Smart Cart

Aiman Kahil
Mahmoud Kattan
Youssef Saad
Sebastian Stukel

Summary:

The Smart Cart is made to prevent accidents in the parking lot and be able to avoid shopping carts. We tried our best to make a miniature sized cart as a team. We put sensors in front of the cart that sense anything from 3-8 inches and stops if it gets close.

Problem Statement:

Stray carts left in parking lots tend to roll away and hit cars.

Problem Justification:

It's a large safety measure and it's our duty to lower the amount of damage cars may take while parked in the parking lot. It would be a relatively low cost to implement, but may require some time to build. After the building is complete it may take time to advertise our equipment.

Research:

https://pediatrics.aappublications.org/content/118/2/e540.abstract

Article Name:

Shopping Cart–Related Injuries to Children

Citation: Smith, Gary A. "Shopping cart–related injuries to children." Pediatrics 118.2 (2006): e540-e544.

Abstract:

An estimated 24200 children younger than 15 years, 20700 (85%) of whom were younger than 5 years, were treated in US hospital emergency departments in 2005 for shopping cart–related injuries. Approximately 4% of shopping cart–related injuries to children younger than 15 years require admission to the hospital. Injuries to the head and neck represent three fourths of all injuries. Fractures account for 45% of all hospitalizations. Deaths have occurred from falls from shopping carts and cart tip-overs. Falls are the most common mechanism of injury and account for more than half of injuries associated with shopping carts. Cart tip-overs are the second most common mechanism, responsible for up to one fourth of injuries and almost 40% of shopping cart–related injuries among children younger than 2 years. Public-awareness initiatives, education programs, and parental supervision, although important, are not enough to prevent these injuries effectively. European Standard EN 1929-1:1998 and joint Australian/New Zealand

Standard AS/NZS 3847.1:1999 specify requirements for the construction, performance, testing, and safety of shopping carts and have been implemented as national standards in 21 countries. A US performance standard for shopping carts (ASTM [American Society for Testing and Materials] F2372-04) was established in July 2004; however, it does not adequately address falls and cart tip-overs, which are the leading mechanisms of shopping cart–related injuries to children. The current US standard for shopping carts should be revised to include clear and effective performance criteria for shopping cart child-restraint systems and cart stability to prevent falls from carts and cart tip-overs. This is imperative to decrease the number and severity of shopping cart–related injuries to children. Recommendations from the American Academy of Pediatrics regarding prevention of shopping cart–related injuries are included in the accompanying policy statement.
https://jamanetwork.com/journals/jamapediatrics/article-abstract/517708

Article Name:

Epidemiology of Shopping Cart–Related Injuries to Children

Citation:

Smith, Gary A., et al. "Epidemiology of shopping cart–related injuries to children: an analysis of national data for 1990 to 1992." Archives of pediatrics & adolescent medicine 149.11 (1995): 1207-1210.

Abstract: Objective:

To describe the epidemiologic characteristics of shopping cart–related injuries among children in the United States. Design: A retrospective analysis of data from the National Electronic Injury Surveillance System of the US Consumer Product Safety Commission for 1990 to 1992. Results: An estimated 75 200 shopping cart–related injuries occurred in children younger than 15 years treated in US emergency departments during 1990 to 1992 (95% confidence interval, 57 500 to 92 900). Children younger than 5 years were at highest risk, accounting for 63 200 (84%) of the injuries. A 20% increase was observed in the number of injuries among 0- to 4-year-old children from 1990 to 1992. Fifty-three percent of injured children were male. The head and neck region was the most common anatomic site of injury, accounting for 74% of injuries among children younger than 15 years. An estimated 2000 children (2.7%) younger than 15 years required hospital admission (1.2% in 1990 compared with 3.5% in 1992). Children aged 0 to 4 years accounted for 93% of these hospital admissions. Among 0- to 14-year-old children, fractures accounted for 45% of hospital admissions, followed by internal injury (22%) and concussion (17%). Conclusions: Injuries related to shopping carts are an important cause of pediatric morbidity, especially among children younger than 5 years. These injuries can also result in death. Shopping carts should be redesigned to decrease the risk of injury to children, and transportation of children in shopping carts of current design should be prohibited.(Arch Pediatr Adolesc Med. 1995;149:1207-1210)

Summary:

This article is about the safety issues concerning 5-year-old children around shopping carts in 1990-1992. This is related to our issue as it directly encapsulates the problem of shopping cart safety.
https://journals.sagepub.com/doi/abs/10.1177/0009922813513322

Article Name:

Pediatric Shopping-Cart-Related Injuries Treated in US Emergency Departments, 1990-2011

Citation:

Martin, Keith J., et al. "Pediatric shopping-cart-related injuries treated in US emergency departments, 1990-2011." Clinical pediatrics 53.3 (2014): 277-285.

Abstract:

This study investigates the effect of the 2004 US shopping cart safety standard on shopping-cart-related injuries among children younger than 15 years of age by retrospectively analyzing data from the National Electronic Injury Surveillance System. An estimated 530 494 children younger than 15 years were treated in US emergency departments for shopping-cart-related injuries from 1990 to 2011, averaging 24 113 children annually. The most commonly injured body region was the head (78.1%). The annual concussion/closed head injury rate per 10 000 children increased significantly ($P < .001$) by 213.3% from 0.64 in 1990 to 2.02 in 2011. Although a shopping cart safety standard was implemented in the United States in 2004, the overall number and rate of injuries associated with shopping carts have not decreased. In fact, the number and rate of concussions/closed head injuries have continued to climb. Increased prevention efforts are needed to address these injuries among children.
Summary: This article is about the safety issues concerning children younger than 15-years-old around shopping carts in 1990-2011. This is related to our issue as it directly encapsulates the problem of shopping cart safety.

Patent #1:

KR101709683B1

Title:

System for user oriented autonomous shopping cart by non-contacting user interface, and method for controlling autonomous shopping cart using the same

Author:

□ □ □ □ □ □

Title:

Shopping Cart

Patent #2:

US5836596A

Author:

Rudolf Wanzl

FIG. 3

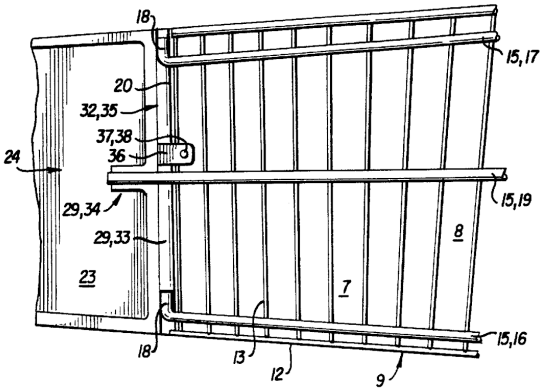


FIG. 4

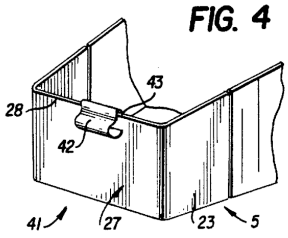
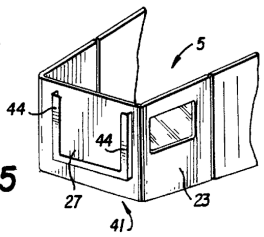


FIG. 5



Design **Specification:**

Form:

The shape of a shopping cart length 33in with 20 ½ in

Function:

The cart will automatically brake before hitting a car or person

- Durability lasts 1-2 years
- Maintenance
- Brake pads
- Sensors

Material:

- 4 infrared sensor
- Shopping cart
- Brake pads Bike brakes

Cost: $30

Aesthetics:

- Similar to a rewal shopping cart

Safety and legal issues:

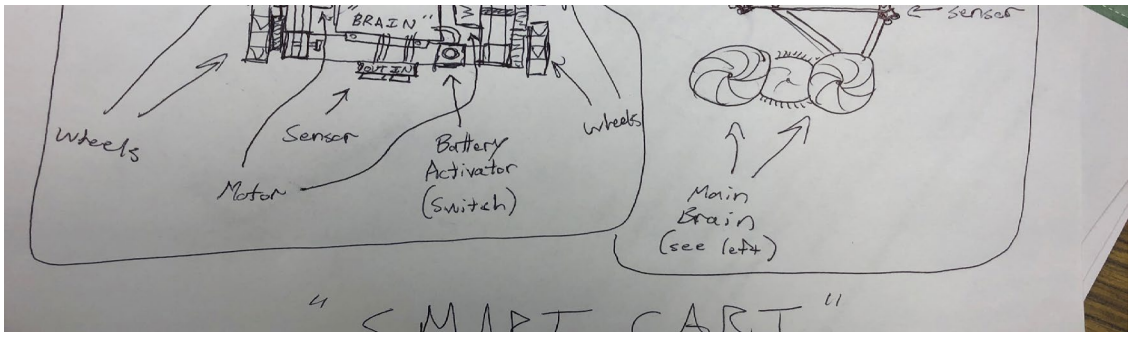
- Needs to be researched through government website

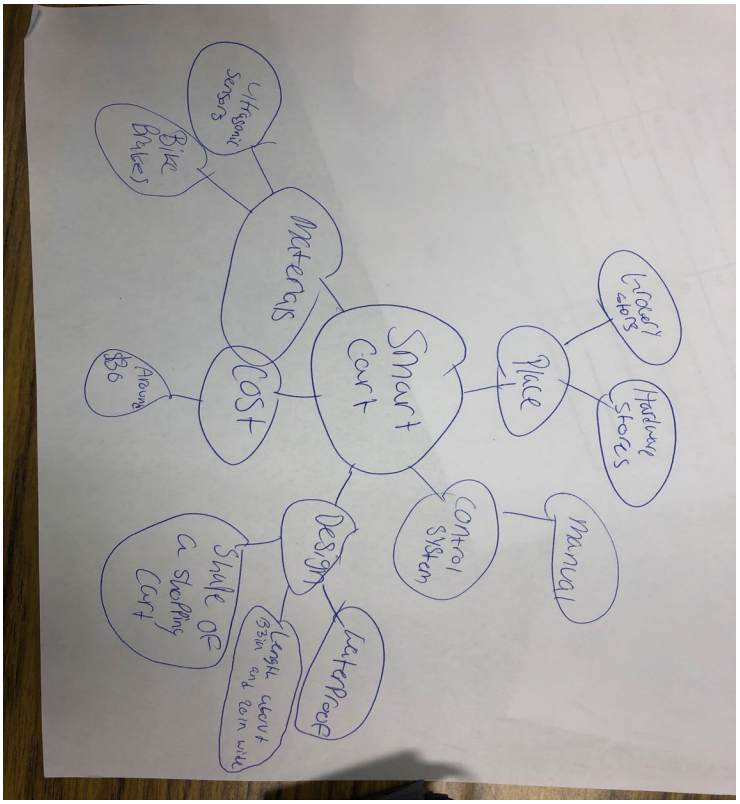
Customer needs and wants:

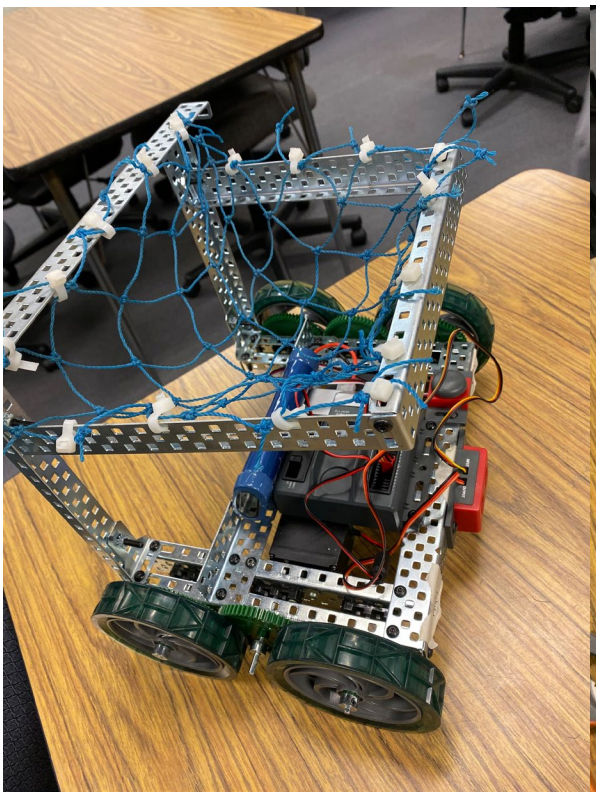
- Needs: Something to stop shopping carts from damaging cars.
- Wants: The brake pads to never fail.

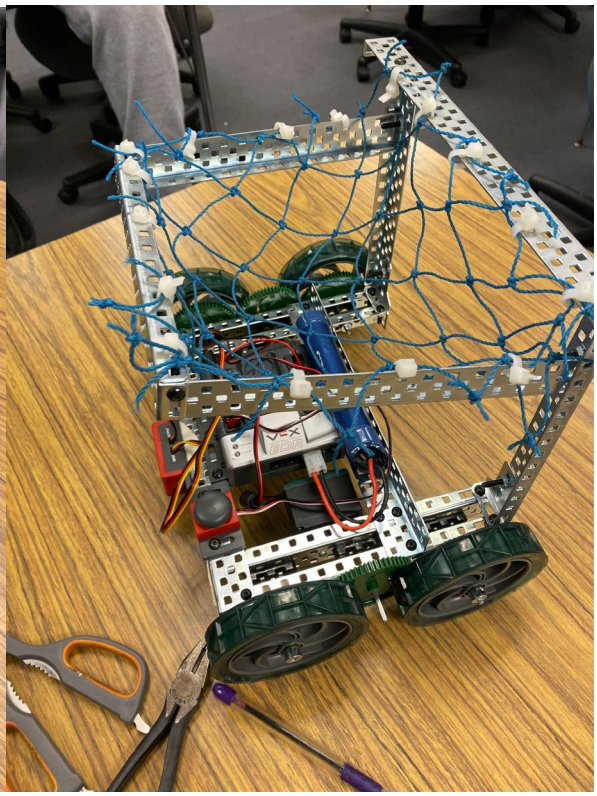
List of Materials:

What	Where	Cost
Batteries	In Shock	$0
4 Wheels	In Shock	$0
1 VEX Sensor In-house	In Stock	$0
3 Arduino Sensors	In Shock	$0
Framing	In Shock	$0
2 Motors	In Shock	$0


"BRAIN"
Wheels
Sensor
Motor
Battery
Activator
(Switch)
Wheels
Sensor
Main
Brain
(see left)


Smart Cart
Materials
Ultrasonic sensors
Bike Brakes
COST
Around $6
Place
Unused stores
Hardware stores
Design
Control System
Manual
Shape of a shopping Cart
Waterproof





Code:

```
#pragma config(Sensor, dgtl1,  S1,           sensorSONAR_cm)
#pragma config(Motor,  port1,           rightM,        tmotorVex393_HBridge, openLoop)
#pragma config(Motor,  port10,          leftM,         tmotorVex393_HBridge, openLoop)
//*!!Code automatically generated by 'ROBOTC' configuration wizard               !!*//

task main()
{
        while(0==0)
        {

motor(rightM)=50;
motor(leftM)=-50;

while(SensorValue(S1)<50&&SensorValue(S1)>0)
{
        motor(rightM)=0;
motor(leftM)=-0;
}

}
```

}

Conclusion:

In conclusion, we didn't figure out how to stop an actual real life sized shopping cart. By making our own little miniature sized one, it was a success and could prevent future instances where vehicles and people are hurt from stray carts. After completing this project, we learned how it's like to work as a team. We all worked together and learned the importance of work ethic.