

**FORM 2**  
**THE PATENTS ACT 1970**  
**(39 of 1970)**  
**&**  
**THE PATENT RULES, 2003**  
**COMPLETE SPECIFICATION**  
**(See section 10 and rule 13)**

**1. TITLE OF THE INVENTION: -**

**OMNI-MATE WHEELCHAIR FOR ENHANCING MOBILITY WITH VERSATILE MOVEMENT & VOICE ASSISTANT INTEGRATION**

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<b>3. PREAMBLE OF THE DESCRIPTION</b>  The following specification particularly describes the invention and the manner in which it is to be performed		

## **Title of The Invention**

Omni-Mate Wheelchair for Enhancing Mobility with Versatile Movement & Voice Assistant Integration.

## **Field of the Invention**

- 5 This invention relates to Omni-Mate Wheelchair for Enhancing Mobility with Versatile Movement & Voice Assistant Integration.

## **Background of the Invention**

Traditional and electric wheelchairs often struggle with tight turns and precise navigation, especially in crowded or confined spaces. Many existing mobility aids require manual  
10 operation, either by the user or a caregiver, limiting independence for individuals with mobility impairments. While some wheelchairs offer smartphone connectivity, their integration with advanced features like voice control and omnidirectional movement is limited. Voice control systems may face difficulties in accurately interpreting commands, particularly in noisy or crowded environments, potentially impacting user experience and  
15 safety. Advanced mobility aids incorporating cutting-edge technologies like mecanum wheels and voice control may be prohibitively expensive for many users, limiting their accessibility and adoption.

**US8484773B2** discloses A cantilevered mobile bed/chair apparatus for safely transporting a patient is described. The mobile bed/chair apparatus includes means for reclining the patient  
20 while lifting the patient's legs to allow access to a bedpan or to facilitate a change in clothing. Also described is means for mounting the bed/chair to a patient mobility device.

**US20200009738A1** discloses A robot uses controlled omni-wheels and an arm assembly coupled to a gripper to facilitate the opening of doors. The gripper is rotatable around at least

one of its axis to engage and rotate a door handle to unlatch a door. The omni-wheels are driven to move the robot along a carved path to open the door.

**US6866288B2** discloses A convertible wheelchair is provided along with a separable lift module for engaging and elevating the convertible wheelchair to a selected elevation. A coupling assembly is operative associated with the lift module and adapted to extend therefrom to where the coupling assembly attaches to the convertible wheelchair. In one embodiment, the coupling assembly comprises a three-point attachment that results in the wheelchair being connected to the coupling assembly and hence the separable lift system at three points. Once coupled to the lift system, the convertible wheelchair, with a patient supported therein, can be raised to a selected elevation. Thereafter, the wheelchair can be converted from a chair configuration to any one of several examination configurations.

**US7597339B2** discloses A wheelchair is capable of radiographing with the wheelchair as is by using a general radiographic device, without a need to switch to a different chair. The wheelchair includes a seat portion, a backrest portion provided with upper frame bodies mounted approximately perpendicular to the seat portion and a main body detachably mounted to the upper frame bodies transversely of the upper frame bodies, holding portions installed consecutively to the upper frame bodies, and wheels. The upper frame bodies are approximately perpendicular to the ground plane of the wheels, the main body is configured of an X-ray transmissive material, and the holding portions are installed consecutively to the upper frame bodies detachably and turnably.

None of the prior art indicate above either alone or in combination with one another disclose what the present invention has disclosed. This invention relates to Omni-Mate Wheelchair for Enhancing Mobility with Versatile Movement & Voice Assistant Integration.

## **SUMMARY OF THE INVENTION**

5 This summary is provided to introduce a selection of concepts, in a simplified format, that are further described in the detailed description of the invention.

This summary is neither intended to identify key or essential inventive concepts of the invention and nor is it intended for determining the scope of the invention.

The Omni Mate Wheelchair offers multiple control options including smartphone integration,  
10 joystick control, and compatibility with a PS2 remote, providing users with autonomy and choice in controlling their mobility aid. Incorporation of mecanum wheels enables omnidirectional movement in eight directions, allowing easy navigation through tight spaces and precise maneuverability. Integration of a voice assistant feature powered by Raspberry Pi technology enables hands-free operation through simple vocal commands, enhancing  
15 accessibility and ease of use for users. Advanced voice recognition technology incorporated into the Omni Mate Wheelchair ensures accurate and responsive control even in challenging conditions, improving user experience and safety. The Omni Mate Wheelchair aims to be cost-effective and accessible, making advanced mobility assistance attainable for a wider range of individuals with mobility impairments.

20 To further clarify advantages and features of the present invention, a more particular description of the invention will be rendered by reference to specific embodiments thereof, which is illustrated in the appended drawings. It is appreciated that these drawings depict only

typical embodiments of the invention and are therefore not to be considered limiting of its scope. The invention will be described and explained with additional specificity and detail with the accompanying drawings.

## **BRIEF DESCRIPTION OF THE DRAWINGS**

- 5    The illustrated embodiments of the subject matter will be understood by reference to the drawings, wherein like parts are designated by like numerals throughout. The following description is intended only by way of example, and simply illustrates certain selected embodiments of devices, systems, and methods that are consistent with the subject matter as claimed herein, wherein:

### **10    FIGURE 1: SYSTEM ARCHITECTURE**

The figures depict embodiments of the present subject matter for the purposes of illustration only. A person skilled in the art will easily recognize from the following description that alternative embodiments of the structures and methods illustrated herein may be employed without departing from the principles of the disclosure described herein.

### **15    DETAILED DESCRIPTION OF THE INVENTION**

- The detailed description of various exemplary embodiments of the disclosure is described herein with reference to the accompanying drawings. It should be noted that the embodiments are described herein in such details as to clearly communicate the disclosure. However, the amount of details provided herein is not intended to limit the anticipated variations of
- 20    embodiments; on the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the scope of the present disclosure as defined by the appended claims.

It is also to be understood that various arrangements may be devised that, although not explicitly described or shown herein, embody the principles of the present disclosure. Moreover, all statements herein reciting principles, aspects, and embodiments of the present disclosure, as well as specific examples, are intended to encompass equivalents thereof.

5 The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of example embodiments. As used herein, the singular forms “a,” “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises,” “comprising,” “includes” and/or “including,” when used herein, specify the presence of stated features,  
10 integers, steps, operations, elements and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components and/or groups thereof.

It should also be noted that in some alternative implementations, the functions/acts noted may occur out of the order noted in the figures. For example, two figures shown in succession may,  
15 in fact, be executed concurrently or may sometimes be executed in the reverse order, depending upon the functionality/acts involved.

In addition, the descriptions of “first”, “second”, “third”, and the like in the present invention are used for the purpose of description only, and are not to be construed as indicating or implying their relative importance or implicitly indicating the number of technical features  
20 indicated. Thus, features defining “first” and “second” may include at least one of the features, either explicitly or implicitly.

Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one of ordinary skill in the art to which example embodiments belong. It will be further understood that terms, e.g., those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

Present invention, dubbed the "Omni-Mate Wheelchair," introduces a versatile control system and advanced features to enhance mobility for users with diverse needs. This wheelchair offers three distinct control methods: smartphone application, joystick control, and compatibility with PS2 remote, providing users with flexibility and accessibility in navigation. Furthermore, it integrates a voice assistant feature facilitated by Raspberry Pi technology, enabling users to interact with the wheelchair through voice commands, thereby enhancing user experience and independence. The utilization of mecanum wheels enable the wheelchair to achieve omnidirectional movement, offering eight-directional mobility for seamless navigation through various environments. By combining multiple control options, voice assistant technology, and innovative wheel design, the Omni-Mate Wheelchair represents a significant advancement in assistive technology, empowering users with enhanced mobility and autonomy in their daily lives.

There are some mobility assistive technologies, which is used in the present invention:

**1. Traditional Wheelchairs:** Conventional wheelchairs are manually operated through hand rims or by a caregiver pushing the chair. While widely used, they lack advanced mobility features and may pose challenges in tight spaces or uneven terrain.



**2. Powered Wheelchairs:** Electrically powered wheelchairs offer greater independence and ease of use compared to manual wheelchairs. However, they typically offer limited maneuverability and may struggle with precise navigation in crowded or confined environments.

5    **3. Smart Wheelchairs:** Some modern wheelchairs incorporate smartphone connectivity for navigation assistance, tracking, and remote control. While offering enhanced features, they often rely on conventional wheel designs, limiting their maneuverability.

**4. Voice Control Systems:** Voice-controlled devices and systems are becoming increasingly popular for hands-free operation in various applications. However, integration into mobility  
10    aids like wheelchairs is still relatively new and may face challenges in accuracy and responsiveness.

**5. Mecanum Wheel Technology:** Mecanum wheels enable omnidirectional movement by utilizing a series of angled rollers. While offering superior maneuverability, they have been primarily used in industrial and robotics applications, with limited adoption in mobility aids.

15    **The components used in the invention:**

**1. Mecanum Wheels:** Mecanum wheels are a type of omnidirectional wheel with a series of rollers mounted along their circumference at a 45-degree angle. Each wheel is independently powered and can be controlled to rotate in both forward and reverse directions. When all wheels are powered and rotated in the same direction, the wheelchair moves forward or  
20    backward conventionally. However, by varying the speeds and directions of rotation of each wheel, the wheelchair can achieve omnidirectional movement, allowing it to move sideways and diagonally with ease. The unique design of mecanum wheels enables the wheelchair to

navigate through tight spaces, make precise turns, and negotiate obstacles more effectively compared to traditional wheelchairs.

**2. Versatile Control Options:** The Omni Mate Wheelchair offers multiple control methods to accommodate users with different preferences and abilities.

- 5       • **Smartphone Integration:** Users can control the wheelchair using a dedicated smart phone application. The app provides an intuitive interface for navigation, customization of settings, and monitoring of battery life and other essential parameters.
- 10       • **Joystick Control:** A traditional joystick interface is available for users who prefer manual control. The joystick allows users to control the wheelchair's movement with precision, adjusting speed and direction as needed.
- 15       • **PS2 Remote Compatibility:** For users with limited hand dexterity or those who prefer alternative control methods, the wheelchair is compatible with a PS2 remote controller. This provides an accessible option for controlling the wheelchair's movement without the need for precise hand movements.
- 20       **3. Voice Assistant Feature:** The Omni Mate Wheelchair is equipped with a voice assistant feature powered by Raspberry Pi technology. Users can activate the voice assistant by saying a predefined wake-up phrase, such as "Hey Omni Mate" or "Activate," followed by a command to control the wheelchair's movement or access other features. The voice assistant utilizes advanced speech recognition algorithms to accurately interpret user commands and execute corresponding actions. Users can issue commands such as "move forward," "turn left," "stop," or "go to the kitchen" using simple vocal commands, providing them with hands-free operation and greater independence.

**4. Safety Features:** The Omni Mate Wheelchair incorporates various safety features to ensure user safety and prevent accidents.

- **Collision Detection:** Sensors are installed around the wheelchair to detect obstacles and prevent collisions. When an obstacle is detected, the wheelchair automatically slows down or stops to avoid impact.
- **Tilt Sensors:** Tilt sensors are integrated into the wheelchair to detect changes in inclination and prevent tipping. If the wheelchair exceeds a certain angle of tilt, it automatically adjusts its speed or stops to prevent accidents.
- **Emergency Stop Button:** An emergency stop button is located on the wheelchair's control panel, allowing users or caregivers to quickly halt the wheelchair's movement in case of emergencies or unexpected situations.

**5. Customization and Adjustability:** The Omni-Mate Wheelchair is designed to be highly customizable and adjustable to accommodate users' individual preferences and needs.

- **Seat Adjustability:** The wheelchair's seat height, angle, and position can be adjusted to provide optimal comfort and support for users of different sizes and physical conditions.
- **Armrests and Footrests:** The armrests and footrests are adjustable to accommodate users with varying arm and leg lengths, ensuring proper posture and comfort during use.
- **Control Customization:** Users can customize the wheelchair's control settings, such as joystick sensitivity and button assignments, to suit their preferences and abilities.

**6. Durability and Reliability:** The Omni-Mate Wheelchair is constructed from high-quality materials and components to ensure durability and reliability.

- **Robust Frame:** The wheelchair features a sturdy frame made from lightweight yet durable materials such as aluminum or carbon fiber, providing strength and stability while minimizing overall weight.
- **High-Quality Components:** The wheelchair is equipped with high-quality motors, batteries, and electronic components sourced from reputable manufacturers to ensure reliable performance and long-term durability.

**7. User-Friendly Design:** The Omni-Mate Wheelchair is designed with user convenience and ease of use in mind.

- **Intuitive Interface:** The control interface, whether it's the smartphone app, joystick, or voice assistant, is designed to be intuitive and user-friendly, allowing users to navigate and operate the wheelchair with ease.
- **Ergonomic Design:** The wheelchair's ergonomic design features padded seats, adjustable armrests, and lumbar support to ensure user comfort during prolonged use.
- **Compact and Portable:** The wheelchair is designed to be compact and easily transportable, with foldable features and detachable components for convenient storage and transportation.

### **Best Method of working**

Present invention discloses an Omni-Mate Wheelchair for Enhancing Mobility with Versatile Movement & Voice Assistant Integration (100) comprises a microcontroller (101), a mecanum wheel (102), a voice assistant (103), a PS2 remote (104), a smart phone (105), a collision detection sensor (106), a tilt sensor (107), an alert system (108), an emergency button (109), wherein said the Mecanum wheels (102) configured to provide omnidirectional movement in eight directions and the voice assistant (103) feature

powered by Raspberry Pi (101) technology for hands-free operation through vocal commands.

In another embodiment the smart phone (105) provides an intuitive interface for navigation, customization of settings, and monitoring of battery life.

- 5 In another embodiment the PS2 remote (104) connected with smart phone provides an accessible option for controlling the wheelchair's movement without the need for precise hand movements.

In another embodiment the collision detection sensors (106) detect obstacles and prevent collisions and the tilt sensors (107) to detect changes in inclination and prevent tipping.

- 10 In another embodiment the emergency stop button (109) is located on the wheelchair's control panel, allowing users or caregivers to quickly halt the wheelchair's movement in case of emergencies or unexpected situations.

**We Claim:**

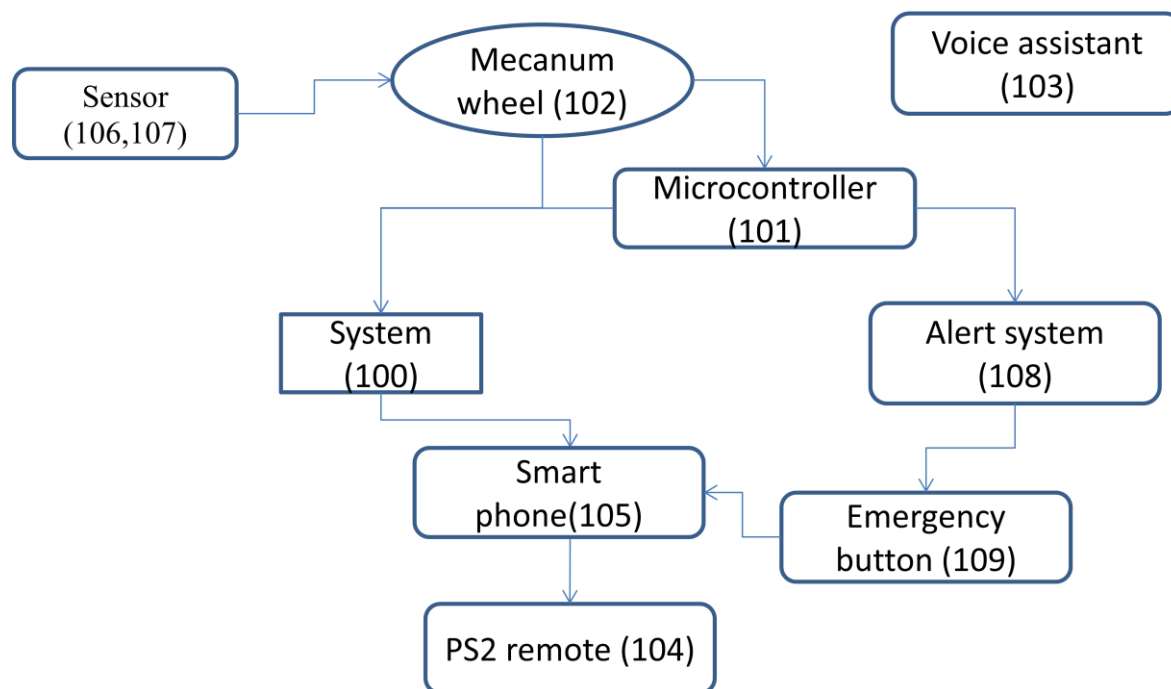
1. An Omni-Mate Wheelchair: Enhancing Mobility with Versatile Movement & Voice Assistant Integration (100) comprises a microcontroller (101), a mecanum wheel (102), a voice assistant (103), a PS2 remote (104), a smart phone (105), a collision detection sensor (106), a tilt sensor (107), an alert system (108), an emergency button (109), wherein said the Mecanum wheels (102) configured to provide omnidirectional movement in eight directions and the voice assistant (103) feature powered by Raspberry Pi (101) technology for hands-free operation through vocal commands.
2. The wheelchair as claimed in claim 1, wherein the smart phone (105) provides an intuitive interface for navigation, customization of settings, and monitoring of battery life.
3. The wheelchair as claimed in claim 1, wherein the PS2 remote (104) connected with smart phone provides an accessible option for controlling the wheelchair's movement without the need for precise hand movements.
4. The wheelchair as claimed in claim 1, wherein the collision detection sensors (106) detect obstacles and prevent collisions and the tilt sensors (107) to detect changes in inclination and prevent tipping.
5. The wheelchair as claimed in claim 1, wherein the emergency stop button (109) is located on the wheelchair's control panel, allowing users or caregivers to quickly halt the wheelchair's movement in case of emergencies or unexpected situations.

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**FIGURE 1: SYSTEM ARCHITECTURE**

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## **ABSTRACT**

### **OMNI-MATE WHEELCHAIR FOR ENHANCING MOBILITY WITH VERSATILE MOVEMENT & VOICE ASSISTANT INTEGRATION**

Disclosed herein an Omni-Mate Wheelchair for Enhancing Mobility with Versatile Movement  
5 & Voice Assistant Integration (100) comprises a microcontroller (101), a mecanum wheel  
(102), a voice assistant (103), a PS2 remote (104), a smart phone (105), a collision detection  
sensor (106), a tilt sensor (107), an alert system (108), an emergency button (109), wherein  
said the Mecanum wheels (102) configured to provide omnidirectional movement in eight  
directions and the voice assistant (103) feature powered by Raspberry Pi (101) technology for  
10 hands-free operation through vocal commands. In another embodiment the smart phone (105)  
provides an intuitive interface for navigation, customization of settings, and monitoring of  
battery life. In another embodiment the PS2 remote (104) connected with smart phone  
provides an accessible option for controlling the wheelchair's movement without the need for  
precise hand movements. In another embodiment the collision detection sensors (106) detect  
15 obstacles and prevent collisions and the tilt sensors (107) to detect changes in inclination and  
prevent tipping. In another embodiment the emergency stop button (109) is located on the  
wheelchair's control panel, allowing users or caregivers to quickly halt the wheelchair's  
movement in case of emergencies or unexpected situations.