JOYSTICK CONTROLLED WHEELCHAIR

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Abstract

For those who are physically disabled, a wheelchair with a joystick controller is essential. They are unable to move around like a regular person. They are always dependent on other people as a result. However, the joystick-controlled wheelchair can solve this issue and enable them to move around freely. The joystick can be used to manually control the wheelchair's movement. Using a joystick, the command is carried out, after which it is transmitted to the Arduino board, where the ATMega328p controller will carry it out. Following processing, the controller sends a digital signal command to the motor driving IC, which in turn controls the wheelchair's movement.

Keywords-*ATMega328p, Analog Joystick, Gear Motor*.

I. INTRODUCTION

For those who are physically disabled, the wheelchair is tremendously helpful. The powered wheelchair can be created using robotics and intelligent system technology. The wheelchair with joystick control is very simple to use. The physically disabled individual can control the wheelchair's mobility by utilizing the joystick. To monitor and manage the system, we used a microcontroller in this project. Wheelchairs are frequently used in public settings, particularly in hospitals.

II. LITERATURE SURVEY

Published in 2017 is an article by Sagar Kesawani titled "Design and Development of Motorized Wheelchair for Handicapped Person." This essay presents a wheelchair that can climb ramps and other obstacles thanks to two motors that are attached directly to the wheels. The purpose of this endeavor is to create a motorized, intelligent wheelchair with stair climbing capabilities. They employed a DC motor that would be powered by a DC battery that could be charged. This system divides control between the wheelchair and the wheelchair operator, and it is adaptable in that the division of the console between the wheelchair and the wheelchair operator changes depending on the demands of the work at hand. [8] [9] This essay examines an Arduino board's operation and potential uses. This also examines its potential as a tool for academic and research endeavors. Fast processing and a simple interface are the main benefits. Today, as more and more people use open-source hardware and software, technology is creating a new dimension by making complex things appear simple and engaging. These open sources offer free or almost free, highly dependable, and reasonably priced technology. The type of

Arduino boards, operating concepts, software implementation, and applications are briefly discussed in this paper.

Voice recognition technology was used by Nipanikar (2013) et al. to operate an autonomous wheelchair and an ultrasonic and infrared sensor system to detect obstructions [2]. Additionally, it included an accelerometer sensor and joystick so that people with disabilities could easily move their hands. Voice recognition technology was used by Nipanikar (2013) et al. to operate an autonomous wheelchair and an ultrasonic and infrared sensor system to detect obstructions [10]. Additionally, it had an accelerometer sensor and joystick for users with disabilities who can easily move their hands. "Smart Wheelchair for physically challenged persons" by Petson Varghese Baijiu was published in the proceedings of the 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), held in Coimbatore, India. This research emphasizes the development of an autonomous wheelchair system that incorporates machine learning.

In this work, a smart wheelchair with autonomous features for locating a target was proposed. People who use wheelchairs typically desire to travel alone, however they are frequently guided by a third party. Therefore, it is crucial to think about how to lessen the subject's reliance on a third party, support their motions, and provide a suitable method of connection between the wheelchair and the third party.

III. WORKING PRINCIPLE

The joystick is first turned to the precise middle position. The motor will halt as long as the joystick is held in the midway position. The potentiometer encodes analogue voltage values when the joystick is manipulated and transmits them to the Arduino board through the analogue data pin. These analogue values are sent to an ADC by the Arduino (Analog to digital converter). Analog values are converted to digital signals via the ADC. Through the digital data output pin, the digital signal is delivered to the L293D motor driving IC. Two integrated H-bridge driver circuits are present in L293D. Two DC motors can be run concurrently in their usual mode of operation, in both forward and backward as well as in either the right or left direction. Two motors can have their operations controlled by input pins 2 and 7 and 10 and 15 have logic. The voltage input at ADC rises as the joystick is slightly turned forward, and the motor begins to rotate in the forward direction. The motor will shut off when the pot is turned back to the centre position. The motor now begins to rotate in reverse as the pot is turned just a little backward. The pot is rotated back to the centre position to restart the motor. Thus, as the pot is turned forward, reverse, right, or left, the motors move ahead, right, or left. A software program is integrated into the internal FLASH of the ATMega328P microcontroller to implement these functions. L293D IC and Arduino ATMega328P are used to drive the two DC motors in accordance with the instructions of the joystick.

IV. BLOCK DIAGRAM

The command is carried out via a joystick before being transmitted to the microcontroller, where the controller ATMega328p will carry it out. Following execution, the controller sends a digital signal command to the L293D motor driving IC, which in turn controls the movement of the two dc motors. As a result, the joystick's commands CAUSE THE DC MOTOR TO ROTATE
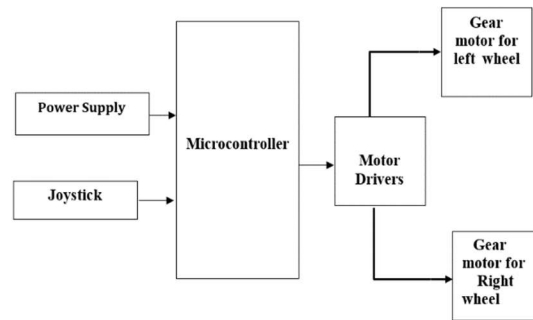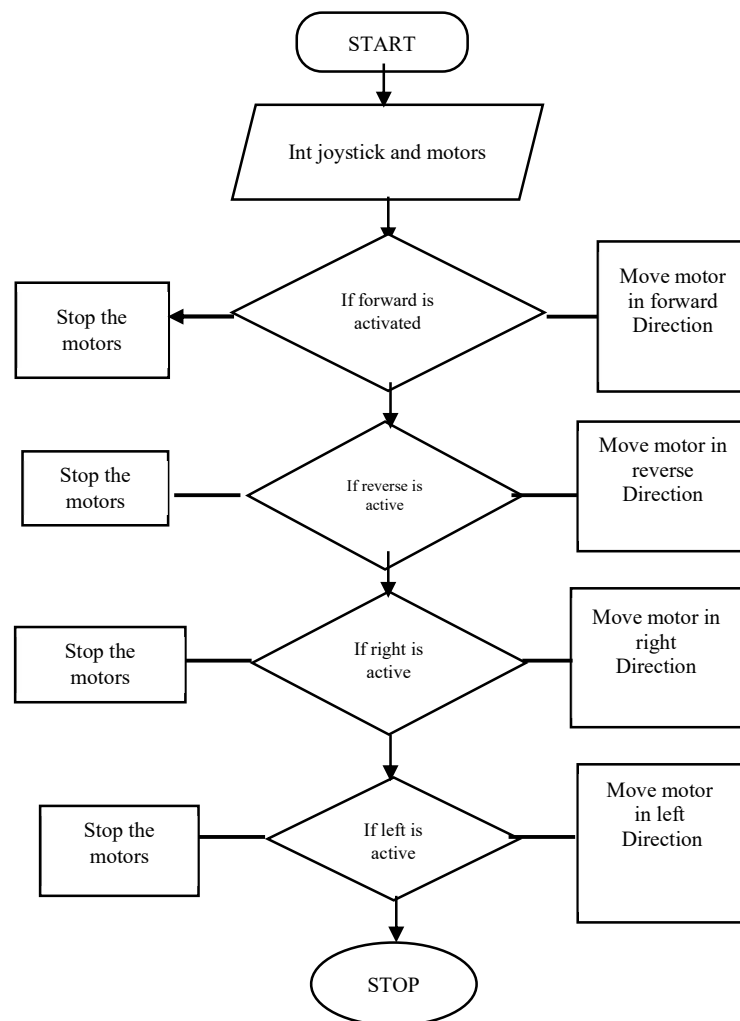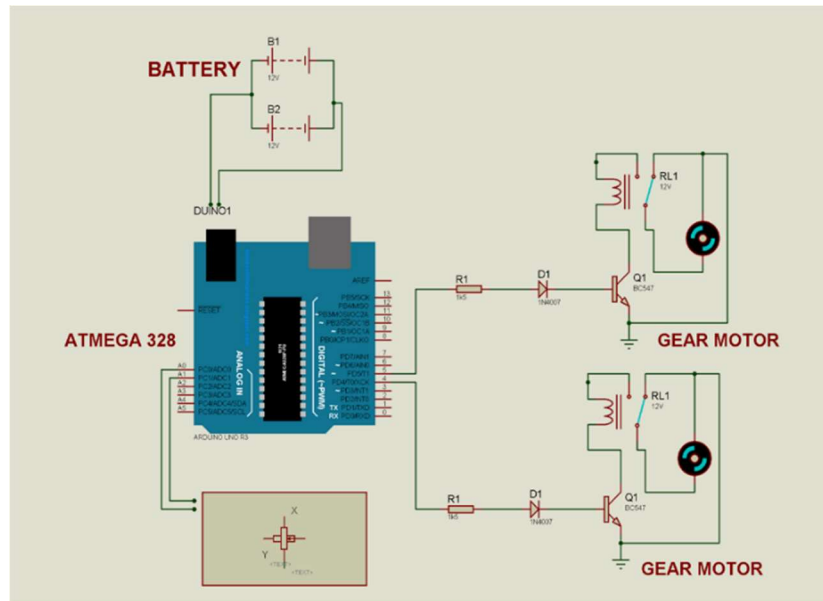
Figure 1.: Block diagram of Joystick control wheelchair

V. FLOW CHART

VI. SCHEMATIC DIAGRAM :

VII. HARDWARE DESCRIPTION
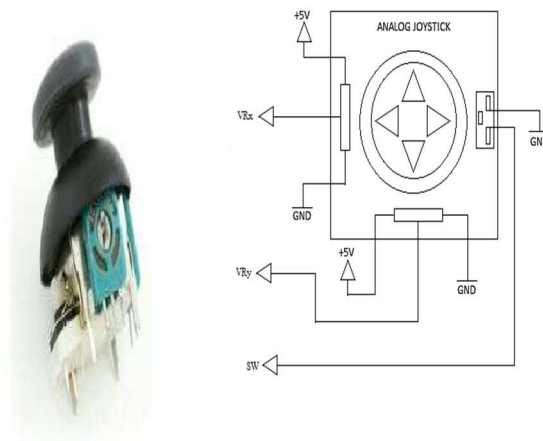
a) ANALOG JOYSTICK

Figure 2: Analog Joystick

An analogue joystick is an input device for a controller that is used for two-dimensional input. It is also known as a control stick joystick or thumb stick. An analogue joystick is comparable to two potentiometers, one for horizontal movement and the other for vertical movement (Y-axis) (X-axis). A choose switch is also included with the joystick. For controlling robots, RC cars, or older video games, it can be incredibly useful.
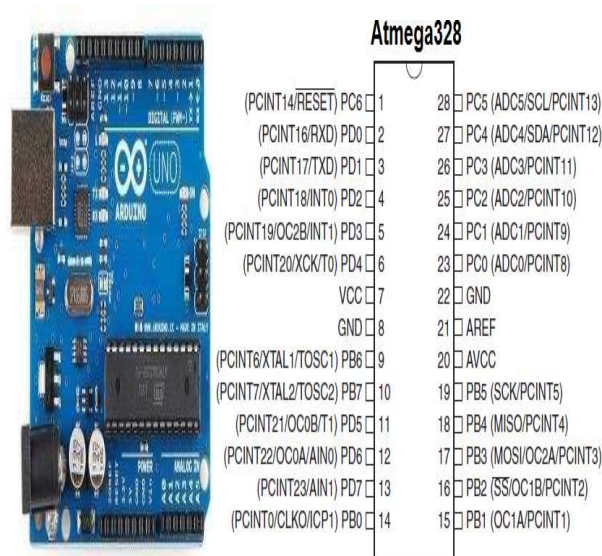
b) ARDUINO AT MEGA 328P

Figure 3 Arduino at mega 328P

AT Mega 328P IC has 28 pins out of which, 20 of the pins function as I/O ports. This means they can function as an input to the circuit or as output. Whether they are input or output is set in the software. 14 of the pins are digital pins, of which 6 can function to give PWM output. 6 of the pins are for analog input/output. Two of the pins are for the crystal oscillator. This is to provide a clock pulse for the at mega chip. The chip needs power so 2 of the pins, Vcc and GND, provide it power so that it can operate. The ATMega328P is a low-power chip, so it only needs between 1.8-5.5V of power to operate.

TheATMega328P chip has an analog-to-digital converter (ADC) inside of it.

c) BATTERY

To power gadgets like cell phones, computers, laptops, electric lights, and electronic watches, batteries transform chemical energy that has been stored into electrical energy. Through electrochemical discharge reactions, batteries provide electrical energy by transforming chemical energy that has been stored.

Humans are compared to half batteries since they can store chemical energy in their bodies similarly to batteries. This chemical energy comes from food for us. This chemical energy is stored in our body and is used by every organ to function. We are unable to generate electricity to run electronic devices, unlike a battery. The chemical energy that is stored in our bodies is transformed into heat or kinetic energy when we exercise or run.

Batteries are composed of one or more cells, each of which has an electrolyte, a positive electrode, and a negative electrode. A tool used to generate electricity is called an electrical cell. The batteries that are used to generate power can be one or multiple cells.

d) GEAR MOTOR

The most widely utilized reduction dc motor for scooters, bikes, and quads on the market is the E-bike MY1016Z2 250W 360rpm Geared DC motor! ATV robots, military robots, and other robots, as well as many DIY projects like Segway and e-cars, use this tough material.

It is considered a mid-range combo and is typically found in the higher-quality quads and scooters available on the market. A Johnson or Mabuchi 550 motor is typically connected to a plastic toy gearbox to power the low range unit, which is typically seen in inexpensive children's carts.

VIII.RESULT AND DISCUSSION

The Arduino IDE handles all of the programming, and the program is loaded onto the Arduino board. The wheelchair can be controlled more easily thanks to the joystick. We obtain the desired output when all components are connected in accordance with the circuit schematic. Our project was successfully finished. A joystick, an Arduino ATMega328P Controller, an L293D IC, two DC motors, and a 9 volt battery were utilised in our project.

Model Figure:

IX. CONCLUSION

We have designed this wheelchair for the physically disabled people those who cannot walk, so that they can easily handle it with their hands by using the Joystick.But for those people who cannot move their legs as well as hands, the voice recognition control wheelchair or the image processing wheelchair can resolve this issue. We can also add a sensor unit to the circuit so that it can detect the obstacle in its path.

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