KSCST Project Synopsis

Project Reference Number: 46S_BE_5516

Title of the project: IMPLEMENTATION OF EYEBALL CONTROLLED WHEEL CHAIR

Name of the College & Department: REVA University, Electronics and Communications Engineering

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Introduction:

1. The Eyeball Controlled Wheelchair is an innovative assistive technology designed to provide mobility to individuals with severe physical disabilities, particularly those who have limited or no control over their limbs.
2. One type of paralysis is Quadriplegia, where a person cannot move any of their limbs. This makes it impossible for them to use traditional wheelchairs that require physical strength to move the wheels.
3. The Advanced Wheelchair uses a special technology that allows the user to control the wheelchair using their eyes.
4. A camera is attached to the user's wheelchair, which captures the movement of their eyes. This movement is then processed by software and sent to the motor that controls the wheelchair's movement.
5. The captured eye movement data is processed by sophisticated algorithms, which analyze and interpret the user's intentions, converting them into actionable control signals for the wheelchair motors
6. This means that the user can move around without having to use their limbs. which will be very useful to those who are disabled and needs to depend on others every-time they want to move around.
7. The Eyeball Controlled Wheelchair is not only limited to basic navigation but also includes additional functionalities. Users can perform actions such as stopping, changing speed, and even executing predefined movements or commands through specialized eye gestures or blinks.

Objectives:

1. According to the latest report prepared by the World Health Organization and the World Bank, 15 percent of the world's population is disabled.
2. Patients who only can control their eyes can still communicate with the real-world using the assistive devices.
3. This makes these people to feel very piteous about their situation and some people also will loose their interest life which is very dangerous for them.
4. This device provides a human computer interface in order to take decisions based on their eye movement.
5. Our main objective is to give the patients the ability to move in all the directions independently without getting harmed.
6. So, this makes the main objective of us is to design a wheelchair that is controlled by the position of the patients eye without the help of care taker.

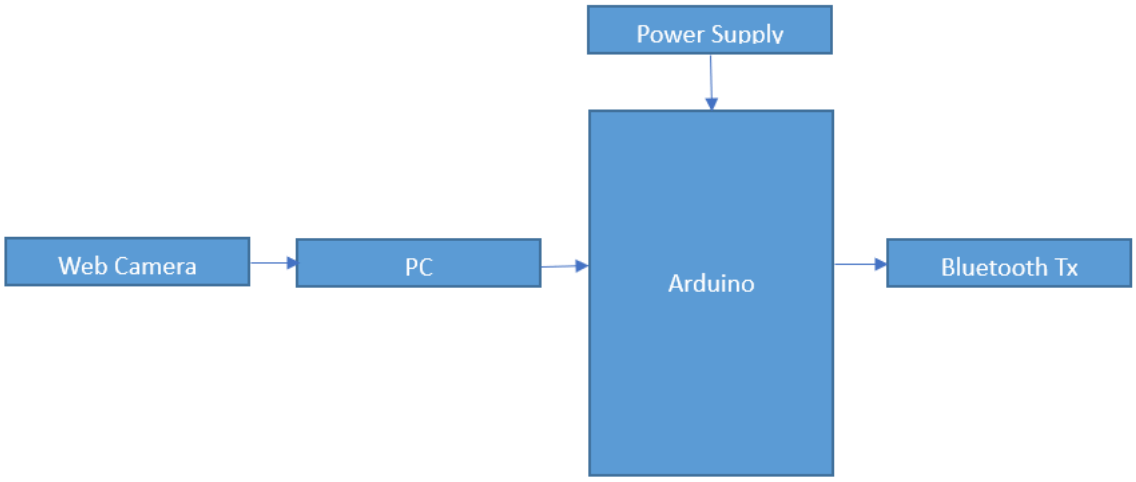
Methodology:

The use of an eyeball-controlled wheelchair is a unique technique primarily designed for individuals who are completely paralyzed. A robot has been developed which allows a patient to sit in a wheelchair and move in a desired direction simply by looking in that direction while facing the camera.

Our project has the 2 phases, They are:

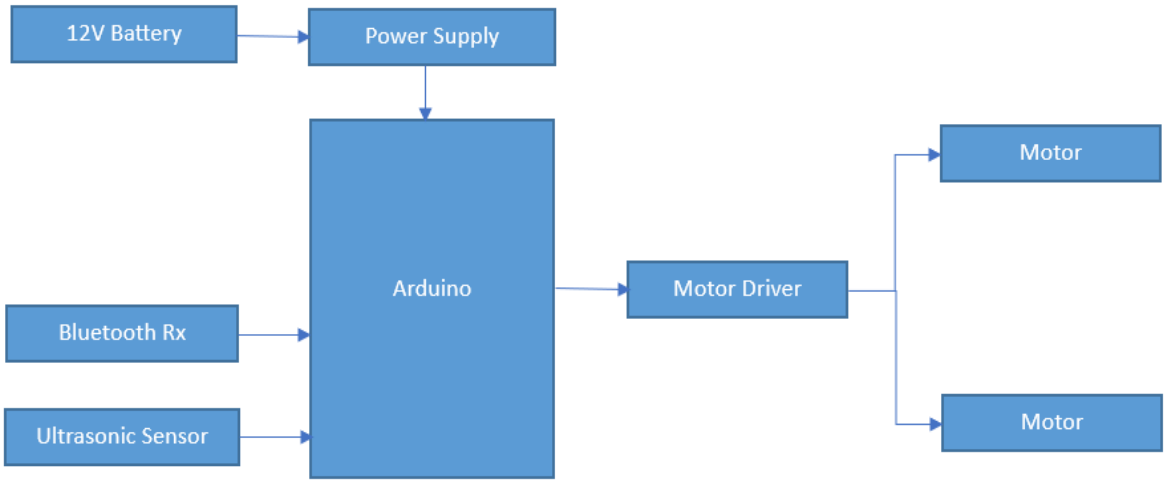
1. Transmission Phase
2. Receiving Phase

Transmission Phase:



1. It gives you an idea how the Sensors and other electronic devices are connected and explained separately based on the priority of solving the issue.
2. The Arduino, is a hardware board with multiple pins, connected with 1 sensor and respective actuator for it. The Arduino's are the big brain of this system.
3. The Web Camera records the live the eye movement of the patient sitting on the wheelchair.
4. The PC displays the live eye movement of the patient and it also determines position of the eye of patient whether it is left, right or blinking.
5. The Arduino receives the data provided by the Web camera and transmits it through the Bluetooth Tx.

Receiving Phase:



1. The Bluetooth Tx transmits the data to the Bluetooth Rx.
2. The 12V rechargeable battery is connected to the power supply to divide the input power to 5V/9V. Then it is connected to the Arduino to provide the power to the Arduino.
3. The Bluetooth Rx receives the data sent by the Bluetooth Tx and sends it to the Arduino.
4. The Arduino process the data sent by the Bluetooth Rx and initiate the appropriate pins in the Arduino.
5. Such that if the position of pupil is left then the Arduino initiates the particular pins to turn left and if the pupil is right it initiates the appropriate pins in Arduino to turn right and if the pupil is looking straight then the robot moves forward and if the eyes are blinking then the Arduino initiates the appropriate pins to stop the Wheelchair.
6. The signals from the pins are sent to motor driver because the power output given by the Arduino will not be enough to drive the DC motors so, with the help of motor driver we can boost the power and run the DC motor then the motor driver acts appropriately according to the pins triggered by the Arduino i.e to turn left, right, move forward or stop.
7. We also have an Ultrasonic Sensor that is assigned to detect any other physical objects that comes to the minimum range of the wheelchair.
8. Whenever it detects the obstacle or any physical object that comes to the minimum range of the wheelchair then it sends the signal to Arduino and then the Arduino immediately stops the wheelchair.

Results and Conclusions:

The Eyeball Controlled wheelchair robot is a device that moves based on the movements of a patient's eyes, thanks to the effective combination of its hardware and software components. By using this robot, patients can independently travel from one location to another without the assistance of a caretaker. Additionally, the robot includes useful features such as collision detection and face detection for the patient's safety and convenience.

The Eyeball Controlled wheelchair has one important application that helps the patients to move independently without they are depending on the caretakers. This makes these patients to gain their confidence on themselves.

Scope for Future Work:

1. In the future, we can also add new functions which can be operable in useful circumstances to control the Wheelchair.
2. In the future, we can also develop a series of operational units so that we can attain a fully operating experience for the handlers from turning on to turning off the Wheelchair.
3. In future, we can also advance the algorithm to be more precise while capturing the eyeball position of patients.
4. In future, we can also add voices to the chair so that it may indicates the others to move side or help.
5. In future, we can also add the GPS to the wheelchair so that they can be found easily, if they are lost.