

UC Irvine MESA

# R.I.C. (Really Intelligent Cart)

“Changing the game in contactless, safe shopping since 2021”

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Publication Date: September 16, 2021

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## **Project Purpose**

To prevent and slow down the spread of COVID-19 and other diseases by providing a safe, contactless shopping cart that can be used in stores! The shopping cart will use the GPS coordinates of the user's phones to follow them while also having obstacle avoidance sensors to avoid obstacles.

## **Abstract**

Since the start of COVID-19, the amount of people getting infected has been getting worse. The CDC recently reported a 107.2% increase in COVID infections globally compared to July 2020. This is partly due to people coming in contact with objects that many possible infected people touched. COVID won't disappear, but we can help stop the spread by innovating existing problems. Shopping carts are used on a daily basis by everyone, hence making it a magnet for COVID to spread. So creating contactless shopping carts is one big step we need to take to stop the spread of COVID!

## **User Research**

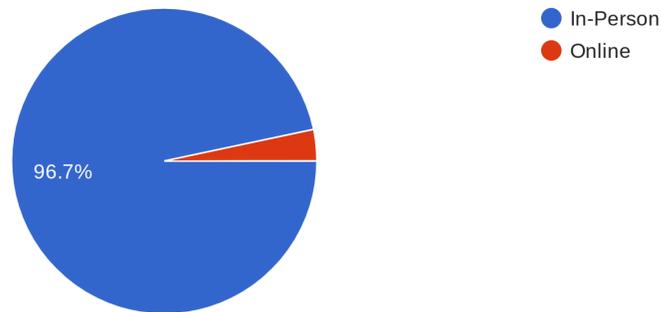
We know our client is everyone in the world as we all shop whether it be for groceries, electronics, or clothing. We also know that the assumed target market is smaller as not everyone goes shopping in person (some shop online) and not everyone uses shopping carts to shop.

We decided to go online to see what already exists. The Cowarobot Auto-follow Smart Luggage is a small, and expensive auto-follow smart luggage that can't carry a lot of goods. Amazon's Scout is a mini-cart that delivers Amazon goods to your home. It does not follow specific people, rather, it uses a map of the area to know which house to deliver to.

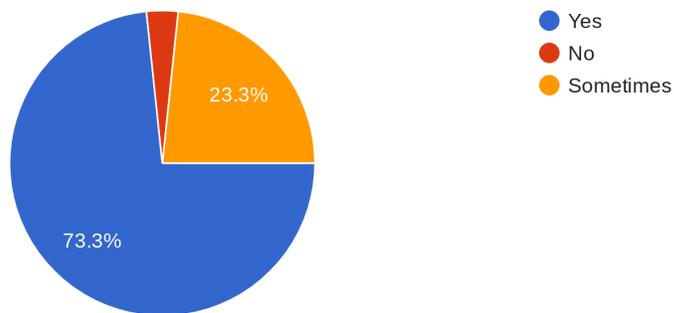
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We decided to conduct an interview with 30 random people in the United States through the UC Berkeley ZeeMee. We asked them the following:

Which way do you frequently shop for groceries, electronics, clothing, etc.  
30 responses



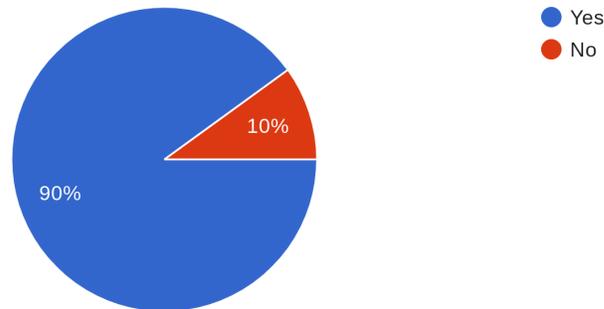
For those who answered in-person: Do you use a shopping cart when offered at the store?  
30 responses



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For those who answered in-person: Do you believe that catching COVID is something serious to keep in mind when using shopping carts? Should this issue be addressed?

30 responses



For those who answered online: Why do you shop online? Is COVID one of the reasons you shop online?

1. Online makes it less risky to get COVID.
2. Before COVID I would say I liked shopping both in person and online, with the lockdowns we couldn't really go out to shops and look around so I've started to prefer online shopping.

From the interview, we learned that the majority shop in-person, use a shopping cart, and worry about the spread of COVID when using a shopping cart. Those who do go online do so because it's safer than in-person, so we know that the spread of COVID when using shopping carts is something we need to tackle.

## User Insight

Through the research and data done, and as in-person shoppers ourselves, we understand the fear one goes through when using a shopping cart as we don't want to get infected with COVID. It is completely understandable that people want to go shop online to prevent getting infected. The spread of diseases is one thing that we need to tackle. We want to change that as we believe that we all have the right to not fear or worry about getting sick

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from doing necessary things outside, such as shopping for groceries. One way we thought of as a group to remove the shopping barrier that exists, the spread of diseases like COVID, is by creating a contactless shopping cart.

## **User Needs**

Based on the data provided, we have concluded that the users want to be able to have a way to not touch the shopping cart as much when shopping in-person to prevent the spread of diseases. The reason being because we, as humans, do not want to be sick. We want to be able to avoid getting sick as much as possible. One way we can do this is by having the shopping cart automatically follow the user.

## **Project Goals**

Our project will need to be as cheap as possible to allow for multiple carts to be purchased by stores. Additionally, the cart needs to be autonomous to allow for a hands-free shopping experience, and thus prevent the spread of diseases. Lastly, the cart needs to have a way to avoid obstacles that are in the way, like fallen groceries and other people, so that the cart can follow the customer at a constant speed.

## **Key Features of Design**

R.I.C. (Really Intelligent Cart) features a shopping basket to allow for items to be put onto the cart. It uses 2 12V motors to be able to move. Additionally, it has a GPS sensor and HC-05 Bluetooth module installed to follow the coordinates of the customer, which are received through an Android App that we created via Blynk. In order to avoid obstacles in the way, such as fallen groceries or shelves, an obstacle avoidance sensor has been added. All electronics are powered by an Arduino Uno and are enclosed in a wooden box, which is beneath the basket. It's size is compact, over ¼ the size of a traditional shopping cart, yet

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effective to provide for more walkable area in the store. This cart is essential during the COVID-19 pandemic to provide customers with a germ-free contactless shopping experience.

## **Impact**

The design of our cart focuses on the idea of having a contactless shopping experience. Making the cart autonomous allows for there being no need to physically move the cart around, making it convenient for those with disabilities. It will be a much safer and easier shopping method as opposed to that of a traditional shopping cart. The only input that would be required of the user is for them to download and open the app for the cart, turn on the cart, and send their coordinates to the designated cart. They won't be touching anything other than their phone, and the items they will buy from the store. Limiting the amount of contact with the cart will allow for less diseases to spread among the customers, like that of COVID-19.

## **Status of Project**

The temporary closure of the ports has resulted in a shipping delay for our items. Thankfully, our items arrived on February 04, 2021. We have the code completed, and are more than halfway done with the wiring of the components.

We have gotten in contact with a friend of ours whose dad owns a local store. He has given us the opportunity to test out our shopping cart at his store to see how well it performs in a real-world situation.

Our goal is to make R.I.C. as convenient and efficient as possible. To do so, we hope to be able to make our cart bigger in the future to allow for more groceries to be carried. We would also like to incorporate a payment method onto the cart so that users can pay for the items as they shop. This will allow users to save time when shopping as they would no longer have to form a line in store to pay for the items

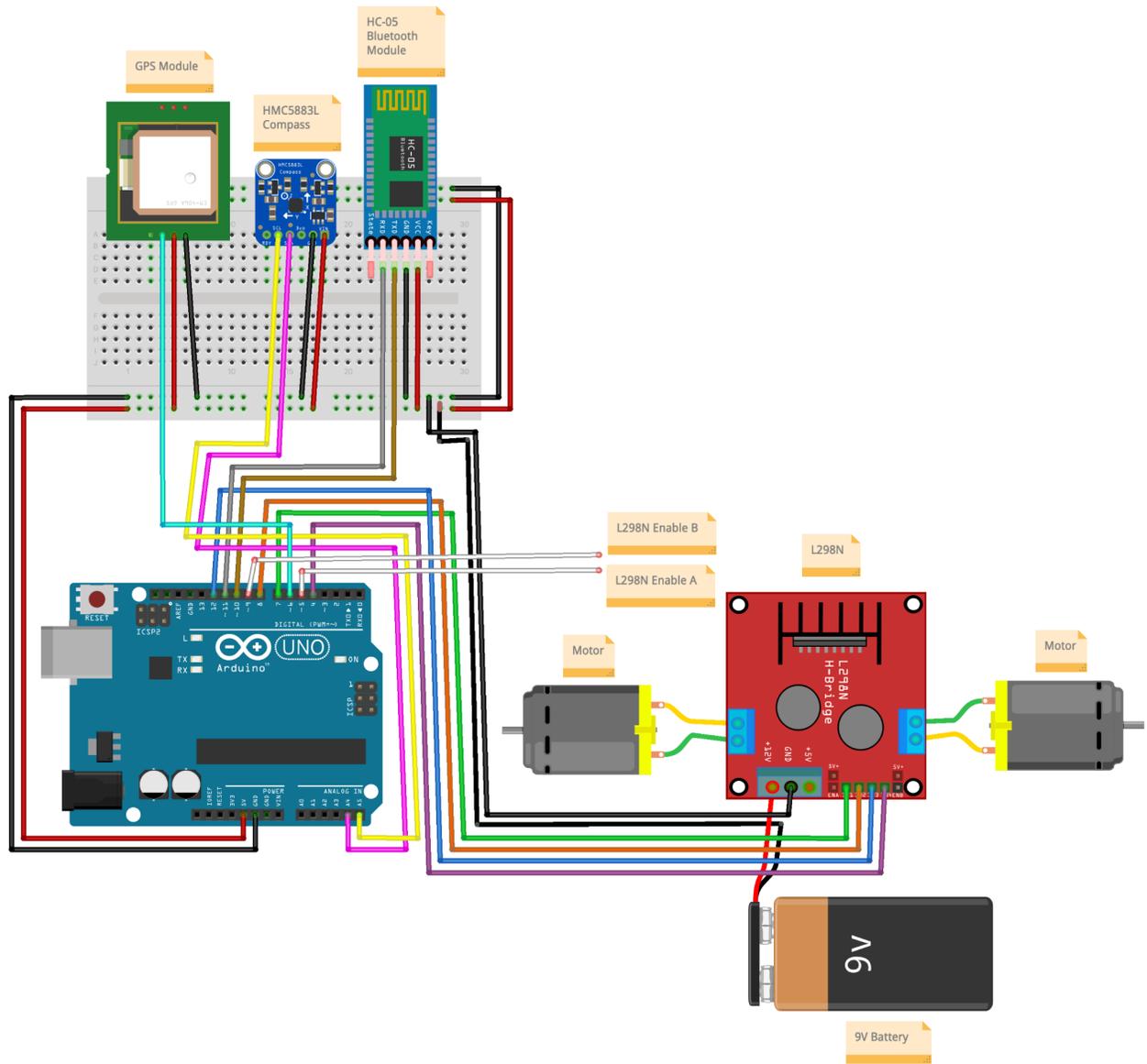
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## Reflection

As we were building R.I.C., we realized that there is a lot of inequity in the world that needs solving, especially during the times of COVID. By interviewing current customers who experienced the COVID pandemic when shopping, we knew what the concerns were when shopping in-person during a pandemic, as well as how we could tackle the problem to allow people to still shop in-person in the safest way possible.

Building R.I.C. has also allowed us to gain team-building skills, which are essential to get the cart built on time. Additionally, we also gained communication skills, which were needed to be able to find a suitable place to test our design. These communication skills also allowed for Victor Acuna to be a better team-captain for us, which in return, made us be on task and allowed us to work together as a team.

## Prototype Graphic



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## R.I.C. (Really Intelligent Cart)

