detect items placed inside
- Voice assistant for user interaction
- Face/person recognition for accurate following
- shopping cart default movement add
. **Smarter AI** – Improved tracking, obstacle avoidance
. **Real Use** – Elderly help, hospital, airport service
. **Commercial Scope** – Retail, Industrial works , smart carts

THANK YOU