

Mechanical Design of Two Wheeler for Physically Challenged People with Voice Recognition

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Abstract—The mechanical design of two-wheeler for physically challenged people is based on people with disabilities. This focuses for only people who does not have their hands and it only get operated through movement of legs and also this two-wheeler has been includer with voice recognition. It provides a good facility for those people with disabilities with a good comfort for travelling a long distance. This includes very long-distance travel along with an exclusive comfort in design.

Keywords—IOT, Relay, Two-Wheeler, Av Camera, Bluetooth Module, Display Screen, Microphone.

I. INTRODUCTION

This Project is mainly based and focus on the physically challenged people and handicapped person especially the handless people [1]. The Main aim is to help them with the cure by using IOT system I their day to day life [2]. It helps them to locate from one place to another without the help of others like a normal person does [3]. This vehicle is optimized to control Driving operations without using the handlebar in the way to facilitate the physically challenged people; accomplished with a voice control system, pedals [4]. Different application scenario is considered in order to illustrate the interaction of the components of Internet of things [5]. Many possible operations can be performed by the vehicle in voice recognition such as Ignition On and Off, Left and Right Indicator, Blow Horn,...etc

II. HARDWARE AND SOFTWARE COMPONENTS

A. Hardware Components

1. ARDUINO UNO
2. RELAY
3. BLUETOOTH MODULE (HC-05)
4. TWO-WHEELER
5. ATTACHMENT WHEELS
6. AV-CAMERA

III. DESCRIPTION

A. Internet of things

The Internet of Things (IoT) is the extension of Internet connectivity into physical devices and everyday objects. Embedded with electronics, Internet connectivity, and other forms of hardware (such as sensors), these devices can communicate and interact with others over the Internet, and they can be remotely monitored and controlled. The definition of the Internet of things has evolved due to convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", covering devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. The IoT concept has faced prominent criticism, especially in regards to privacy

and security concerns related to these devices and their intention of pervasive presence.

B. Arduino

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions, see the index of Arduino boards.

- Microcontroller ATmega328
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limits) 6-20V
- Digital I/O Pins 14 (of which 6 provide PWM output)
- Analog Input Pins 6
- DC Current per I/O Pin 40 mA



Fig. 1. Arduino

C. Bluetooth Module

HC-05 Bluetooth Module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Its communication is via serial communication which makes an easy way to interface with controller or PC. HC-05 Bluetooth module provides switching mode between master and slave mode which means it able to use neither receiving nor transmitting data. In this Bluetooth Module it acts as both transmitter and receiver between the Arduino and android application for transmitting a signal for the voice command.

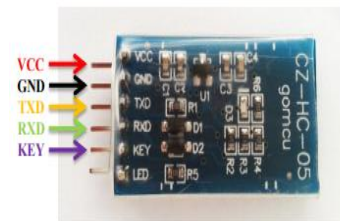


Fig. 2. Bluetooth Pin Diagram

D. Relay

A relay is defined as an electrically operated switch; their main use is controlling circuits by a low-power signal or when several circuits must be controlled by one signal. The first relay was used in long distance telegraph circuits as amplifiers, basically they repeated the signal they received from one circuit, and transmitted it into a different one, they were also used in early computers to perform logical operations. The Arduino relay module is designed for a wide range for micro controllers such as the Arduino board, AVR, PIC, ARM, with digital outputs. This module incorporates 2 relays. The following forms the relay system:

- Input: Vcc, connected to the 5V current on the Arduino Board, GND, connected to the ground and 2 digital inputs. (In1 & In2)
- Output: The 2 channel relay module could be considered like a series switches: 2 normally Open (NO), 2 normally closed (NC) and 2 common Pins (COM).
- NC- Normally Closed, in which case NC is connected with COM when INT1 is set low and disconnected when INT 1 is high.
- NO- Normally Open, in which case NO is disconnected with COM when INT1 is set low and connected when INT 1 is high.

E. AV Camera

The mirror set up and visualizing through mirror and other mirror related operations are carried out with AV CAMERA. The AV CAMERA is the wireless audio video camera with high clarity definition pictures. The portable TV or DVD player is used to display the image or video captured by the camera which is fixed behind the vehicle. It is used as the alternate of the side mirror used in the motor cycles. AV Camera consist of various parts such as AV Camera, AV Receiver, Receiver Antenna, 12V DC Adaptor, Audio Video Jackie Cable, Portable Display, Connecting Chords.



Fig. 3. AV Camera with Receiver

Identify applicable funding agency here. If none, delete this text box.

F. Micro Controller

A microcontroller is a computer on a single chip. Micro suggests that the device is small and controller tells that the device is used to control objects, process or events. Microcontroller is a highly integrated chip that contains all the devices comprising a computer. Typically, this includes a CPU, RAM, Input/ Output ports, timers, interrupts. So microcontroller is also called as "true computer on a chip". Unlike a general-purpose computer which also includes all of these devices. A microcontroller is designed for a very specific task to control a particular system. A microcontroller is a general-purpose device but one that is meant to read data, performs limited calculations on that data and control its environment based on those calculations. The prime use of microcontroller is to control the operation of machine using a fixed program that is stored in ROM that does not change over the life time of the system. There are number of popular families of microcontrollers which are used in different applications as per their capability and feasibility to perform the desired task, most common of these are 8051, AVR and PIC microcontrollers. In this article we will introduce you with AVR family of microcontrollers.

IV. EXSISTING SYSTEM

The evolution of the wheelchair over the years have gone through a great era of transformation. The wheelchairs navigate with help of single mode of input. They have no interface system which helps give a voice output. They also do not have any bookmarking system that provides ease of reading. The system accepts only either audio or gesture movements of the body.

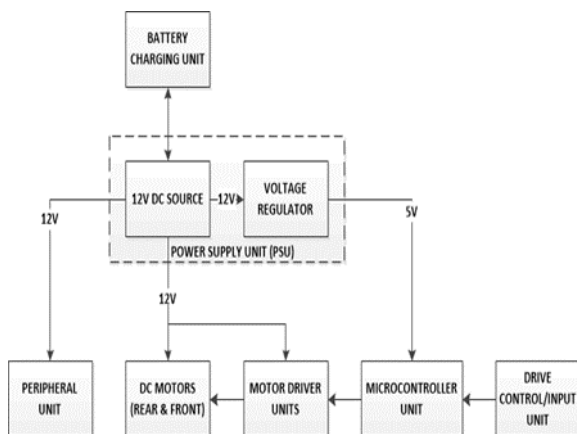


Fig. 4. Block Diagram of Existing System.

V. VOICE RECOGNITION WHEEL CHAIR

The design aims at free flow of navigation through the library and reading books with translation. This system emphasizes the importance of impaired people to utilize the library very effectively. It is economical and user-friendly and handy to the impaired people. The preset position is set to entrance of the library to where they reach after the end of the process.

VI. BASIC PRINCIPLE

The basic principle is analyzing the voice command and navigating to the correct place in the library. Where the command obtained from the user at transmitting through the input end and program obtained via Arduino programming, final analyzed output obtained through the output of given system.

VII. PROPOSED SYSTEM

By using their leg tilt movement, the handle bar control can be done with the help of rod connected between the leg and wheel. This is the clutch less system so there is no need of gear change. Instead of mirror alignment we are using the AV video camera. The accelerator and the break are controlled by their legs. Using IOT system the physical works done by the hands have been controlled. The work done using IOT in this vehicle are:

- Vehicle switching ON and OFF
- Blowing horn
- Head light ON/OFF

The IOT system includes the voice recognition system for the operations like switching ON/OFF the engine, head light ON/OFF. The replacement of the side mirror is by the AV video camera. The IOT system consists of Arduino UNO, relay, one head lamp, Bluetooth module, mobile phone for Bluetooth transmitting signal. The mobile transmit the observed voice signal through the Bluetooth to the Bluetooth receiver connected with the controller (Arduino UNO). Thus, it receives the voice command and work as for the command like ON/OFF of the engine and the head light ON/OFF.

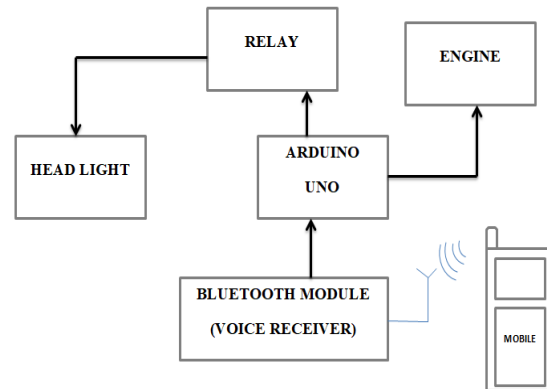


Fig. 5. IOT System Block Diagram.

VIII. FEATURES

The proposed idea has a various feature in it which are meant to navigate through various directions and flow of driving a two wheeler in an easiest manner. The ideas are

1. Voice recognition
2. Navigation through direction of two ways.
3. Moving of ABC in vehicle
4. AV camera to view back side of vehicle.
5. Ignition on and Ignition off.
6. Indicator to left and Right.

7. Arduino Lite Application.

IX. RESULT

The smart vehicle that we designed for the ARMLESS person plays a major role in the field of mechatronics. It solves the biggest fact of the handicapped person. The bike designed will be helpful for them and too gives the importance of IOT in the field of mechanic to the people. Not like the other bikes, it will be user friendly and easily operatable for those people.

X. APPLICATIONS

- The IOT system used in this project is also useful for the people who is blind in various application
- The bike is useful for those who is without hands and hand paralyzed person
- The bike consumes less amount of energy like the ordinary bikes, hence the power consumption is maintained
- The same mechanism can be implemented in car prototype also
- Children can also learn to ride bike easily using this bike

XI. ADVANTAGES

Overcome the fact that the armless people cannot ride a motorcycle

- User friendly
- Reduced physical works
- Pollution free
- Easily workable
- Cost efficient
- Average speed
- high safety

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