ABBIE (Assist Bot)

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Video: https://youtu.be/QKRvNG1-pEg

Full description at: https://devpost.com/software/assit-bot/

ABSTRACT

Though travelling has been fun for most, but some of them find it hectic and fearsome. It may be either due to lack of exposure for the procedures incorporated, issues related to communication or the person may be specially-abled. In any or all of the above cases, travel assistance plays an important role.

The present work involves developing a bot for assisting a specific group of people at crowded areas or areas of public interest. Assistor bot is a small capsule shaped bot (similar to R2D2 from Star Wars) which consists of a touch screen and a speech recognition software which efficiently assists people in moving with ease at unknown places where they have been for the first time viz. Airport, Railway station, Bus stand, some new mall etc.

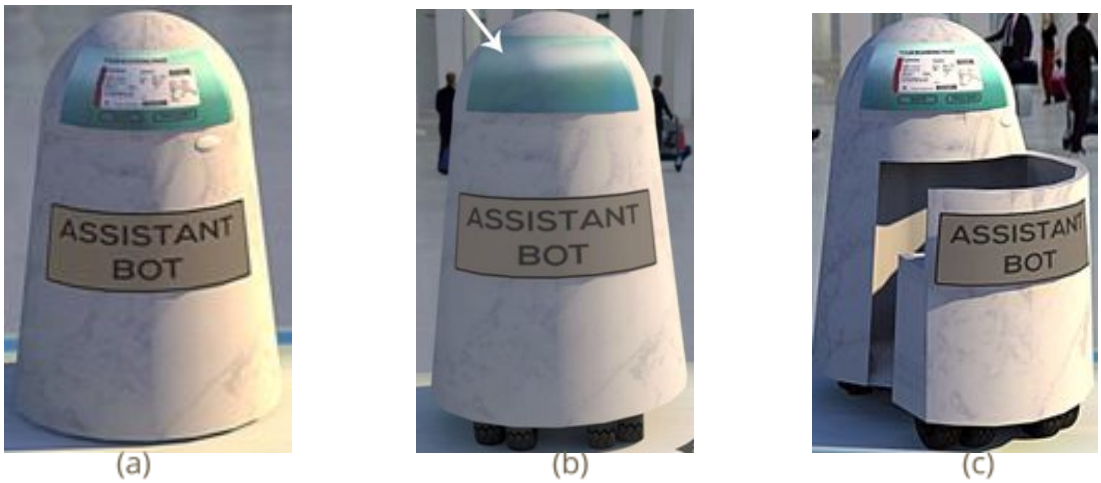


Figure: (a) Assist bot under charging condition; (b) Bot in deployed (activated) condition;

(c) Change in structure of bot for allowing physically disabled people to sit

The assist bot can be deployed at all the public places running on a 2 kW battery that can be charged using induction charger as soon as the bot is placed in its charging spot. The assist bot runs on a 1kW DC brushless motor similar to the ones used in electric chairs. A deployed or activated assist bot is depicted in fig. (b).

In case of people with disabilities (i.e. if a person answers yes to disability), the bot uses two sets of servo motors in order to open a place for the handicapped person to sit, helping the user to undergo all the procedures without anyone's help. The servo motors used for opening and closing of the foldable chair are powered by the battery bank and require a maximum of 5 W. Power in excess is distributed for the electric circuit of the project consisting of a speech recognition module, a touch screen module, a microcontroller or microprocessor interface and a motor controller circuit. The bot changing itself structurally to allow the disabled person to sit is depicted in fig(c).

Therefore, deployment of such bots not only allows the disabled people to commute independently at crowded places, but also ensures effective utilization of technology for the safety of weaker

sections of the society.

TECHNICAL DESCRIPTION

The bot uses accelerometer and GPS sensors in a VR based device such as the Google project Tango in order to record the path to a destination and store it to a server. The tango records the path from one point to other using values from GPS, VR/AR sensors and Accelerometer of the Google project tango tablet and feeds it to a local server. This server then saves the recorded paths in a large database of mapped paths and gives them labels as are commanded by the user. The bot therefore uses an algorithm that is made to convert the strings of GPS and accelerometer coordinates into a path of really high resolution and follows the path to move to the destination. The bot also has another self-learning algorithm which basically records the path of the user while he/she is manually driving the bot and asks for the name of the destination from the user when the destination is reached. The server then keeps updating the path for better routes as well as faster routes.

Since the project uses a VR based device, it can be made voice as well as touch based. In order to resolve the problem of two bot following the same path, the local server is based on artificial intelligence that correctly places the bot on a particular path such that the bots do not cause any traffic problems or collide. The bot also consists of several sensors on it that tend to ensure that the bot stop when it detects an obstacle and continues on its path as soon as the obstacle moves away. Furthermore, it can also ask the server to reroute to a different path if there are any problems with the path that it is following.

The bot is driven with the help of a DC hub motor powered by lithium ion batteries that tend to get charged using solar panels. The charging time for the batteries is less as the bot is smaller in size with an uncompromised range. Apart from solar panel, the bot can has an auxiliary power source which is achieved by charging at charging stations, which was initially used by electric cars for charging.

Figure 1: (a) Assist bot under charging condition; (b) Bot in deployed (activated) condition;

(c) Change in structure of bot for allowing physically disabled people to sit

The assist bot can be deployed at all the public places running on a 2 kW battery that can be charged using induction charger as soon as the bot is placed in its charging spot (fig.1(a)). The assist bot runs on a 1kW DC brushless motor similar to the ones used in electric chairs. A deployed or activated assist bot is depicted in fig.1 (b).

In case of people with disabilities (i.e. if a person answers yes to disability), the bot uses two sets of servo motors in order to open a place for the handicapped person to sit, helping the user to undergo all the procedures without anyone's help. The servo motors used for opening and closing of the foldable chair are powered by the battery bank and require a maximum of 5 W. Power in excess is distributed for the electric circuit of the project consisting of a speech recognition module, a touch screen module, a microcontroller or microprocessor interface and a motor controller circuit. The bot changing itself structurally to allow the disabled person to sit is depicted in fig.1(c).

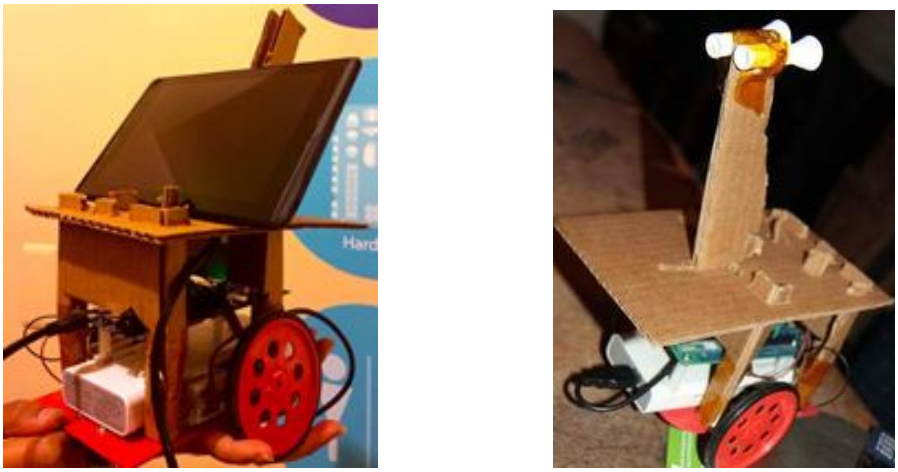
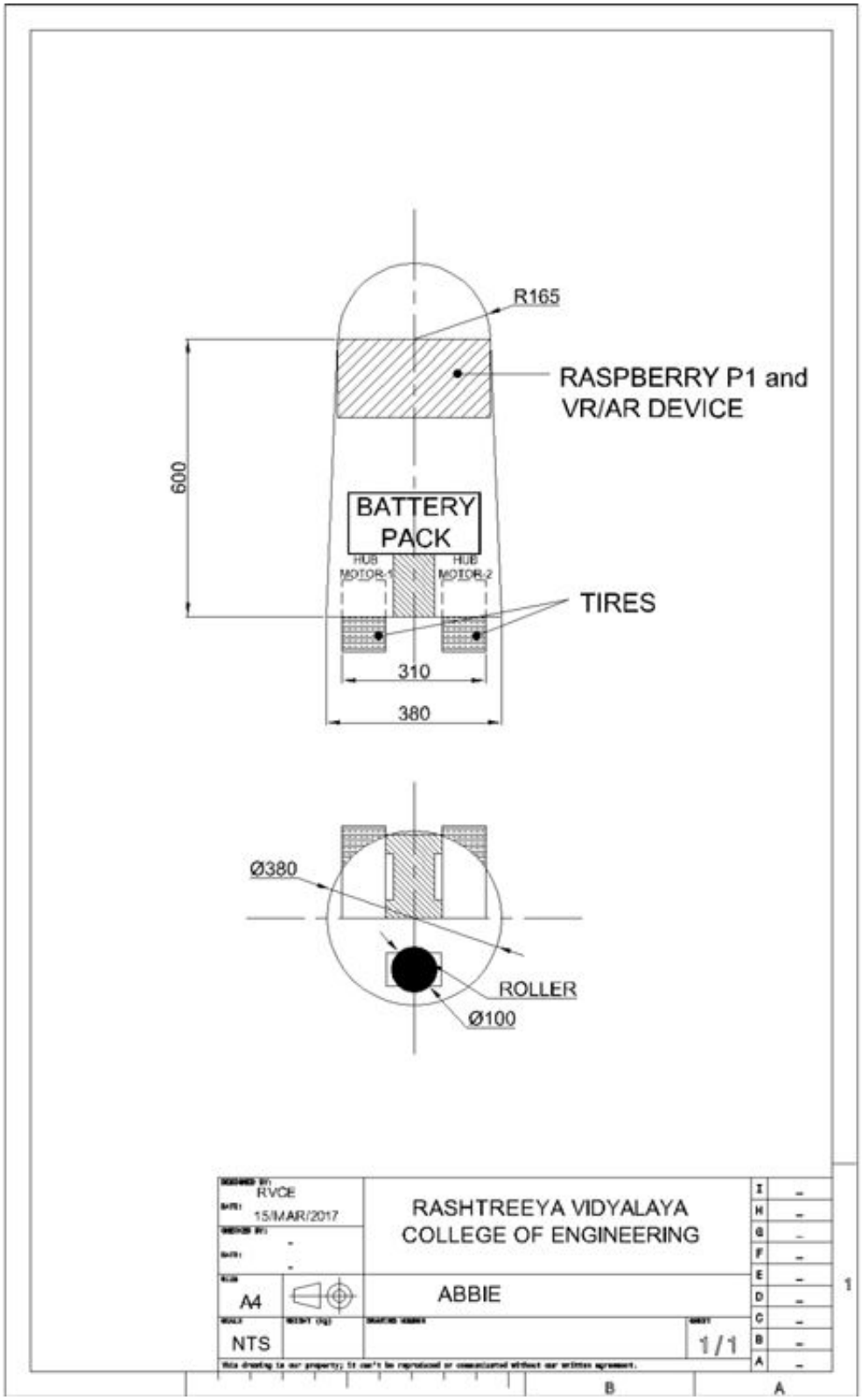


Figure 2: Different views of ABBIE Prototype-1

Figure 3: Different views of ABBIE Prototype-2

TECHNICAL DRAWING



ORIGINALITY/NOVELTY AND BENEFITS OF THE PROJECT

In the present times, a huge problem lies in transportation field with the problem of pollution from vehicles being the major one. Though the introduction of hybrid cars as well as electric cars in the field of transportation has been done but the problems associated with them such as their high cost as well as less range has made people hesitant towards buying. Moreover, even after introduction of these more energy efficient cars, the problem of traffic as well as noise still remains the same. The inability of people with disabilities to travel around the city with ease has become an important point to be addressed due to increase in the traffic density. To ensure faster, easy to use, affordable as well as eco-friendly way of transportation, motivates the present work on assist-bots.

Presently there have been attempts made by Google in order to make an electric self-driving car that could be used for transportation. However, the use of complex artificial intelligence based systems causes several conflicts for the autonomous driving under certain scenarios in the real world where the AI has to take moral decisions. Due to the problems associated with this, the project was reconsidered and taken down a few months back with the resources for the same made open source.

Artificial intelligence based self-driving cars have been worked upon for a really long time but the no effective solutions have been arrived as there have been certain scenarios where the car has to take a moral decisions. In addition to that, problem associated with traffic, cost incurred on the fast depleting energy resource as well as source of charging for the electric car are not addressed, giving rise to even more hurdles in deployment of the technology. Moreover, for indoor navigation, there was introduction of an Artificial Intelligence based bot in Russia that was used in order to help, guide people and prevent anyone from missing the flight, which turned out to be a costly affair. Use of AI based robots meant use of really accurate sensors which in turn sky rockets the cost of the bot which was the main reason it wasn't scaled up for other airports.

Whilst, ABBIE is an assistant bot which has components such as VR/AR Sensors against very accurate sensors, thereby reducing almost 80% of the cost. Also, the number of components used in the main assembly is considerably less, thereby reducing the maintenance cost of the bot. Since it solar powered, the operating cost is negligibly small. Due to lesser weight, the operating efficiency is better compared to electric/solar powered cars. The added advantage of being lighter is that it can be easily deployed at any station. Since the decision making is done by AI equipped server, it forms the only source of investment.

Overall ABBIE makes human life better when compared to the present.

BUSINESS PLAN

The business plan can be discretized into four phases of execution.

The first phase involves deployment of the bot at R V College premises in order to understand the space requirement for recharging and other operational challenges. This also allows us to closely follow the critical areas of deployment of charging points and associated control required for its pit-stop.

Upon successful completion of first phase, we will move on to the second phase, wherein the bot will be deployed at airports upon obtaining the clearance from the authorities. The bots will be placed at entrance and charging points will placed at crucial areas (the data of which is obtained from first phase). Initially the deployment will be carried out for free to check its performance and security related issues.

The third phase aims at extrapolating the results obtained at R V College premises to public places. To start-off with it will be deployed at malls and bus stands. The challenges associated with the environment and control will be evaluated and the bot will be ruggedized accordingly. Once its operation is successful, based on mutual agreement with the airport authorities a meager amount will be fixed.

In the last phase, the bot will be deployed for transportation within the city. The bot will also help in tracking the places that are worth to visit for out-of-towners and therefore acting as a guide.