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VOICE RECOGNITION ROBOTIC DOG GUIDES FOR VISUALLY IMPAIRED PEOPLE

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ABSTRACT

A smart multipurpose human assistance robotic dog is designed to guide the visually impaired and elderly people to some predefined destination avoiding obstacles and traffic. It is also designed to act as an advanced multipurpose human assistance and service robot that is able recognize the words spoken by the user, talk to them and take action according to the spoken voice command. Voice commands are recognized by an android Smartphone and the information is transferred to the main MCU using a Bluetooth serial port that runs Bluetooth SPP protocol stack.The robotic dog has the ability to follow a human when commanded with voice. Touch sensitive e-skin senses human finger touch and helps answering complex user requests such as time, date and weather conditions such as light and temperature. The same can be asked using voice also. It even allows the user to set wake up alarm. A built in audio playback system can play music tracks in MP3 format. One of the music tracks is kept as the alarm tone. It also plays the role of a regular watchdog during night and barks like any normal dog if it finds any abnormal activity. During the day time it can charge itself by moving around within a given region in order to find the maximum sun light, intelligently avoiding the shaded areas, thereby freeing the user completely from maintenance issues such as battery charging.

1. INTRODUCTION

Guide dogs are assistance dogs trained to lead elderly or visually impaired people around obstacles. These dogs need to be trained by some special training institute and maintained healthy in order to help people. Being a service dog, they also have a maximum lifetime around 8 to 10 years. These dogs help them in one another way. Elderly people are often left alone and have least amount of interaction with other people. Although a guide dog relieve them from such a situation, they are dumb and lag intelligence of a human companion. For many visually impaired people, a cane or a stick is a close friend helping them to detect

and avoid obstacles in the walking paths. During walking with the cane, they sense and guess directions and locations by hearing sounds surrounding, sniffing smells in the air, feeling touches on skin, counting footsteps they walk, and memorizing events in time and spaces. However, it is difficult for them to do this all the time when surrounding environment could suddenly change, or when they get lost memory of locations. Voice Recognition Robotic Dog Guides Visually Impaired People, Follows Master, Acts as Watchdog, Plays MP3 Music, Finds Sun Light and Charges itself, Respond to e-Skin Touch, Wake up Alarm, and Informs about Time-Date-Light-Temperature.

2. RELATED WORK

As many countries step into the aging society rapidly, more and more elders suffer from deficits of motor function or disability of the limbs, which are usually caused by neurological problems or lack of muscle strength. In addition, the growing elderly population causes the shortage of people for nursing care. Therefore, there is a great need to develop rehabilitation robots that can partially replace the nurses and the therapists. To improve the walking ability of the elderly, the walker-type rehabilitation robot has become a popular research topic over the last decade. There have been many intelligent walker-type robots comprising active or passive wheels and supporting frame. A novel assistive robotic walker called "JAIST active robotic walker (JARoW)" to provide potential users with sufficient ambulatory capability in an efficient, cost effective way was presented in [14].The Hitomi system to help the blind in outdoor environment was proposed in [15].Apowerassisted walker for physical support during walking was developed in [16]. The Care-O-bot and Nursebot are developed as personal. A new intelligent walker based on passive robotics to assist the elderly, handicapped people, and the blind was proposed in [20]. There are still many deficiencies in the present walker systems. First, many walkers are designed for the indoor environment. Second, most of them are big in size and/or heavy in weight. An indoor robot is often restricted within limited places. Big size makes it impossible to be used in narrow space and heavy weight restricts the man euverability. Many elders and patients are not so weak that they have to be nursed carefully. Nevertheless, sufficient support, such as a cane or stick, is necessary to help them take a walk outside, which enables them to realize high-quality lives or accelerate the rehabilitation. In these cases, an intelligent cane system may be more useful than walkers due to its flexibility and handiness.

3. EXISTING SYSTEM

In existing method they used cane robot for aiding the elderly and handicapped peoples walking. For many visually impaired people, a cane or a stick is a close friend helping them to detect and avoid obstacles in the walking paths.

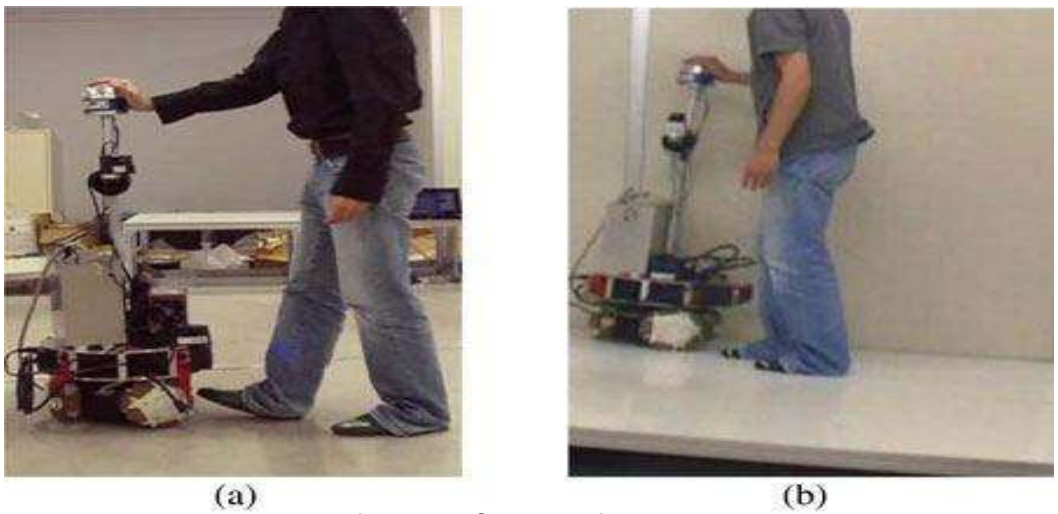

Fig.1. Example construction

During walking with the cane, they sense and guess directions and locations by hearing sounds surrounding, sniffing smells in the air, feeling touches on skin, counting footsteps they walk, and memorizing events in time and spaces. However, it is difficult for them to do this all the time when surrounding environment could suddenly change, or when they get lost memory of locations. Voice recognition method is not used in existing method. Cane robot is not user friendly. An intelligent cane robot is

designed for aiding the elderly and handicapped people's walking. The robot consists of a stick, a group of sensors, and a unidirectional basis driven by three Swedish wheels. Recognizing the user's walking intention plays an important role in the motion control of our cane robot.

The direction to which a person intends to move is referred to as the ITD. The ITD can be evaluated by the angle between the forward direction (along with the axis yr) and the ITD itself. Obviously, the ITD is a time-dependent value and is denoted by ρ(n) in the rest of the paper. Furthermore, the quantity of this intention is characterized by the measured resultant force Fρ (n) along the ITD. Note that discrete time scale n is assumed for the requirement of filtering technology.

In this existing method, a new omni directional-type cane robot was developed for the elderly and handicapped. Motion control of this robot was studied based on online estimating human walking intention. The main contribution of this study has been to present dynamic models and online inference algorithm for the human walking intention, which is significant to lead the user's walking in a natural and comfortable way. An IBAC scheme was also proposed and used to drive the cane robot. Experiments were performed on the flat ground and slope. The effectiveness of the proposed algorithm was confirmed through experiments. It should be pointed out that the interface between the human and the robot is the multi axis force sensor, which is expensive and fragile. To lower the cost and improve the system reliability, in the future, we would like to construct a low-cost sensing system comprising cheaper force sensors (e.g., force sensing resistors) and range finding sensors for the cane robot. By utilizing some sensor fusion approaches, the state of user can then be reliably recognized and provided to the motion controller.

4. PROPOSED SYSTEM

A. ANDROID VOICE RECOGNITION METHOD

Uses android mobiles internal voice recognition to pass voice commands to your robot Pairs with Bluetooth Serial Modules and sends in the recognized voice as a string. For example if you say Hello the android phone will return a sting *Hello# to your Bluetooth module *and # indicate the start and stop bits. Can be used with any microcontroller which can handle strings. Examples Platforms: Arduino, ARM, PICAXE, MSP430, 8051 based and many other processors and controllers HC-05 embedded Bluetooth serial communication module (can be short for module) has two work modes: order-response work mode and automatic connection work mode. And there are three work roles (Master, Slave and Loopback) at the automatic connection work mode. When the module is at the automatic connection work mode, it will follow the default way set lastly to transmit the data automatically. When the module is at the order-response work mode, user can send the AT command tothe module to set the control parameters and sent control order.. The work mode of module can be switched by controlling the module PIN (PIO11) input level.

B. ANSWERING USER QUESTIONS BY ROBOT

The Twin MOS Micro SD Memory Card is functionally compatible with the SD Memory card but is smaller in dimensions. It can be inserted into a passive SD or mini SD memory Card Adapter and operate as an SD Memory Card. Twin MOS Micro SD Card TM is ideal for digital devices designed to use Micro SD Card. All the commands spoken by the user is stored in the memory. When the user asked any queries to the robot, the questions directly mapping with memory card. After that the commands processed by micro processor with the help of interfacing sensors like sonar, digital MEMS, light sensor.finally Replied to the user with the help of speaker.

C. ARM PROCESSOR AND ITS MODULES

The LPC1311/13/42/43 operate at CPU frequencies of up to 72 MHz. The ARM Cortex-M3 CPU incorporates a 3-stage pipeline and uses a Harvard architecture with separate local instruction and data buses as well as a third bus for peripherals. The ARM Cortex-M3 CPU also includes an internal prefetch unit that supports speculative branching. The LPC1311/13/42/43 operate at CPU frequencies of up to 72 MHz. The ARM Cortex-M3 CPU incorporates a 3-stage pipeline and uses a Harvard architecture with separate local instruction and data buses as well as a third bus for peripherals. The ARM Cortex-M3 CPU also includes an internal prefetch unit that supports speculative branching. The peripheral complement of the LPC1311/13/42/43 includes up to 32 kB of flash memory, up to 8 kB of data memory, USB Device (LPC1342/43 only), one Fast-mode Plus I2C-bus interface, one

UART, four general purpose timers, and up to 42 general purpose I/O pins. This application note describes a practical sonar system, using ultrasonic sound waves to determine the distance to obstacles, using a Microchip PIC16F87XA MCU. By measuring the time between sending the pulse and detecting the echo, the distance to the object can be determined. I²C is a multi-master serial computer bus invented by Philips that is used to attach low-speed peripherals to a motherboard, embedded system, or cell phone. USART is also known as a Serial Communications Interface or SCI. for system software µVision4. we used µVision4 integrates all the tools need to develop embedded applications including C/C++ compiler, macro assembler, linker/locator, and a HEX file generator.

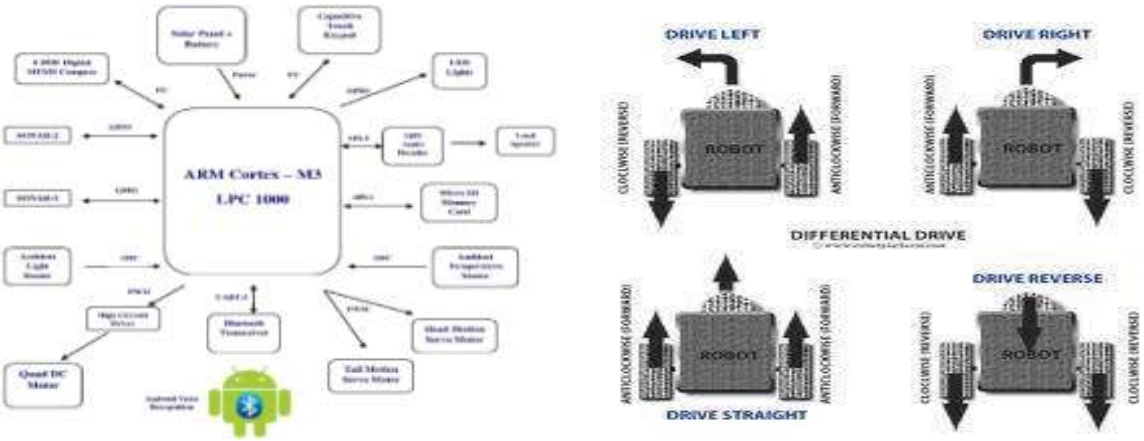

Fig.2. Interfacing

5. EXPERIMENTAL RESULTS

In this chapter let us discuss about the implementation of this application. First we divide the whole application into small modules. The system comprises the modules like robotic unit, embedding of hardware and software. Let us see about the flowchart and implementation of the systems in the following sections. Information is provided in natural MP3 quality voice interface via an external speaker. Onboard 2-GB memory card allows storing huge number of audio files including MP3 music. Capacitive Touch keypad eliminates finger pain while using older Braille keys and allows blind people to enter notes and control device operation easily. 100 % hands free operation using voice recognition facility. High quality stereo MP3 makes it sounds natural and pleasant to hear. Sun finding based intelligent charging eliminates maintenance issues. GPS less path following based on compass and distance sensor makes it cost effective In addition, the robot provides user information needed, in audio format, including time, calendar, alarm, navigation direction, ambient light and temperature condition. SONAR is capable of measuring object distance upto 3m. Low power 32-bit ARM Cortex-M3 microcontroller enables highly deterministic operation using battery power only. Here the whole modules divided into into small modules. The system comprises the modules like robotic unit, embedding of hardware and software. Let us see about the flowchart and implementation of the systems in the following sections.

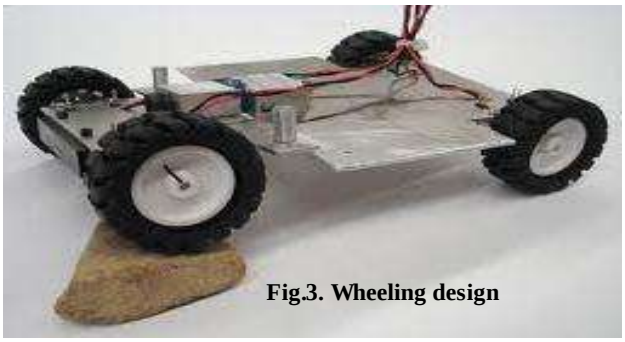

Fig.3. Wheeling design

6. CONCLUSION

In this project a multipurpose assistance robot is designed from the existing technique which effectively helps visually impaired people with zero maintence. Detection of obstacles with the help of sonar sensors gives more accuracy than any other sensors. In this project we have used voice recognition method which helps to recognize human voice. This recognition method is achieved by android mobile phone It is decided to implement the design for the robotic devices to achieve artificial intelligence which is independent and thinking capability of different operations and assist human kinds.

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