Eye Ball Controlled Wheel Chair For Paralyzed Patients

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Abstract- *Even in this modern day, it is very difficult for physically challenged people to move from one place to other without others help. To give them an independent feel, a smart eye controlled system is provided. A novel design of an embedded cardio-respiratory monitoring system for wheelchair users is proposed. This system gets the input from from eye. The movement of the wheel chair will be controlled by these inputs. Depending on these input the wheel chair will move forward, left, right or backward. With the help of this system the user can move independently without others help. It also included with obstacle detection system to ensure the safety for the user. If any obstacle is detected then the indication can be given with the help of LCD.The entire system is composed of a sensor node, and a cloud server. The former is used to obtain continuous vital-sign signals, and the latter processes the sampled signals to estimate the temperature level, implemented in an embedded system to achieve a fully integrated radar system. This is used to sense the movement of the eye ball's direction using eye ball (Straight Command, Left/Right Command, Stop Command).The system is cost effective and thus can be used by patients spread over a large economy range.*

Keywords- Eye control system, Embedded cardio-respiratory system,Wheel chair , LCD(Liquid crytal display), Vital-sign signals.

I. INTRODUCTION

This project is an attempt to make lives of the people suffering from this phenomenon simple and by simpler which will thereby reinstate their confidence and their happiness. The idea is to create an Eye Monitored System(EMS) which allows movement of the patient's wheelchair depending on the eye movements. We know that a person suffering from quadriplegia can partially move his eyes and tilt his head, thus presenting an opportunity for detecting those movements. We have created a device where a patient sitting on the Wheel Chair assembly looking directly at the eyeball sensor, is able to move in a direction just by looking in that direction. The signals are monitored by a script, which will then guide the motors wired to the AtMega328 Microcontroller over the Serial Interface to move in a particular direction.

The system is cost effective and thus can be used by patients spread over a large economy range.This project makes use of microcontroller, which is programmed, with the help of Embedded C instructions. It provides the information to the microcontroller and the controller judges whether the instruction is right movement or left movement instruction and controls the direction respectively. The controller is interfaced with two dc motors to control the direction of the wheel chair. To perform the task the controller is loaded with intelligent program written using Embedded C language.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

Existing System

Many wheelchair users adopt a sedentary lifestyle, which results in progressive physical deconditioning with increased risk of musculoskeletal, cardiovascular and endocrine/metabolic morbidity and mortality. Engaging in a walking program with an over ground robotic exoskeleton may be an effective strategy for mitigating these potential negative health consequences and optimizing fitness in this population. However, additional research is warranted to inform the development of adapted physical activity programs incorporating this technology.

Proposed system

To overcome the foresaid issues, the eye control system gives the freedom to make their life simple and helpful. This system detects eye pupil's movement. Microcontroller unit sends signals to driver circuit to move in particular direction.

Ultrasonic sensors are used to avoid collision between wheel chair and objects in their path. In emergency situation if paralyzed patients close their eyes wheel chair stops. This chair moves in left, right, forward and back as per patient's eye ball movement.

This enables the paralyzed person's life independent. The proposed system which are focused to the eyeball of the

patient generate three different ranges of values depending upon the position of the eyeball. In the kit there are condition for store the value of every eye position i.e. left, right, straight and stop.

Temperature sensor is used to detect patient's temperature level; if temperature is high buzzer will be on. Camera is used to detect movement of direction(Left, Right and Stop) using motor with the help of motor driver; Ultrasonic senor used to detect objects in their path.This system uses LCD for displaying monitored parameters. Here uses the arduino controller for controlling overall system.

HARDWARE SUMMARY

1. POWERSUPPLY:

Power supply is a reference to a source of electrical power A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely toothers.

Power supplies for electronic devices can be broadly divided into linear and switching power supplies. The linear supply is a relatively simple design that becomes increasingly bulky and heavy for high current devices; voltage regulation in a linear supply can result in low efficiency. A switched-mode supply of the same rating as a linear supply will be smaller, is usually more efficient, but will be more complex.

2. TRANSFORMER:

Transformers convert AC electricity from onevoltage to another with little loss of power. Transformers work only with AC and this is one of the reasons why mains electricity is AC.Step-up transformers increase voltage, step-down transformers reduce voltage. Most power supplies use a step-down transformer to reduce the dangerously high mains voltage (230V in UK) to a safer lowvoltage.

3. BRIDGERECTIFIER:

A bridge rectifier can be made using four individual diodes, but it is also available in special packages containing the four diodes required. It is called a full-wave rectifier because it uses the entire AC wave (both positive and negative sections). 1.4V is used up in the bridge rectifier because each diode uses 0.7V when conducting and there are always two diodes conducting, as shown in the diagram below. Bridge rectifiers are rated by the maximum current they can pass and the maximum reverse voltage they can withstand (this must be at least three times the supply RMS voltage so the rectifier can withstand the peak voltages).

4. SMOTHING:

Smoothing is performed by a large value electrolytic capacitor connected across the DC supply to act as a reservoir, supplying current to the output when the varying DC voltage from the rectifier is falling. The diagram shows the unsmoothed varying DC (dotted line) and the smoothed DC (solid line). The capacitor charges quickly near the peak of the varying DC, and then discharges as it supplies current to the output.

5. **REGULATOR:**

Voltage regulator ICs are available with fixed (typically 5, 12 and 15V) or variable output voltages. They are also rated by the maximum current they can pass. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current ('overload protection') and overheating ('thermal protection').

6. ARDUINO UNO:

The Arduino Uno is an open source microcontroller platform based on simple input-output board (I/O). It has 14digital input/output pins. Of the 14 pins, 6 can be used as PWM outputs, 6 as analog inputs. It has a 16 MHz quartz crystal and a USB connection. The Arduino Uno is inexpensive, supports cross-platform, open source, easy programming environment.

III. WRITE DOWN YOUR STUDIES AND FINDINGS

IMPLEMENTATION

MATLAB

MATLAB (matrix laboratory) is a multi-paradigm numerical computing environment and proprietary programming language developed by MathWorks. MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms, creation of user interfaces, and interfacing with programs written in other languages.

Although MATLAB is intended primarily for numerical computing, an optional toolbox uses the MuPAD symbolic engine allowing access to symbolic

computing abilities. An additional package, Simulink, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems.

The MATLAB application is built around the MATLAB programming language. Common usage of the MATLAB application involves using the "Command Window" as an interactive mathematical shell or executing text files containing MATLAB code

- Interactive figure updates in the Live Editor, including title, labels, legend, and other annotations, as well as the ability to copy live script outputs to other applications.
- heatmap chart functions for visualizing data.
- More functions for operating on tallarrays, including ismember, sort, conv, and moving statistics functions.

Image Acquisition Toolbox:

Image Acquisition Toolbox is a very valuable collection of functions that handles receiving image and video signal directly from computer to the Matlab environment. This toolbox recognizes video cameras from multiple hardware vendors. Specially designed interface leads through possible transformations of images and videos, acquired thanks to mechanisms of Image Acquisition Toolbox.

Image Processing Toolbox:

Image Processing Toolbox is a wide set of functions and algorithms that deal with graphics. It supports almost any type of image file. It gives the user unlimited options 17 for pre- and post- processing of pictures. There are functions responsible for image enhancement, deblurring, filtering, noise reduction, spatial transformations, creating histograms, changing the threshold, hue and saturation, also for adjustment of color balance, contrast, detection of objects and analysis of shapes.

IV. RELATED WORK

EMBEDDED SYSTEMS

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints.It is embedded as part of a complete device often including hardware and mechanical parts. Embedded systems control many devices in common use today.

Ninety-eight percent of all microprocessors are manufactured as components of embedded systems. Examples of properties of typically embedded computers when compared with general-purpose counterparts are low power consumption, small size, rugged operating ranges, and low per-unit cost. This comes at the price of limited processing resources, which make them significantly more difficult to program and to interact with.

However, by building intelligence mechanisms on top of the hardware, taking advantage of possible existing sensors and the existence of a network of embedded units, one can both optimally manage available resources at the unit and network levels as well as provide augmented functions, well beyond those available.

For example, intelligent techniques can be designed to manage power consumption of embedded systems. Modern embedded systems are often based on microcontrollers (i.e. CPU's with integrated memory or peripheral interfaces),but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more-complex systems.

In either case, the processor(s) used may be types ranging from general purpose to those specialised in certain class of computations, or even custom designed for the application at hand.

A common standard class of dedicated processors is the digital signal processor (DSP). Since the embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance.

Some embedded systems are mass-produced, benefiting from economies of scale. Embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, and largely complex systems like hybrid vehicles, MRI, and avionics. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

V. RESULTS

In order to validate the development, the system is connected with a motorized platform via microcontroller interface. The flow of control signals from laptop to microcontroller unit. The platform successfully demonstrates eye-controlled mobility. This is prototype which moves in a

direction left, right, forward and backward as signals from programming languages

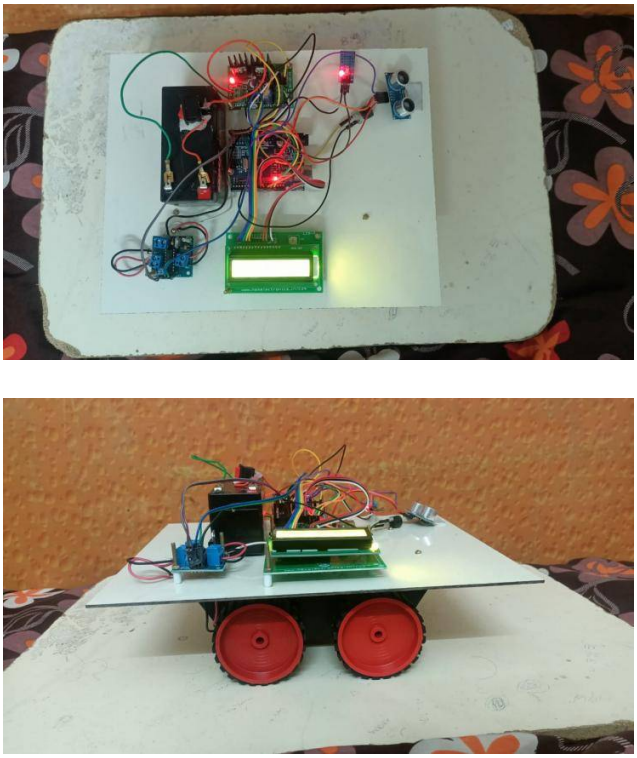

Fig .1 Experimental setup

VI. CONCLUSION

This paper is implemented using various components, the project is just a prototype if we make this project as commercial project, then definitely useful to all the disabled people, who are unable to move and unable to drive normal wheel chair their own. With their eye movements they can move wheel chair right, left, front, and back directions with Eyeball sensor which is a highly sensitive sensor and capable of detecting the tilt. The system can be controlled by voice and the accidents are prevented by the use of ultrasonic sensor.The developed system is a supporting aid for paralyzed patients.The future scope of the project can be extended using wireless technology, and intelligent hand gesture wheel chair.

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