KSCST SYNOPSIS

1) Project Reference Number
46S_BE_4102

2) Title of the project
DEVELOPMENT OF A WIRELESS CONTROLLED CART

3) Name of the College & Department
Vemana Institute of Technology, Mechanical Engineering Department.

4) Name of the Students & Guide

- Mr. Naresh. G   [1VI19ME026]
- Mr. Ajay Kumar R   [1VI19ME001]
- Mr. Rakesh S   [1VI19ME035]
- Mr. Akash   [1VI17ME004]

Guide: Mrs. K.S. Meenalochani, Asst. Prof
Mr. Kiran Kumar. N, Asst. Prof

5) Keywords

Arduino UNO, Bluetooth HC module, Ultrasonic sensor.

6) Introduction/background

A wireless controlled cart is a fully automated cart which will follow the humans without any physical contact. There are many applications for human following carts, where such carts must localize the walking person and avoid obstacles. One such application is shopping cart. Especially, it is difficult for physically challenged and aged customers to push or pull the cart with load. When a customer needs two carts, he cannot push or pull them simultaneously. An automatic user friendly human following shopping cart can solve these problems which can be controlled wirelessly and thus reduces the human effort. Few of the wireless communication devices that can be used are bluetooth, mobile phone and global positioning system. The cart will be guided to the locations of the desired items to be purchased. The trolley rotates to the left when a human turns to the left, when a person turns to the right it turns to right. The trolley automatically stops if the person stops moving. It should also be capable of obstacle avoidance. These movements and obstacles avoidance can be accomplished using sensors and Arduino. Applications of the proposed cart need not to be limited to shopping but can also be used in hospitals to aid nurses and doctors by carrying medicine or surgery supplies and in construction sites to carry tools and other supplies across the job site.

.

7) Objectives

- To make shopping easier and effortless for customers

- To reduce time taken for shipping

- To build a contactless shopping cart

- To develop a smart shopping cart which supports wireless controlled customer following system.

- To ensure a safe and healthy way of shopping since it is contactless and it can prevent spread of communicable diseases.

- To bring in a product which can enhance the benefits of both customers and retailers.

- To develop a shopping cart which will be beneficial for physically challenged and aged customers

8) Methodology

The cart of external body is fabricated using mild steel rods of 10 mm diameter. The length the cart is 70 cm, width is 45 cm and depth is 50 cm. The total weight of the cart is 26 kg and it has three wheels. It has one caster wheel of diameter 10 cm in the front end and two wheels of diameter 15 cm at the back end. It has two Arduino, one Arduino for controlling voice command and other one is for automatic human following mode. It has three ultrasonic sensors for sensing left, right and straight movement of the user and all three connected to the second Arduino. 12 volts d. c. power is supplied for Arduino and also for two wiper motors. Motor power is 120 W. Other components used are 4 channel relay, voltage regulator and switches. It has two modes one is voice controlled mode and other one is automated human movement sensing mode. Before start using the cart, the user must select either voice or automating sensing mode by operating the switch. In voice controlled mode, based on the human command the cart will follow the user. It will work within a range of 2 meters. HC05 Bluetooth module is paired with the mobile to run the cart. In automated human movement sensing mode the cart will follow the user with the help of ultrasonic sensors which is also used for obstacle avoidance within a range of 50 cm. All three ultrasonic sensors are connected to Arduino Uno which is an open-source microcontroller board. When motion is detected by the sensors, Arduino receives input signal and based on the direction, output is sent to the relay through which motors are controlled. The cart can carry an external load of 30 kg and move at a speed of 4 km/hr.
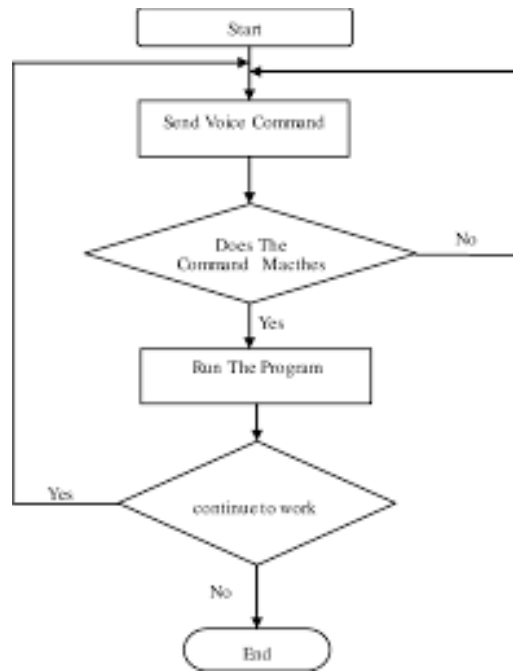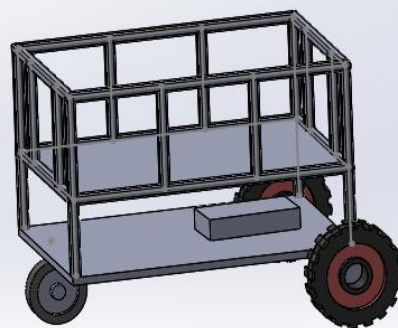
Fig 1: Flow chart

Fig 2: 3D view

9) Results and Conclusions

- The wireless controlled cart was tested successfully under voice command mode and automatic operational mode.
- This cart was working accurately in voice command mode and automated sensing mode within a range of 2 meters and 50 cm respectively at a speed of 4km/hr.
- It can carry a load of 30 kg
- The cart can be used in hospitals, ware houses and in production lines.
- It moves with the same speed with and without load.
- It cannot be moved manually so even after the use when it has to be moved to a specific pick up location one of the two modes should only be used which becomes convenient for the staff.

10) Scope for Future Work

- Future shopping carts can utilize advanced technologies like AI, computer vision, and smart sensors to autonomously follow humans, enhancing convenience and eliminating the need for manual pushing.

- Integration with personal devices and automated checkout systems can provide personalized assistance and streamline the shopping experience, offering product recommendations, discounts, and seamless scanning and payment options directly from the cart**.**

- The battery can be charged using solar panels. Whenever the cart is not in use it can be kept outside for charging.

- Advanced computer vision can be used for identifying and follow an user.

- Refrigeration compartment can be added to keep frozen food items.