

Communication and Control System for Quadriplegic Patients

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Abstract— Presently a-days mishaps are overwhelming and the majority of them prompt spinal string damage. Spinal cord injury causes information travelling along spinal nerves below level of injury will completely or partially cut off this leads to paralysis. Paralysis is of two types: Quadriplegia, Paraplegia. Quadriplegia is derived from two words quadric means four and plegia stands for paralysis. When a person has spinal string damage. Above first thoracic vertebra paralysis usually affects cervical spinal nerves resulting dis-functioning of four limbs. These quadriplegic patients are suffering with many problems such as the person cannot walk himself and cannot be able to do his work with his own. In some cases the patient suffering from quadriplegic could not even speak. To help these quadriplegic patients to communicate we wish to propose a new mechanism where they will be able to communicate to anyone by various types of head movements as that is the only controllable part in their body.

Key words: ATmega 32, AVR Studio 4, Relay, LabVIEW

I. INTRODUCTION

Paralyzed stroke patients are unable to normally communicate with their environment. For these patients, the only part of their body that is under their control, in terms of muscular movement, is their head. Some examination around there has concentrated on exploring new productive specialized apparatuses for deadened patients for making an interpretation of their head developments into fitting correspondence messages. The main aim of this project is to present the design and application of an accelerometer based efficient human computer interface (HCI). Building up an option channel without talking and hand development is imperative in expanding the personal satisfaction for the impaired. Accelerometer based HCI frameworks enable individuals to effectively and financially speak with their condition just by their head developments. The nearest neighbourhood algorithm is used to classify the signals.

II. HARDWARE DESCRIPTION

A. ATmega32 Microcontroller:

The superior, low-control Microchip 8-bit AVR RISC-based microcontroller consolidates 32KB ISP streak memory with read-while-compose capacities, 1KB EEPROM, 2KB SRAM, 54/69 broadly useful I/O lines, 32 broadly useful working registers, a JTAG interface for limit examine and on-chip investigating/programming, three adaptable clock/counters with think about modes, inside and outside intrudes on, serial programmable USART, a widespread serial interface (USI) with begin condition finder, a 8-channel 10-bit A/D converter, programmable guard dog clock with inward oscillator, SPI serial port, and five programming selectable power sparing modes. The gadget works between

1.8-5.5 volts. By executing effective directions in a solitary clock cycle, the gadget accomplishes throughputs moving toward 1 MIPS for each MHz, adjusting power utilization and preparing speed.

B. Accelerometer:

An accelerometer is a gadget that measures legitimate quickening. The best possible speeding up measured by an accelerometer is not really the organize increasing speed (rate of progress of speed). Rather, the accelerometer sees the increasing speed related with the marvel of weight experienced by any test mass very still in the casing of reference of the accelerometer gadget. For instance, an accelerometer very still on the surface of the earth will gauge an increasing speed $g=9.81 \text{ m/s}^2$ straight upwards, because of its weight. By contract, accelerometers in free fall or very still in space will quantify zero. Another expression for the sort of speeding up that accelerometers can quantify is g -compel quickening.

C. Relay:

A transfer is an electrically worked switch. Many transfers utilize an electromagnet to work an exchanging component mechanically, yet other working standards are likewise utilized. Transfers are utilized where it is important to control a circuit by a low-control motion (with finish electrical disengagement amongst control and controlled circuits), or where a few circuits must be controlled by one flag. The principal transfers were utilized as a part of long separation broadcast circuits, rehashing the flag rolling in from one circuit and re-transmitting it to another. Transfers were utilized broadly in phone trades and early PCs to perform coherent operations.

D. LCD:

The Hitachi LM018L is a 40 character x 2 line intelligent sort Liquid Crystal character show module. It incorporates an inherent LSI controller HD44780 which gives a scope of components, including

- 192 5x7-dot characters plus 8 user-defined characters.
- Instruction functions
 - Display Clear
 - Cursor Home
 - Display On/Off
 - Cursor On/Off
 - Character Display Blink
 - Cursor Shift
 - Display Shift

The module can be directly interfaced to a 4-bit or 8-bit MPU.

III. SOFTWARE IMPLEMENTATION

A. AVR Studio 4:

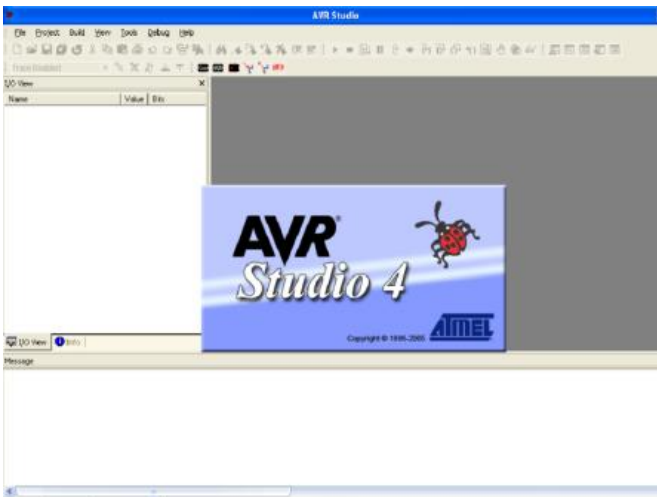


Fig. 1: AVR Studio 4

The AVR Lib c bundle gives a subset of the standard C library for Atmel AVR 8-bit RISC microcontrollers. What's more, the library gives the fundamental start up code required by generally applications. There may be a few motivations to compose code for AVR microcontrollers utilizing plain constructing agent source code. Among them are: Code for gadgets that don't have RAM and are along these lines not bolstered by the C compiler. Code for extremely time-basic applications. Extraordinary changes that is impossible in C. Generally, everything except the first should most likely be possible effectively utilizing the inline constructing agent office of the compiler. Despite the fact that avr-lib c is essentially focused to help programming AVR microcontrollers utilizing the C (and C++) dialect, there's constrained help for coordinate constructing agent use too. The advantages of it are: Use of the C pre-processor and therefore the capacity to utilize the same representative constants that are accessible to C programs, and in addition an adaptable full scale idea that can utilize any legitimate C identifier as a large scale (while the constructing agent's large scale idea is essentially focused to utilize a full scale set up of a constructing agent direction). Utilization of the runtime structure like consequently relegating interfere with vectors. For gadgets that have RAM, instating the RAM variable output additionally be used.

B. Lab VIEW:

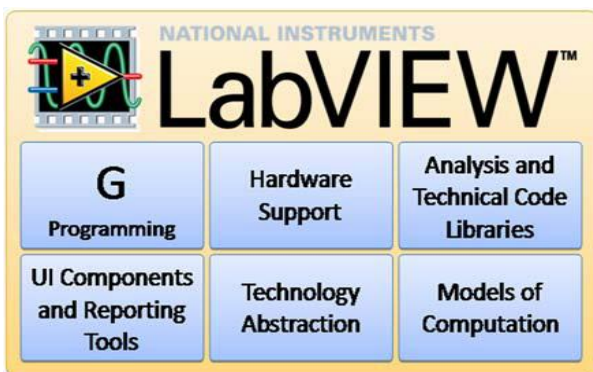


Fig. 2: Lab VIEW

Lab VIEW (short for Laboratory Virtual Instrument Engineering Workbench) is a framework plan stage and improvement condition for a visual programming dialect from National Instruments.

The graphical dialect is named "G" (not to be mistaken for G-code). Initially discharged for the Apple Macintosh in 1986, Lab VIEW is ordinarily utilized for information obtaining, instrument control, and modern computerization on an assortment of stages including Microsoft Windows, various versions of UNIX, Linux, and OS X. The latest version of Lab VIEW is Lab VIEW 2015, released in August 2015.

The graphical approach permits non-software engineers to manufacture programs by relocating virtual portrayals of lab hardware with which they are now commonplace. The Lab VIEW programming condition, with the included cases and documentation, makes it easy to make little applications. This is an advantage on one side, however there is likewise a specific threat of thinking little of the aptitude required for excellent G programming.

IV. RESULTS AND DISCUSSION

In case of any need of help, the patient tilts his head to his right to choose the main menu options. The needs in the main menu keep scrolling until he selects one of the main menu in it. The patient again tilts his head to the centre position to choose one of the options in the main menu. For example "Device control" is selected in the main menu in the below example.

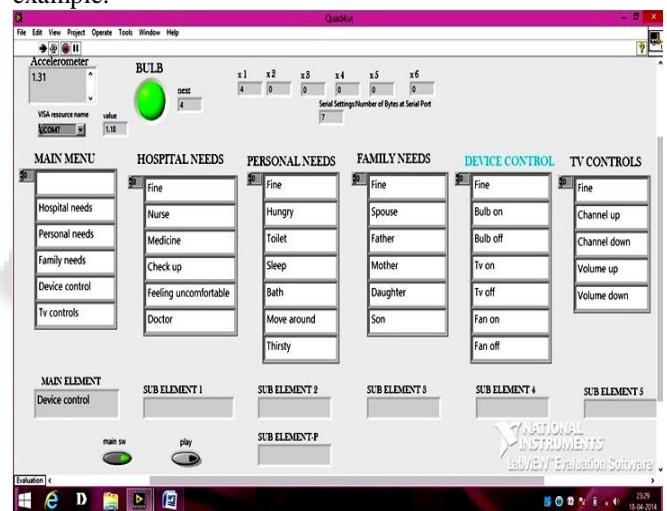


Fig. 3: Output window of 1st step

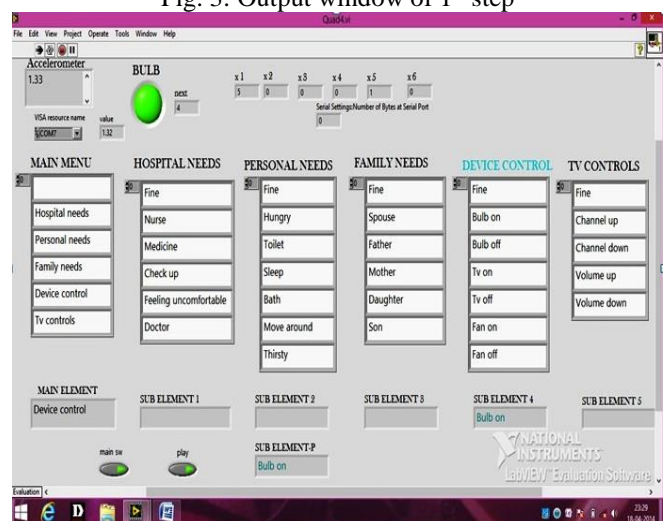


Fig. 4: Output window of 2nd step

Upon choosing the sub menu from the main menu, the patient again tilts his head to the right position to select

one of the sub menu options. In the above example the patient selects “bulb on” menu in the sub menu.

For final audio output, the patient tilts his head to the center position. In the below example the word “bulb off” is announced loud as audio output.

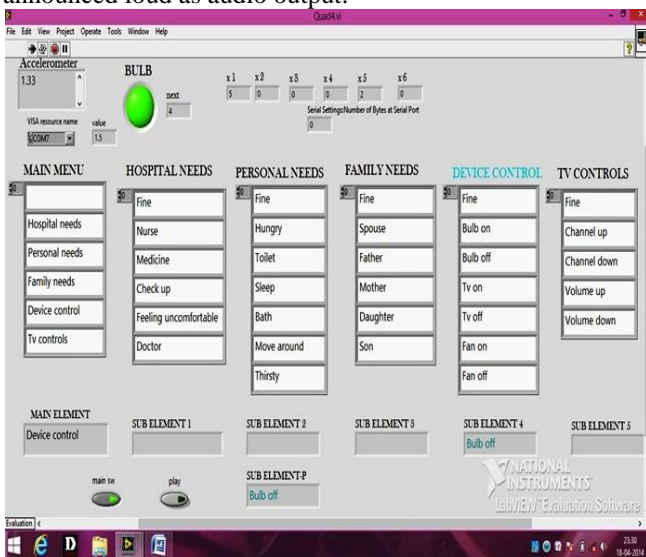


Fig. 5: Output window of Final step

V. CONCLUSIONS

We have fabricated a model of a gadget that can be executed as a correspondence and control framework for quadriplegic patients utilizing low-power and minimal effort parts. Utilizing a more elevated amount microcontroller, Accelerometer we can additionally form this model into a reasonable framework in a constant application for the physically crippled individuals. Through this task, we have learnt to configuration circuits, program ATMEGA32 microcontrollers, and Lab VIEW. We have additionally picked up learning on countless which are accessible in the market. By altogether testing the circuit, we have learnt in-circuit troubleshooting. We have gained the abilities expected to effectively total a venture, for example, time administration and monetary administration.

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