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A Device For Blind Human Ultrasonic Echolocation

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ABSTRACT

This paper present a device that combined the principles of ultrasonic human echolocation and animal echolocation .This device is helpful for blind and visually impaired people. Some animals such as (bats and dolphin) sense by active echolocation, in which emitted acoustic pulses and their reflection are used to sample the environment .Bats and dolphin are highly informative compared to humans. Active echolocation is also used by some blind humans, who use signals such as tongue clicks cane taps as mobility aids. The device consists of a headset with an ultrasonic emitter and stereo microphones affixed with artificial pinnae. Methods-: The echoes of ultrasonic pulses are recorded and time-stretched to lower their frequencies into the human auditory range before being played back to the user. Results- Simple words were able to lateral depth and distance judgments. This device is working as record the echoes. Conclusion-: This device is suggests can be used effectively for environment and human auditory system. Many humans is suffer for blindness (cardiac patient) and night visions this devices uses in this people.

Key Words-: echolocation, animal, human, blind, ultrasonic, device.

I. INTRODUCTION

This device is work according to animal echolocation technique is make of ultrasonic device is useful for blind humans and visually impaired. This device is combined that the principle of animal echolocation and human echolocation.

II. ANIMAL ECHOLOCATION

Echolocation, also called bio sonar, is the biological sonar used by several kinds of animals. Echo locating animals emit calls out to the environment and listen to the echoes of those calls that return from various objects near them [1]. They use these echoes to locate and identify the objects. Some animals like as micro chiropteran bats and odontocetes(toothed whales and dolphins). Microbats generate ultrasound via the larynx and emit the sound through the open mouth or, much more rarely, the nose. The latter is most pronounced in the horseshoe bats (Rhinolopus.). Microbats calls range in frequency from 14,000 to well over 100,000 Hz, mostly beyond the range of the human ear (typical human hearing range is considered to be from 20 Hz to 20,000 Hz)[2]. Bats may estimate the elevation of targets by interpreting the interference patterns caused by the echoes reflecting from the tragus, a flap of skin in the external ear.

The relative intensity of sound received at each ear as well as the time delay between arrival at the two ears provide information about the horizontal angle (azimuth) from which the reflected sound waves arrive.

III. HUMAN ECHOLOCATION

Human echolocation is the ability of humans to detect objects in their environment by sensing echoes from those objects, by actively creating sounds – for example, by tapping their canes, lightly stomping their foot, snapping their fingers, or making clicking noises with their mouths – people trained to orient by echolocation can interpret the sound waves reflected by nearby objects, accurately identifying their location and size [3]. This ability is used by some blind people for acoustic way finding, or navigating within their environment using auditory rather than visual cues [4]. It is similar in principle to active sonar and to animal echolocation [7][8], which is employed by bats, dolphins and toothed whales to find prey. Some blind people are skilled at Echolocating silent objects simply by producing mouth clicks and listening to the returning echoes. It has been shown that blind echolocation experts use what is normally the "visual" part of their brain to process the echoes.

IV. SONIC EYE-:

Here we present a device, referred to as the Sonic Eye that uses a forehead-mounted speaker to emit ultrasonic “chirps” (FM sweeps) modeled after bat echolocation calls[9][10].The echoes are recorded by bilaterally mounted ultrasonic microphones, each mounted inside an artificial pinna, and also modeled after bat pinnae to produce direction-dependent spectral cues[12][13]. After each chirp, the recorded chirp and reflections are played back to the user at 1m of normal speed,where m is an adjustable magnification factor [15][16]. This magnifies all temporally based cues linearly by a factor of m and lowers frequencies into the human audible range. For empirical results reported here, m is 20 or 25 as indicated [19][20]. That is, cues that are normally too high or too fast for the listener to use are brought into the usable range simply by replaying them more slowly [23][24][25].

Although a number of electronic travel aids that utilize sonar have been developed (e.g., [26], [27], [28], [29]), none appear to be in common use, and very few provide information other than range-finding or a processed localization cue. For example in [27], distance to a single object is calculated and then mapped to a sound frequency, providing only extremely limited information about the world. The device presented in [26] is the most similar to the Sonic Eye. In [26] ultrasonic downward frequency sweeps are emitted, and then time stretched before presentation to the user. However the signals are time stretched in 2 micro sec chunks sampled every 100 microsecond, the overall playback of the echoes is not time stretched, no pinnae are used, the binaural microphones are placed only 2 cm apart, and microphone and transducer fidelity is unknown. In contrast, the Sonic Eye provides a minimally processed input which, while initially challenging to use, has the capacity to be much more informative and integrate better with the innate human spatial hearing system.

The relatively raw echoes contain not just distance information but horizontal location information and also vertical location information.

V. PROCESSING STEPS

Step 1: The computer generates a chirp waveform, consisting of a 3 ms sweep from 25 kHz to 50 kHz with a constant sweep rate in log frequency.

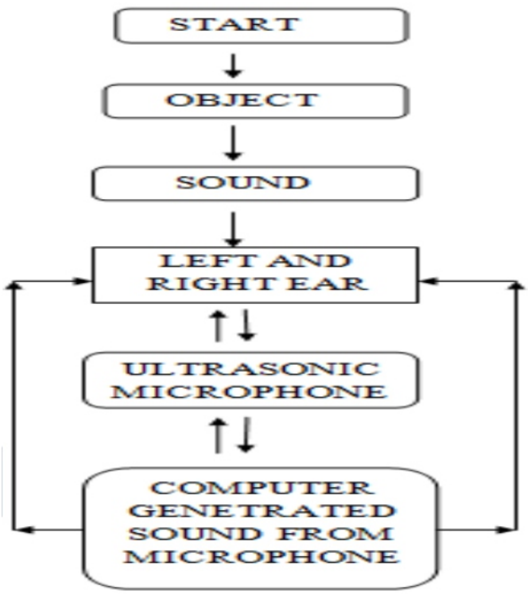
Step-2 The initial and final 0.3 ms are tapered using a cosine ramp function. The computer, in a small enclosure mini-ITX case, runs Windows 7 and performs all signal processing using a custom Matlab program.

Step-3 The recorded signal is band pass-filtered using Butterworth filters from 50 to 25 kHz, and time-dilated by a factor of m. For m = 25, the recorded ultrasonic chirp and echoes now lie between 1 and 2 kHz.

Step-4 The processed signal is played to the user through Air Drives open-ear headphones, driven by a Gigaport HD USB soundcard.

Step-5 They is measure the time distance and depth.

FLOW CHART



VI. METHODS

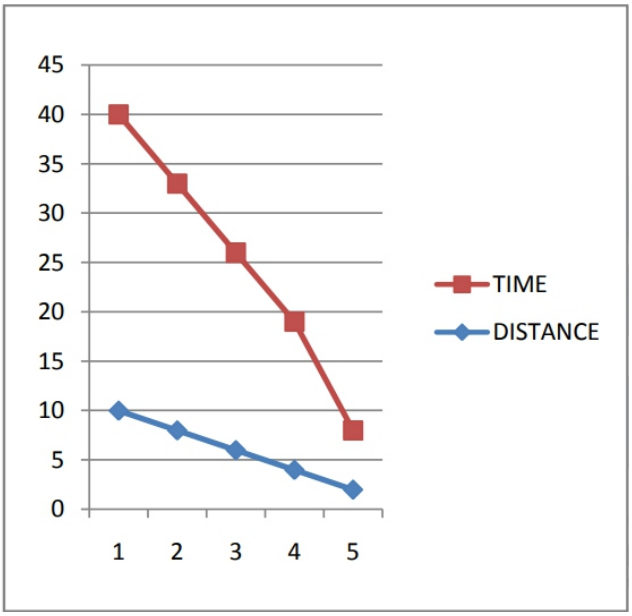
We measured angular transfer functions for the ultrasonic speaker and microphone in an anechoic chamber (Figure 3). The full-width half-max (FWHM) angle for speaker power was ~50~, and for the microphone ~160~. Power was measured using bandpass Gaussian noise between 25 kHz and 50 kHz.

VII.EXPERIMENT,EXPERIMENT-1

S.NO	DISTANCE	TIME
1.	10 KM	30 MINUTES
2.	8KM	25 MINUTES
3.	6KM	20 MINUTES
4.	4KM	15 MINUTES
5.	2KM	10 MINUTES

WITH DEVICE

TESTED WITH DEVICE



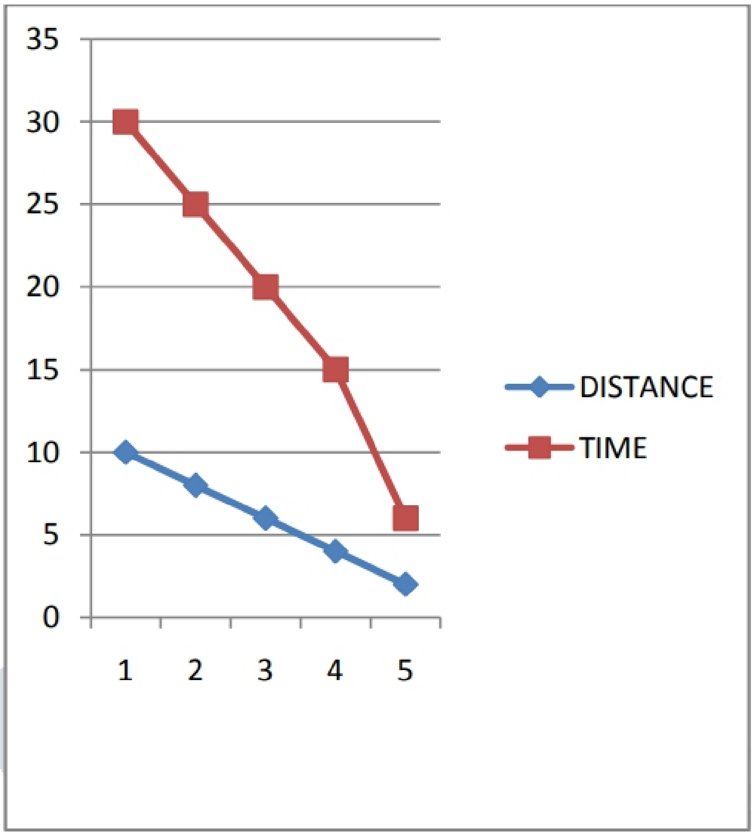
EXPERIMENT-2

THE EXPERIMENT IS TESTED THE

FREQUENCY 25 HZ TO 50 HZ WITHOUT

S.NO	DISTANCE	TIME
1.	10KM	5MINUTE
2	8KM	5 MINUTE
3	6KM	3 MINUTE
4	4KM	2 MINUTE
5	2KM	2 MINUTE

TESTED WITHOUT DEVICE



VIII. SUMMARY AND CONCLUSION

Here we present a prototype assistive device to pulse echo time delays, made available through the time in navigation and object perception via ultrasonic echo location .The ultrasonic signals exploit the advantages of high frequency sonar signals and time-stretch them into human audible frequencies. Depth information is encoded in stretching process. Azimuthal location information is encoded as interaural time and intensity differences between echoes recorded by the stereo microphones. Finally, elevation information is captured to the microphones as direction dependent spectral filters. Thus, the device presents a threedimensional auditory scene to the user with high theoretical spatial resolution, in a form consistent with natural spatial hearing. Behavioural results from two experiments with naive sighted volunteers demonstrated that two of three spatial dimensions (depth and laterality) were readily available with no more than one session of feedback/training. Elevation information proved more difficult to judge, but a third experiment with moderately trained users indicated successful use of elevation information as well. Taken together, we interpret these results to suggest that while some echoic cues provided by the device are immediately and intuitively available to users, perceptual acuity is potentially highly amenable to training. Thus, the Sonic Eye may prove to be a useful assistive device for persons who are blind or visually impaired.

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Design & Development Of An Intelligent Prosthetic Hand For Transradial Amputee

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A B S T R A C T

Develop a robot arm using common materials. Students will explore design, construction, teamwork, and materials selection and use. So that it can be used to make peoples life better who are limited to thedaily activities because of lost of medical anatomy and so that we can spread the smile and make this world a better place to live.

Keywords- Prosthetic hand, EMG, AVR, Motor, servo.

I. INTRODUCTION

Robots play a critical -- and growing -- role in modern medicine, from training the next generation of doctors, dentists, and nurses, to comforting and protecting elderly patients in the early stages of dementia. Using robots, medical professionals can make smaller incisions for shorter surgeries, reducing hospital stays and improving patients' prognoses and saving costs. As robots become even smaller and developers continue to further integrate the devices with artificial intelligent resembles something from a Hollywood sci-fi movie, but Hybrid Assistive Limb 5, or HAL 5, as it is known, is an artificially powered ecoskeleton that helps double the amount of weight someone can carry unaided. Developed by Yoshiyuki Sankai, a professor at Tsukuba University of Japan, the invention is backed by venture capitalist firm Cyberdyne. Expanding beyond Japan, last year Odense University Hospital announced it would use HAL 5for clinical trials on worker augmentation. The medical community wants more. For example, physicians want more devices that perform their functions autonomously; they'd like to see automated scrub and circulating nurses; they encourage the implementation of tele-consulting solutions within the operating room, and they'd like to see automation in tissue suturing, bonding and anesthesiology, according to the Robot Review.

II. WHAT IS A PROSTHESIS?

A prosthesis is an artificial limb (an artificial substitute) that replaces a missing leg or arm due to disease, accidents, or congenital defects.Main types of artificial limbs.

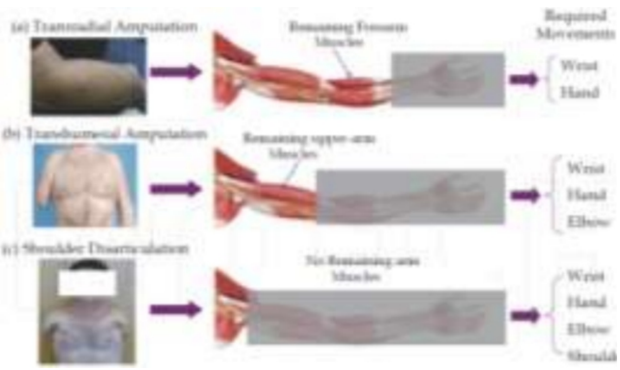

Fig 1.0

A person's prosthesis should be designed and assembled according to the patient's appearance and functional needs. For instance, a patient may need a transradial prosthesis, but need to choose between an aesthetic functional device, a myoelectric device, a bodypowered device, or an activity specific device. The patient's future goals and economical capabilities may help them choose between one or more devices.

Over the years there have been advancements in artificial limbs. New plastics and other materials, such as carbon fiber, have allowed artificial limbs to be stronger and lighter, limiting the amount of extra energy necessary to operate the limb. This is especially important for transfemoral amputees. Additional materials have allowed artificial limbs to look much more realistic, which is important to transradial and transhumeral amputees because they are more likely to have the artificial limb exposed.

III. SERVO MOTOR

Fig 1.1

A. What's Inside the Servo?

To fully understand how the servo works, you need to take a look under the hood. Inside there is a pretty simple set-up: a small DC motor, potentiometer and a control circuit. The motor is attached by gears to the control wheel. As the motor rotates, the potentiometer's resistance changes, so the control circuit can precisely regulate how much movement there is and in which direction.

When the shaft of the motor is at the desired position, power supplied to the motor is stopped. If not, the motor is turned in the appropriate direction. The desired position is sent via electrical pulses through the signal wire. The motor's speed is proportional to the difference between its actual position and desired position. So if the motor is near the desired position, it will turn slowly, otherwise it will turn fast. This is called proportional control. This means the motor will only run as hard as necessary to accomplish the task at hand, a very efficient little guy.

B.How is the Servo Controlled?

Servos are controlled by sending an electrical pulse of variable width, or pulse width modulation (PWM), through the control wire. There is a minimum pulse, a maximum pulse and a repetition rate. A servo motor can usually only turn 90° in either direction for a total of 180° movement. The motor's neutral position is defined as the position where the servo has the same amount of potential rotation in the both the clockwise or counter-clockwise direction. The PWM sent to the motordetermines position of the shaft, and based on the duration of the pulse sent via the control wire the rotor will turn to the desired position. The servo motor expects to see a pulse every 20 milliseconds (ms) and the length of the pulse will determine how far the motor turns. For example, a 1.5ms pulse will make the motor turn to the 90° position. Shorter than 1.5ms moves it to 0° and any longer than 1.5ms will turn the servo to 180°, as diagramed below.

C.Motor Units

1. The functional unit of the neuromuscular system

– Terminal axon of motor endplate

– Synapse

– Post-synaptic membrane of associated muscle fiber

2. Classification of motor units varies

– Physiological analysis

– Mechanical/velocity of contraction (twitch) analysis

D.Mechanical/Velocity of Contraction (Twitch) Classification

1. Slow twitch motor units recruited first

– Postural control

– Finely graded movements

2. Fast twitch units recruited last

– Rapid, powerful, impulsive movements

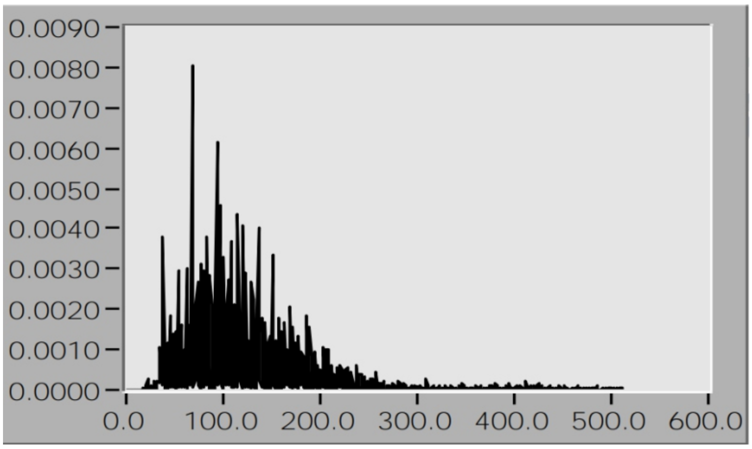

Fig 1.2

IV. AVR MICROCONTROLLER

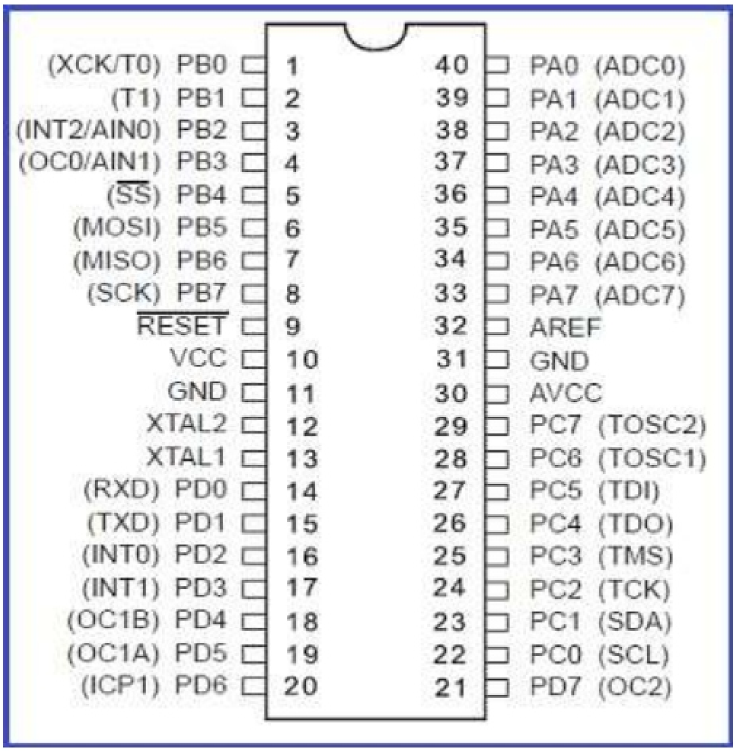

Fig 1.3

Does this mean that the microcontroller is another name for a computer…? The answer is NO!The computer on one hand is designed to perform all the general purpose tasks on a single machine like you can use a computer to run a software to perform calculations or you can use a computer to store some multimedia file or to access internet through the browser, whereas the microcontrollers are meant to perform only the specific tasks, for e.g., switching the AC off automatically when room temperature drops to a certain defined limit and again turning it ON when temperature rises above the defined limit.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.

Electromyography (EMG) is an electrodiagnostic medicine technique for evaluating and recording the electrical activity produced byskeletal muscles. EMG is performed using an instrument called an electromyograph, to produce a record called anelectromyogram. An electromyograph detects the electrical potential generated by muscle cells when these cells are electrically or neurologically activated. The signals can be analyzed to detect medical abnormalities, activation level, or recruitment order, or to analyze the biomechanics of human or animal movement.

V. EMG SIGNAL PROCESSING

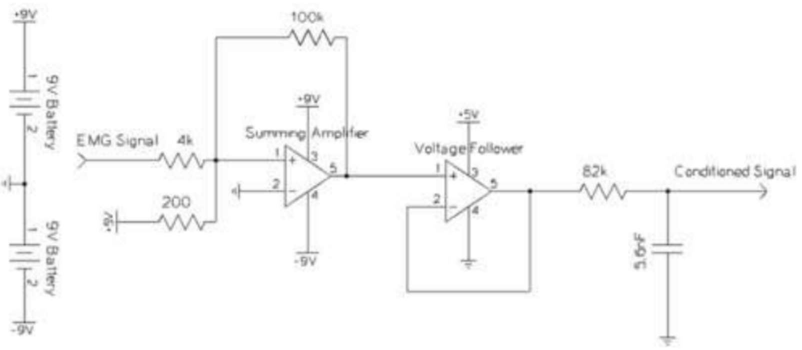

Fig 1.4

Rectification is the translation of the raw EMG signal to a single polarity frequency (usually positive). The purpose of rectifying a signal is to ensure the raw signal does not average zero, due to the raw EMG signal having positive and negative components. It facilitates the signals and process and calculates the mean, integration and the fast fourier transform (FFT). The two types of rectification of signals refer to what happens to the EMG wave when it is processed. These types include full length frequency and half length. Full length frequency adds the EMG signal below the baseline (usually negative polarity) to the signal above the baseline making a conditioned signal that is all positive. This is the preferred method of rectification because it conserves all signal energy for analysis, usually in the positive polarity. Half length rectification deletes the EMG signal below the baseline. In doing so, the average of the data is no longer zero therefore it can be used in statistical analyses. The only difference between the two types of rectification is that full-wave rectification takes the absolute value of the signal array of data points. Electrical discharge (signals) from muscles recorded with electrodesIndwelling: needle or fine wire and Surface: mono- or bipolar. The Signals are low amplitude voltages at relatively low frequencies (75 - 250 Hz) of firing (mV, uV) Signals are Pre-amplified (e.g., gain = 35) ,Amplified (e.g., gain = 5000)Displayed on a monitor or oscilloscope Evaluated in real-time and Stored on HD/tape for subsequent analysisThere are several Types of EMG AnalysisClinical/diagnostic using needle electrodes (usually bipolar) , Research/movement analysis using surface or fine wire electrodes, On/off phenomena ,Timing, Signal quantification (integration/area under a curve),Force analysis

VI. EFFECT OF AP

Causes a release of Ca+from the sarcoplasmic reticulum triggering the molecular interaction of actin and myosin resulting in sacromere (microanatomical level) and gross muscle shorting (macroanatomicallevel) with resultant tension productionCauses a release of Ca+from the sarcoplasmic reticulum triggering the molecular interaction of actin and myosin resulting in sacromere (microanatomical level) and gross muscle shorting (macroanatomicallevel) with resultant tension production

EMG electrically detects AP's as small voltages

1. Records potential difference as a wave of depolarization traverses under one and than the other electrode
2. The result is two monophasic waves

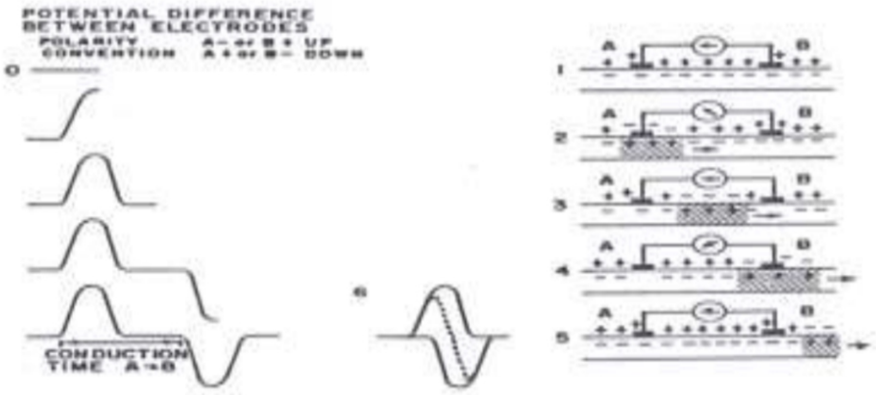

Fig 1.5

Fig 1.6

Methodology /gestures

Fig 1.7

VII. 3D DESIGN

Fig 1.8

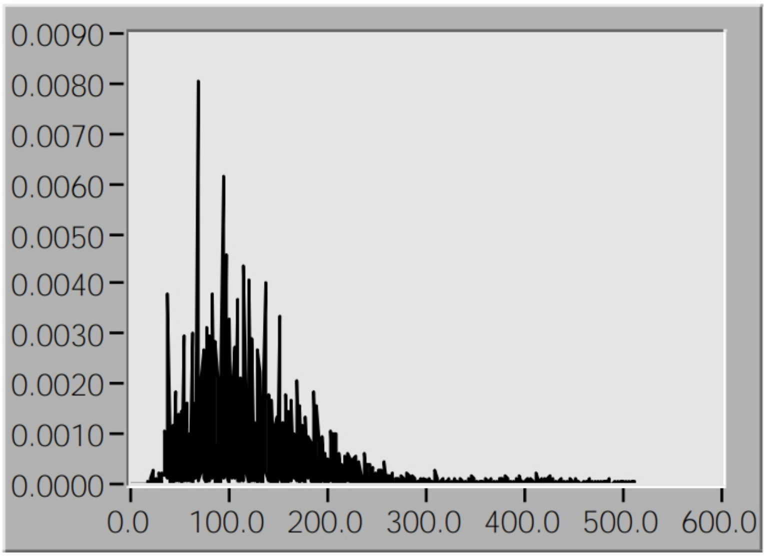

Fig 1.9 Power Spectrum

VIII. BLOCK DIAGRAM

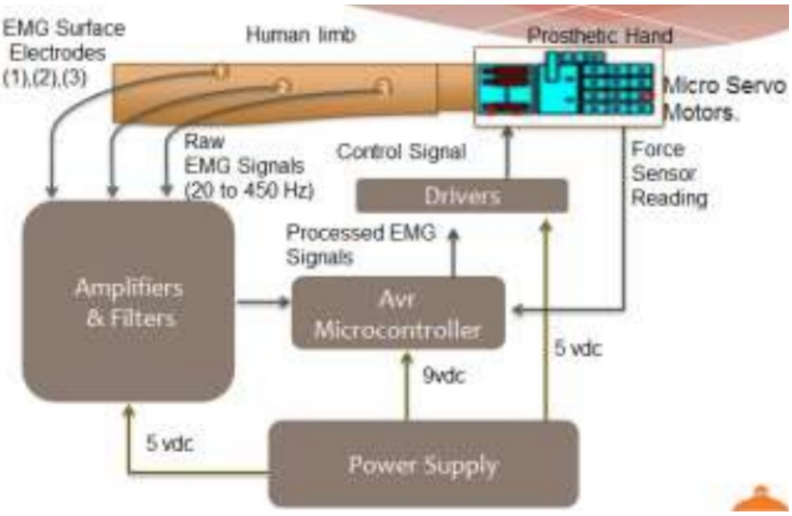

Fig 1.10

IX. CONCLUSION

The research on robotic hands is going on since so many years and all research is heading towards only towards one vision and that is how can make this technology efficient and responsive like real human body and theyare all trying and exploring new ways to make it happen .many people got an inspiration from this ongoing research hopefully one day there will be all efficient robotic hand we come to make a difference in people lives who lost their hand or legs in accidents and war heroes who fought for their country

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High Efficiency Interleaved DC-DC Converter for PV Applications

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A B S T R A C T

Interleaved Boost converters (IBC) serve a number of applications, which require a boost in the output voltage such as the distributed generators (DG´S), high voltage battery chargers etc. This paper brings out the design and simulation of a high efficiency two-phase interleaved DC-DC converter with an efficient MPPT controller. The configuration of interleaved boost converters comprises parallel combination of a number of boost converters with phase shifted PWM signals. The advantages of interleaved boost converters compared to conventional boost converters are reduction in output ripple voltage, ripple current and high efficiency. The current ratings of switching devices are considerably reduced due to the high frequency operation, which in turn helps in the reduction of overall cost. The performance parameters of the proposed interleaved boost converter are analyzed by MATLAB simulation.

Keywords: Interleaved Boost Converter(IBC), Distributed Generators(DG´S), Maximum Power point Tracking (MPPT)

I. INTRODUCTION

Today, the world trend is to find a non-depletable and clean source of energy. Solar energy is the most effective and harmless source available to us. It is considered as one of the most promising source of energy due to its enormous abundance. Solar PV technology has seen unparalleled growth in the last few decades.Solar PV technology finds several applications in different fields. One of the main challenges of PV technology is the lower voltage output from the panel of a specific rating. The development of an efficient DC-DC converter assumes importance on this ground. Interleaved Boost Converter has the boost and current sharing capability on high power application. It can be configured with many phases that allow the input current sharing and heat dissipation. Even though there are a number of DC boost converters that are available for the PV applications, they have high amount of ripples. In addition to the minimization of the ripples, interleaved boost converters have higher modularity, reliability and power capability at the cost of additional inductors, diodes and switching devices. The two phase interleaved boost converter can be used with PV so as to get reduced current ripples.

The robot receives the data and tracks to that particular coordinate with the help of GPS. The robot has a central AVR microcontroller which controls and coordinates all the activities of the robot, and a dedicated 8051 micro controller for the GPS control. Once the robot reaches the zone, using This paper will first explain the basic principle of Photovoltaic cell. Next, the operation and simulation of interleaved DC-DC converter are obtained. The simulation results are also presented.

II. PHOTOVOLTAIC CELL

PV cell is configured as a large area p-n junction made from silicon.Sunlight consists of little particles of energy called photons. When a PV cell is exposed to sunlight some of the photons get reflected, pass right throughor absorbed by the solar cell. When the energy of the photons is higher than the band gap energy they get absorbed by theelectrons and they move to the conduction band from the valence band.Free electrons and electron deficiencies or holes are created in the crystal lattice. When connected to an external load, electrons that are created on the n type side, may travel through the wire power the load, and continue through the wire until they reach the p-type semiconductor metal contact .The voltage measured is equal to the difference in the quasi Fermi levels of the minority charge carriers. The flow of electrons in the conduction band represents the current and so a PV cell can be modelled as a current source.

A. Equivalent circuit of PV cell

A PV cell can be represented by a current source, a diode, a shunt resistance R*sh* and a series resistance R*s*. The diode represents the pn junction of the cell, R*sh* the leakage current and R*s*. the internal resistance of the cell.

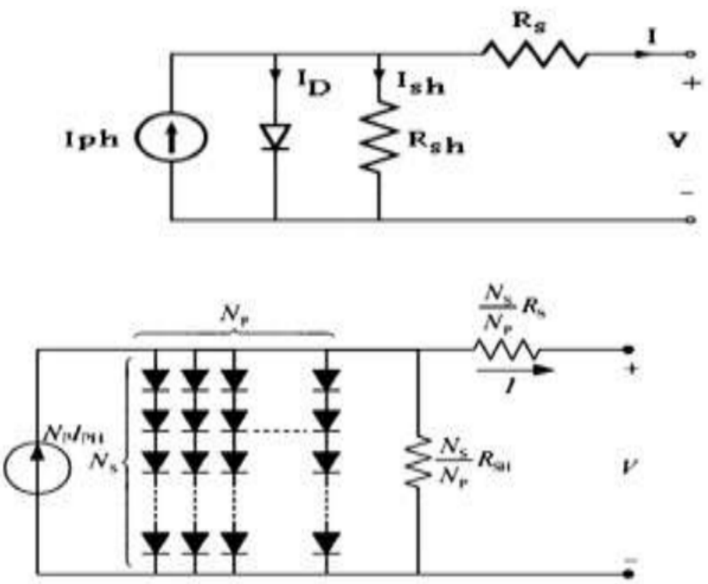

Fig. 1 Equivalent circuit of PV cell

The equation governing the output current is as follows:

$$I = I_L - I_0\{exp[\frac{q(V+IRs)}{nkT}]-1\} - \frac{V+IRs}{R_{sh}}$$

Where, q is the charge of an electron and k the Boltzmann‟s constant.

B. PV and IV characteristics of solar cell

The I-V and P-V characteristics of the solar cells are non- linear in nature. The solar cell characteristics mainly depend on the existing atmospheric conditions such as temperature and irradiance. Maximum power current (Imp) is the amount of current of a given device at its maximum power point and Maximum powervoltage(Vmp) is the voltage value of a given device at its maximum power point. Maximum power point(Pmp) is the point where the product of current and voltage is at maximum power.

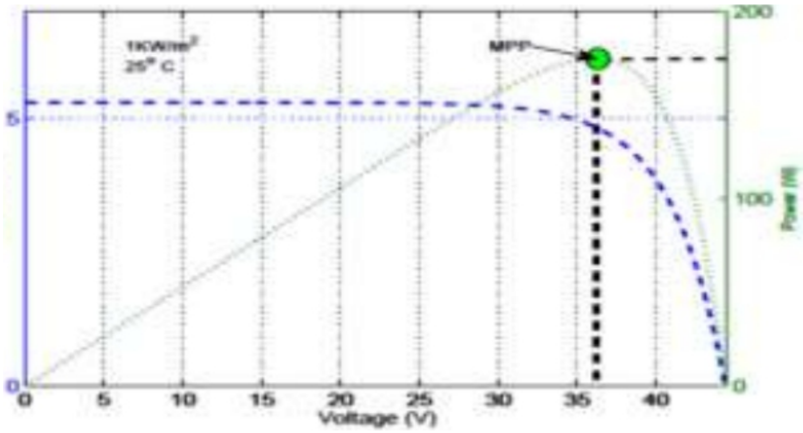

Fig .2. I-V and P-V cure of a PV cell

III. MPPT USING P&O ALGORITHM

MPPT or Maximum Powerpoint Tracking is a technique that controllers use for PV systems to maximize power output and thus the efficiency. The weather and load changes cause the operation of a PV system to vary almost all the times. A dynamic tracking technique is important to ensure maximum power is obtained from the photovoltaic arrays. The MPPT algorithm operates based on the truth that the derivative of the output power (P) with respect to the panel voltage (V) is equal to zero at the maximum power point.

There are several methods adopted for this such as the incremental conductance and the P&O algorithm.Here the maximum power point tracking using P&O algorithm is made use of. It is referred to as a „hill climbing" method, because it depends on the rise of the curve of the power against voltage below the maximum power point, and the fall above that point. Perturb and observe is the most commonly used MPPT method due to its ease of implementation. Perturb and observe results top level efficiency, provided that a proper predictive and adaptive hill climbing strategy is adopted.

The algorithm perturbs the operating point by increasing or decreasing the voltage by a small amount and measures the PV array output power before and after the perturbation. If the power increases, the algorithm continues to perturb the system in the same direction; otherwise the system is perturbed in the opposite direction. When the stable condition is arrived the algorithm oscillates around the peak power point. In order to maintain the power variation small the perturbation size is to remain very small. The technique is advanced in such a style that it sets a reference voltage of the module corresponding to the peak voltage of the module. A controller then acts to transfer the operating point of the module to that particular voltage level.

Figure 3 shows a flowchart for reference voltage perturbation in which the PV array output voltage reference is used as the control parameter in conjunction with a controller to adjust the duty ratio of the MPPT power converter. The advantages of this technique is that it is simple to implement, the only thing needed is to measure the current and voltage from the PV cell and process this information in microcontroller.

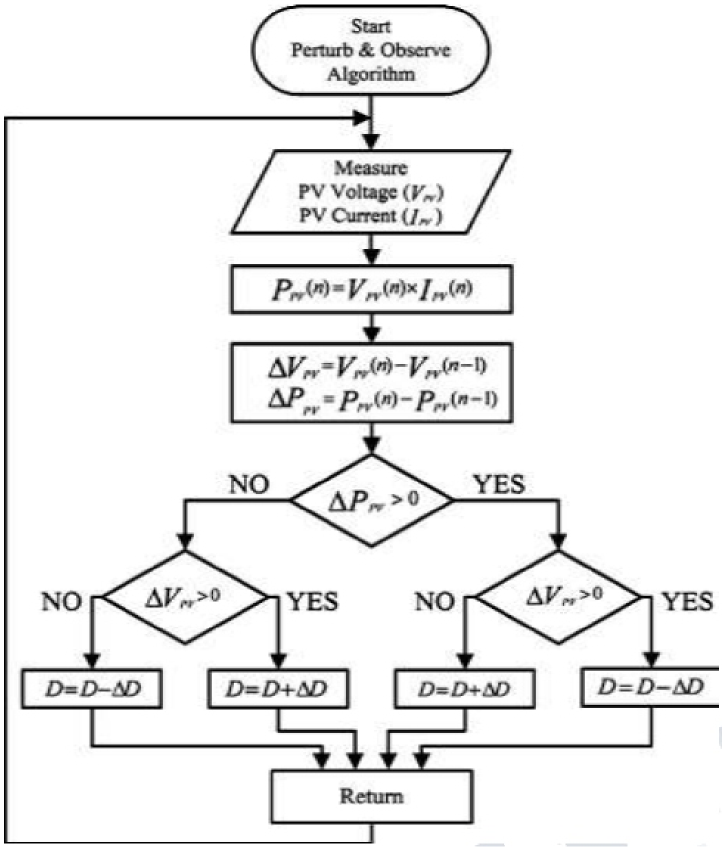

Fig. 3 Flowchart of P&O algorithm

The conventional boost converters have many disadvantages among which some can be stated as follows:

High reverse recovery current across the rectifier diode.

Turn on and off losses

Leakage inductance energy(induces high voltage spikes across the active switch) and

Current stress in switching device.

Because of the above problems an interleaved DC-DC boost converter is topology is proposed.

IV. DESIGN AND ANALYSIS OF PROPOSED IBC

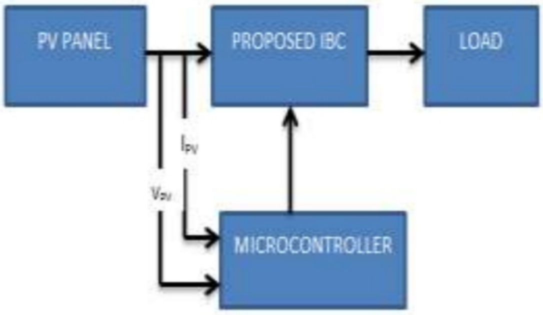

Fig.4. Block diagram of the converter

In this proposed system, the sunlight is incident on the solar panel or module, and then the voltage across the PV panel is fed into the interleaved boost converter for step up the dc voltage. The Controller is used for adjusting the duty cycle to obtain the desired output voltage.

A. Design of two phaseIBC

In high-power boost converters, the major design aspect is the selection of the boost inductor and the output capacitor. The major concern is the size, cost, and weight of such a high-power inductor that is the single heaviest component in the entire dc/dc converter. To reduce the inductor size and weight, high frequency ferrite core is used. In addition, the dc-dc converter performance directly influences the characteristics of the PV. Indeed, the ripple and harmonic content of the current is one of the various phenomena influencing PV efficiency as well as battery lifetime .So the main objective of this research is to minimize inductor size, capacitor, current/voltage ripples and harmonic content.

For reduced switching losses, proper choice of semiconductor devices, and design of inductor and capacitor, No. of interleaving units and decision on duty ratio are of importance. The methodology follows as:

- Selection of number of phases and duty ratio
- Design of inductance
- Determination of power semiconductor switches
- Designing an output filter

a) Selection of number of phases and duty ratio

It has been observed that that the ripple current in the input current decreases with increase in the number of phases. On the other hand, the cost and complexity of the circuit increases. So a compromise has made between them. In in this paper, the number of phases was chosen to be two to reduce the ripple content without increasing the cost drastically

Duty ratio also aids in ripple reduction and hence it has to be selected carefully. From the plot of the input current ripple versus the duty ratio, it can be found that for an N-phase IBC, the ripple can be zero at particular values of duty ratio. The duty cycle ratio (D) is defined as,

$$D = 1 - \frac{V_{in}}{V_o}$$

Where V*out* is the output voltage and V*in* is the input voltage.

b) Selection of inductors and output capacitors

Design of inductance is very important in boost topologies so that the inductor is sized correctly. The inductor value is selected using the following equation,

$$L = \frac{V_{in} * D * T_s}{\Delta I_{in}}$$

By assuming appropriate peak to peak capacitor ripple, the output capacitor value can be obtained from the following equation,

$$C_{out} = \frac{V_o * D * T_s}{R_L * \Delta V_o}$$

Where, RL is the load resistor, D is the duty ratio and TS is the Total time.

B. Analysis of two phase IBC

Interleaving is the process in which the pulse frequency of any periodic power source is increased.Two phase interleaving topology of a boost converter is shown in the figure 5. The main advantage of phase interleaving is that the total input current is divided into two phases,resulting in the reduction of current rating of the switching devices. The other advantages of interleaving are the reduction of the I^2R loss since the current divides into „n" paths and also the reduction in the output ripple voltage and ripple current.

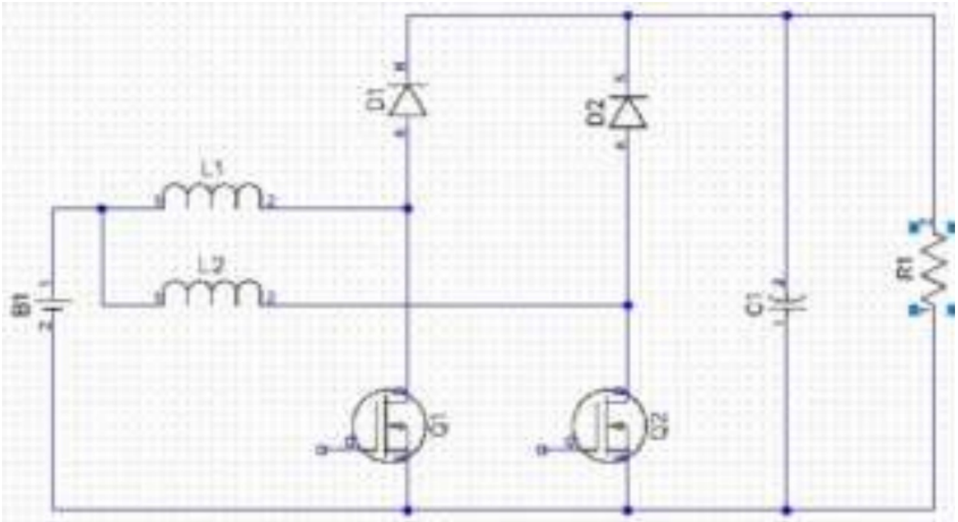

Fig.5. Circuit diagram of two phase interleaved boost converter

The operation of the converter is as follows, here similar inductors are considered i.e.; L1=L2=L.
D1 and D2 are the duty cycles of Q1 and Q2. There are three mode of operation.

MODE 1:

At t =0, the gate pulse is given to the switch„Q1‟ of the first phase. Then the switch „Q1‟ is turned on, the current across the inductor L1 rises linearly. At the same time, the switch „Q2‟ in the second phase is turned off and the energy stored in the inductor L2 is transferred to the load through the output diode D2. In this time interval, the diode D1 in the first phase is in reverse bias condition .the rate of change of il2 is given by

Whereas rate of change of il1 is;

$$\frac{dil_1}{dt} = \frac{Vi}{L} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

MODE 2:

At time t1, Q1 and Q2 are opened. The inductors L1 and L2 discharge through the load. The rate of change of iLl and iL2 are

$$\frac{dil1}{dt} = \frac{dil2}{dt} = \frac{Vi-Vo}{L} \ldots\ldots\ldots(3)$$

MODE 3:

At t = t2, the gate pulse is given to the switch „Q2‟ of the first phase. Then the switch „Q2‟ is turned on, the current across the inductor L2 rises linearly. At the same time, the switch „Q1‟ in the first phase is turned off and the energy stored in the inductor L1 is transferred to the load through the output diode D1.

In this time interval, the diode D2 in the second phase is in reverse bias condition. At time t1, Q2 is closed. The current in the inductor L2 starts to rise while L1 continues to discharge. The rate of change of iL1 is approximately given by,

$$\frac{di l_1}{dt} = \frac{v_i - v_0}{L} \quad \ldots\ldots\ldots\ldots..(4)$$

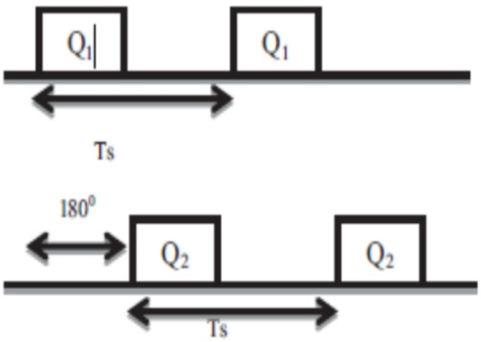

Fig. 6 Switching pattern of IBC

v. SIMULATION OF MPPT CONTROLLER WITH IBC

As per the design, the simulation of a two phase IBC with an MPPT controller was done in MATLAB. The output from the MPPT controller is given to the interleaved boost converter. The controller as mentioned before uses the P&O algorithm for maximum power point tracking. The output pulse from the controller is used to drive the IBC which consists of two parallel connected boost converter units. The MATLAB Simulink model of the proposed converter is shown in figure 7.

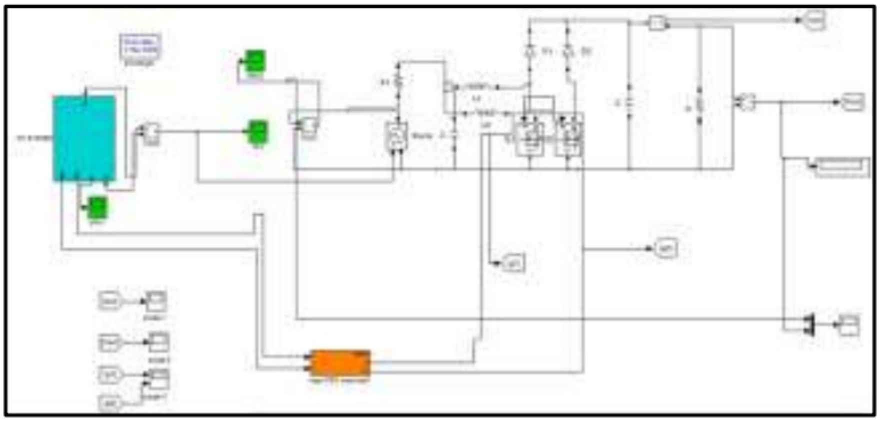

Fig. 7 MATLAB Simulink model of IBC with MPPT controller

The simulation result is as follows

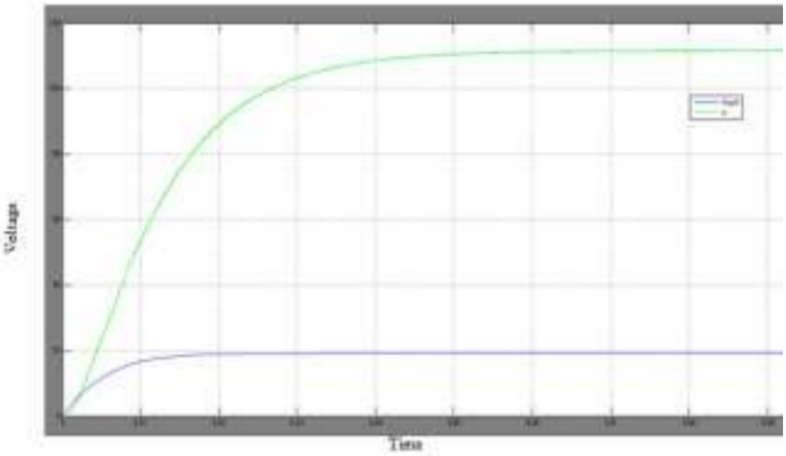

Fig.8. Input and output voltage of IBC with MPPT controller

VI. CONCLUSION

Interleaved boost converter has many advantages and is very suitable for renewable energy applications.The high efficiency interleaved dc-dc boost converter has been designed and simulated for PV applications. The disadvantages of conventional boost converters are rectified and the efficiency is improved. Here the switching losses are minimized by adopting a novel interleaving topology. The input current sharing helps in the reduction of stress on switches, which enables the introduction of low current rated switches to be used in high power density converters.In addition the output current and voltage ripplesare reduced significantly. The design equations of the proposed converter are presented and performance parameters are compared using simulation. The simulation results have been presented for renewable energy applications, but the concept can be extended to higher voltage levels such as electric traction, UPS etc.

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State Of Art :Design Of Robotic Architecture With Brain Mapped Wheelchair For Intelligent System Control

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A B S T R A C T

Independent mobility is core to being able to per-form activities of daily living by oneself. However, powered wheelchairs are not an option for a large number of people who are unable to use conventional interfaces, due to severe motor–disabilities. For some of these people, non–invasive brain– computer interfaces (BCIs) offer a promising solution to this interaction problem and in this article we present a shared control architecture that couples the intelligence and desires of the user with the precision of a powered wheelchair. We show how four healthy subjects are able to master control of the wheelchair using an asynchronous motor–imagery based BCI protocol and how this results in a higher overall task performance, compared with alternative synchronous P300–based approaches

Keywords— BCI, Wheelchair, Robotic Architecture, Brain Mapping

I. INTRODUCTION

Millions of people around the world suffer from mobility impairments and hundreds of thousands of them rely upon powered wheelchairs to get on with their activities of daily living [1]. However, many patients are not prescribed powered wheelchairs at all, either because they are physically unable to control the chair using a conventional interface, or because they are deemed incapable of driving safely [2].Consequently, it has been estimated that between 1.4 and 2.1 million wheelchair users might benefit from a smart powered wheelchair, if it were able to provide a degree of additional assistance to the driver [3].

In our work with brain–actuated wheelchairs, we target a population who are—or will become—unable to use conventional interfaces, due to severe motor–disabilities. Noninvasive brain–computer interfaces (BCIs) offer a promising new interaction modality that does not rely upon a fully functional peripheral nervous system to mechanically interact with the world and instead uses the brain activity directly. However, mastering the use of a BCI, like with all new skills, does not come without a few challenges. Spontaneously performing mental tasks to convey one's intentions to a BCI can require a high level of concentration, so it would result in a fantastic mental workload, if one had to precisely control every movement of the wheelchair. Furthermore, due to the noisy nature of brain signals, we are currently unable to achieve the same information rates that you might get from a joystick, which would make it difficult to wield such levels of control even if one wanted to.

Thankfully, we are able to address these issues through the use of intelligent robotics, as will be discussed. Our wheelchair uses the notion of shared control to couple the intelligence of the user with the precise capabilities of a robotic wheelchair, given the context of the surroundings [4]. It is this synergy, which begins to make brain–actuated wheelchairs a potentially viable assistive technology of the not–so–distant future.

In this paper we describe the overall robotic architecture of our brain–actuated wheelchair. We begin by discussing the brain computer interface, since the human is central to our design philosophy. Then, the wheelchair hardware and modifications are described, before we explain how the shared control system fuses the multiple information sources in order to decide how to execute appropriate manoeuvres in cooperation with the human operator. Finally, we present the results of an experiment involving four healthy subjects and compare them with those reported on other brain–actuated wheelchairs. We find that our continuous control approach offers a very good level of performance, with experienced BCI wheelchair operators achieving a comparable performance to that of a manual benchmark condition.

II. BRAIN COMPUTER INTERFACES (BCI)

The electrical activity of the brain can be monitored in real time using an array of electrodes, which are placed on the scalp in a process known as electroencephalography (EEG).In order to bypass the peripheral nervous system, we need to find some reliable correlates in the brain signals that can be mapped to the intention to perform specific actions. In the nexttwo subsections, we first discuss the philosophy of different BCI paradigms, before explaining our chosen asynchronous implementation for controlling the wheelchair.

A. The BCI Phi

Many BCI implementations, rely upon the subject attending to visual stimuli, which are presented on a screen. Consequently, researchers are able to detect a specific event–related potential in the EEG, known as the P300, which is exhibited 300 ms after a rare stimulus has been presented. For example, in one P300–based BCI wheelchair, the user is presented with a 3*3 grid of possible destinations from a known environment (e.g. the bathroom, the kitchen etc., within the user's house), which are highlighted in a standard oddball paradigm [5]. The user then has to focus on looking at the particular option to which they wish to drive.

Once the BCI has detected their intention, the wheelchair drives autonomously along a predefined route and the user is able to send a mental emergency stop command.(if required) with an average of 6 seconds delay. Conversely, another BCI wheelchair, which is also based upon the P300 paradigm doesn't restrict the user to navigating in known, pre–mapped environments. Instead, in this design, the user is able to select subgoals (such as close left, far right, mid–ahead etc.) from an augmented reality matrix superimposed on a representation of the surrounding environment [6].To minimise errors (at the expense of command delivery time),after a subgoal has been pre–selected, the user then has to focus on a validation option. This gives users more flexibility in terms of following trajectories of their choice, however, the wheelchair has to stop each time it reaches the desired sub–goal and wait for the next command (and validation) from the user. Consequently, when driving to specific destinations, the wheelchair was stationary for more time than it was actually moving (as can be seen in Fig. 8 of [6]).

Our philosophy is to keep as much authority with the users as possible, whilst enabling them to dynamically generate natural and efficient trajectories. Rather than using external stimuli to evoke potentials in the brain, as is done in the P300 paradigm, we allow the user to spontaneously and asynchronously control the wheelchair by performing a motor imagery task. Since this does not rely on visual stimuli, it does not interfere with the visual task of navigation. Furthermore, when dealing with motor–disabled patients, it makes sense to use motor imagery, since this involves a part of the cortex, which may have effectively become redundant; i.e. the task does not interfere with the residual capabilities of the patient.

In our motor imagery (MI) paradigm, the user is required to imagine the kinaesthetic movement of the left hand, the right hand or both feet, yielding three distinct classes. During the BCI training process, we select the two most discriminable classes to provide a reliable mapping from the MI tasks to control actions (e.g imagine left hand movements to deliver a turn left command and right hand movements to turn right).To control our BCI wheelchair, at any moment, the user can spontaneously issue a high–level turn left or turn right command. When one of these two turning commands is not delivered by the user, a third implicit class of intentional non–control exists, whereby the wheelchair continues to travel forward and automatically avoid obstacles where necessary. Consequently, this reduces the user's cognitive workload. The implementation will be discussed in Section IV-D.

B. The BCI Implementation

Since we are interested in detecting motor imagery, we acquire monopolar EEG at a rate of 512 Hz from the motor cortex using 16 electrodes (see Fig. 1). The electrical activity of the brain is diffused as it passes through the skull, which results in a spatial blur of the signals, so we apply a Laplacian filter, which attenuates the common activity between neighbouring electrodes and consequently improves Fig. 1: The active electrode placement over the motor cortex for the acquisition of EEG data, based on the International 10-20 system (nose at top). our signal to noise ratio. After the filtering, we estimate the power spectral density (PSD) over the last second, in the band 4–48 Hz with a 2 Hz resolution [8]. It is well know that when one performs motor imagery tasks, corresponding parts of the motor cortex are activated, which, as a result of event related desynchronisation, yields a reduction in the muband power (8–13 Hz) over these locations (e.g. the right hand corresponds to approximately C1 and the left hand to approximately C2 in Fig. 1). In order to detect these changes, we estimate the PSD features every 62.5 ms (i.e. 16 times per second) using the Welch method with 5 overlapped (25%) Hanning windows of 500 ms. Every person is different, so we have to select the features that best reflect the motor–imagery task for each subject. Therefore, canonical variate analysis (CVA) is used to select subject–specific features that maximize the separability between the different tasks and that are most stable (according to cross validation on the training data) [9]. Decisions with a confidence on the probability distribution that are below a given rejection threshold are filtered out. Finally, evidence about the executed task is accumulated using an exponential smoothing probability integration framework [11]. This helps to prevent commands from being delivered accidentally.

III. WHEELCHAIR HARDWARE

Our brain controlled wheelchair is based upon a commercially available mid–wheel drive model by Invacare that we have modified. First, we have developed a remote joystick module that acts as an interface between a laptop computer and the wheelchair's CANBUS–based control network. This allows us to control the wheelchair directly from a laptop computer. Second, we have added a pair of wheel–encoders to the central driving wheels in order toprovide the wheelchair with feedback about its own motion. Third, an array of ten sonar sensors and two webcams have been added to the wheelchair to provide environmental feedback to the controller. Fourth, we have mounted an adjustable 8‖ display to provide visual feedback to the user.

Fifth, we have built a power distribution.As shown in the figure 2 below, the wheelchair's knowledge f the environment is acquired by the fusion of complementary sensors and is represented as a probabilistic occupancy grid. The user is given feedback about the current status of the BCI and about the wheelchair's knowledge of the environment. unit, to hook up all the sensors, the laptop and the display to the wheelchair's batteries. The complete BCI wheelchair platform is shown in Fig. 2. The positions of the sonars are indicated by the white dots in the centre of the occupancy grid, whereas the two webcams are positioned forward–facing, directly above each of the front castor wheels.

Fig. 2: The complete brain–actuated wheelchair A.Wheel–encoders

The encoders return 128 ticks per revolution and are geared up to the rim of the drive wheels, resulting in a resolution of 2.75*10^3 metres translation of the inflated drive wheel per encoder tick. We use this information to calculate the average velocities of the left and right wheels for each time–step. Not only is this important feedback to regulate the wheelchair control signals, but we also use it as the basis for dead reckoning (or estimating the trajectory that has been driven). We apply the simple differential drive model derived in [12]. To ensure that the model is always analytically solvable, we neglect the acceleration component. In practice, since in this application we are only using the odometry to update a 6m*6m map, this does not prove to be a problem. However, if large degrees of acceleration or slippage occur and the odometry does not receive any external correcting factors, the model will begin to accumulate significant errors [12].

IV. SHARED CONTROLARCHITECTURE

The job of the shared controller is to determine the meaning of the vague, high–level user input (e.g. turn left,turn right, keep going straight), given the context of the surrounding environment [4]. We do not want to restrict ourselves to a known, mapped environment—since it maychange at any time (e.g. due to human activities)—so the wheelchair must be capable of perceiving its surroundings.Then, the shared controller can determine what actions should be taken, based upon the user's input, given the context of the surroundings. The overall robotic shared control architecture is depicted in Fig. 3 and we discuss the perception and planning blocks of the controller over then next few subsections.

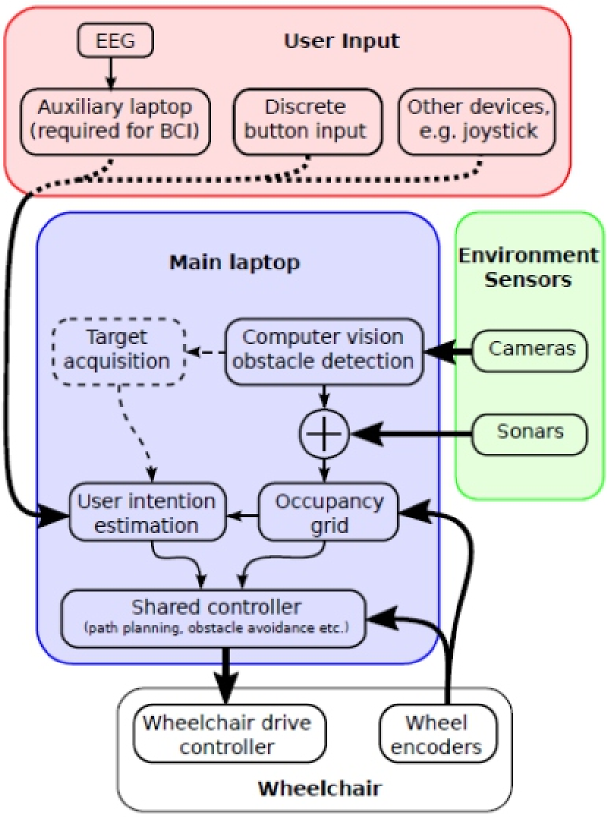

Fig. 3: The user's input is interpreted by the shared controller given the context of the surroundings. The environment is sensed using a fusion of complementary sensors, then the shared controller generates appropriate control signals to navigate safely, based upon the user input and the occupancy grid.

A. Perception

Unlike for humans, perception in robotics is difficult. To begin with, choosing appropriate sensors is a not a trivial task and tends to result in a trade–off between many issues, such as: cost, precision, range, robustness, sensitivity, complexity of post-processing and so on. Furthermore, no single sensor by it-self seems to be sufficient. For example, a planar laser scanner may have excellent precision and range, but will only detect a table's legs, reporting navigable free space between them. Other popular approaches, like relying solely upon cheap and readily available sonar sensors have also been shown to be unreliable for such safety–critical applications [14]. To overcome these problems, we propose to use the synergy of two low–cost sensing devices to compensate for each other's drawbacks and complement each other's strengths.Therefore, we use an array of ten close–range sonars, with a wide detection beam, coupled with two standard off–the–shelf USB webcams, for which we developed an effective obstacle sensing devices to compensate for each other's drawbacks and complement each other's strengths. Therefore, we use an array of ten close–range sonars, with a wide detection beam, coupled with two standard off–the–shelf USB webcams, for which we developed an effective obstacle.

(a) Original image (b) Edge detection (c) Distance transform (exaggerated contrast) (d) Watershed segmentation (e) Detected obstacles (red)

The obstacle detection algorithm is based on monocular image processing from the webcams, which ran at 10Hz. The concept of the algorithm is to detect the floor region and label everything that does not fall into this region as an obstacle; we follow an approach similar to that proposed in [13], albeit with monocular vision, rather than using a stereo head. The first step is to segment the image into constituent regions. For this, we use the watershed algorithm, since it is fast enough to work in real–time [15]. We take the original image (Fig 4a) and begin by applying the well–known Canny edge–detection, as shown in Fig. 4b. A distance transform is then applied, such that each pixel is given a value that represents the minimum Euclidean distance to the nearest edge. This results in the relief map shown in Fig. 4c, with a set of peaks (the farthest points from the edges) and troughs (the edges themselves). The watershed segmentation algorithm itself is applied to this relief map, using the peaks as markers, which results in an image with a (large) number of segments (see Fig. 4d). To reduce the number of segments, adjacent regions with similar average colours are merged. Finally, the average colour of the region that has the largest number of pixels along the base of the image is considered to be the floor. All the remaining regions in the image are classified either as obstacles or as navigable floor, depending on how closely they match the newly–defined floor colour. The result is shown in Fig. 4e, where the detected obstacles are highlighted in red. Since we know the relative position of the camera and its lens distortion parameters, we are able to build a local occupancy grid that can be used by the shared controller, as is described in the following section.

C. Updating the Occupancy Grid

At each time–step, the occupancy grid is updated to include the latest sample of sensory data from each sonar and the output of the computer vision obstacle detection algorithm. We extend the histogram grid construction method described in [16], by fusing information from multiple sensor types into the same occupancy grid. For the sonars, we consider a ray to be emitted from each device along its sensing axis. The likelihood value of each occupancy grid cell that the ray passes through is decremented, whilst the final grid cell (at the distance value returned by the sonar) is incremented. The weight of each increment and decrement is determined by the confidence we have for each sensor at that specific distance. For example, the confidence of the sonar readings being correct in the range 3 cm to 50 cm is high, whereas outside that range it is zero (note that the sonars are capable of sensing up to 6 m, but given that they are mounted low on the wheelchair, the reflections from the ground yield a practical limit of 0.5 m). Similarly, the computer vision algorithm only returns valid readings for distances between 0.5m and 3 m. Using this method, multiple sensors and sensor modalities can be integrated into the planning grid. As the wheelchair moves around the environment, the information from the wheel–encoder based dead–reckoning system is used to translate and rotate the occupancy grid cells, such that the wheelchair remains at the centre of the map. In this way, the cells accumulate evidence over time from multiple sensors and sensor modalities. As new cells enter the map at the boundaries, they are set to ―unknown‖, or 50% probability of being occupied, until new occupancy evidence (from sensor readings) becomes available. Figure above shows The obstacle–detection algorithm is based upon a computer vision approach prosed in [13], but adapted for monocular vision. The floor is deemed to be the largest region that touches the base of the image, yet does not cross the horizon.

In the current implementation, the user is not able to stop the chair in free space, instead the chair will stop when it has docked to a potential target. In future this control strategy could easily be extended to include an additional BCI command (or another biosignal, in the case of a hybrid approach) to implement an explicit stop signal.

V. EVALUATION

We demonstrate that both natıve and experienced BCI wheelchair operators are able to complete a navigation task successfully. Furthermore, unlike in P300 based systems, not only was the user in continuous spontaneous control of the wheelchair, but the resultant trajectories were smooth and intuitive (i.e. no stopping, unless there was an obstacle, and users could voluntarily control the motion at all times).

A.Experiment Protocol

As a benchmark, the subject was seated in the wheelchair and was instructed to perform an online BCI session, before actually driving. In this online session, the wheelchair remained stationary and the participant simply had to perform the appropriate motor imagery task to move a cursor on the wheelchair screen in the direction indicated by a cue arrow. There was a randomized balanced set of 30 trials, separated by short resting intervals, which lasted around 4–5 mins, depending on the performance of the subject. After the online session, participants were given 15–30 minutes to familiarise themselves with driving the wheelchair: Trajectories followed by subject s3 on one of the manual benchmark trials (left), compared with one of the BCI trials (right). These trajectories were reconstructed from odometry using the independent reconstruction method [19]. Using each of the control conditions: a two button manual input, which served as a benchmark, and the BCI system. Both input paradigms allowed the users to issue left and right commands at an inter–trial interval of one second. The actual task was to enter a large open–plan room through a doorway from a corridor, navigate to two different tables, whilst avoiding obstacles and passing through narrow openings (including other non–target tables, chairs, ornamental trees and a piano), before finishing by reaching a second doorway exit of the room when approaching the target tables, the participants were instructed to wait for the wheelchair to finish docking to the table, then once it had stopped they should issue a turning command to continue on their journey. The trials were counter–balanced, such that users began with a manual trial, then performed two BCI trials and finished with another manual trial.

B. Results and Discussion

All subjects were able to achieve a remarkably good level of control in the stationary online BCI session, as can be seen in Table I. Furthermore, the actual driving task was completed successfully by every subject, for every run and no collisions occurred. A comparison between the typical trajectories followed under the two conditions is shown in Fig 5. The statistical tests reported in this section are paired Student's tests. A great advantage that our asynchronous BCI wheelchair brings, compared with alternative approaches like the P300 based chairs, is that the driver is in continuous control of the wheelchair. This means that not only does the wheelchair follow natural trajectories, which are determined in real time by the user (rather than following predefined ones, like in [5]), but also that the chair spends a large portion of the navigation time actually moving. This is not the case with some state–of–the–art P300–controlled wheelchairs, where the wheelchair has to spend between 60% and 80% of the manoeuvre time stationary, waiting for input from the user. In terms of path efficiency, there was no significant difference (p = 0:6107) across subjects between the distance travelled in the manual benchmark condition (43.1*8.9 m) and that in the BCI condition (44.9*4.1 m). Although the actual environments were different, the complexity of the navigation was comparable to that of the tasks investigated on a P300 based wheelchair in [6]. In fact, the average distance travelled for our BCI condition (44.9*4.1 m), was greater than that in the longest task of [6] (39.3*1.3 m), yet on average our participants were able to complete the task in 417.6*108.1 s, which was 37% faster than the 659*130 s reported in [6]. This increase in speed might (at least partly) be attributed to the fact that our wheelchair was not stationary for such a large proportion of the trial time. Across subjects, it took an average of 160.0 s longer to complete the task under the BCI condition (see Fig. 5, p = 0:0028). On brighter days, some shadows and reflections from the shiny wooden floor caused the wheelchair to be cautious and slow down earlier than on dull days, until the so nars confirmed that actually there was not an obstacle present. Therefore, it makes more sense to do a within subjects comparison, looking at the performance improvement or degradation on a given day, rather than comparing absolute performance values between subjects on different days. From Figure below it can be seen that for the inexperienced users (s1 and s2), there was some discrepancy in the task completion time between the benchmark manual condition and the BCI condition. However, for the experienced BCI wheelchair users (s3 and s4), the performance in the BCI condition is much closer to the performance in the manual benchmark condition. This is likely to be due to the fact that performing a motor imagery task, whilst navigating and being seated on a moving wheelchair, is much more demanding than simply moving a cursor on the screen (c.f. the stationary online BCI session of Table I). In particular, aside from the increased workload, when changing from a task where one has to deliver a particular command as fast as possible following a cue, to a task that involves navigating asynchronously in a continuous control paradigm, the timing of delivering commands becomes very important. In order to drive efficiently, the user needs to develop a good mental model of how the entire system behaves (i.e. the BCI, coupled with the wheelchair) [20].Clearly, through their own experience, subjects s3 and s4 had developed such mental models and were therefore able to

TABLE I: Confusion matrices of the left and right classes and accuracy for the online session, for each subject, before actually controlling the wheelchair.

	s1 L	s1 R	s2 L	s2 R	s3 L	s3 R	s4 L	s4 R
Left class	13	2	12	3	14	1	15	0
Right class	0	15	0	15	0	15	0	15
Accuracy (%)	93.3		90.0		96.7		100.0	

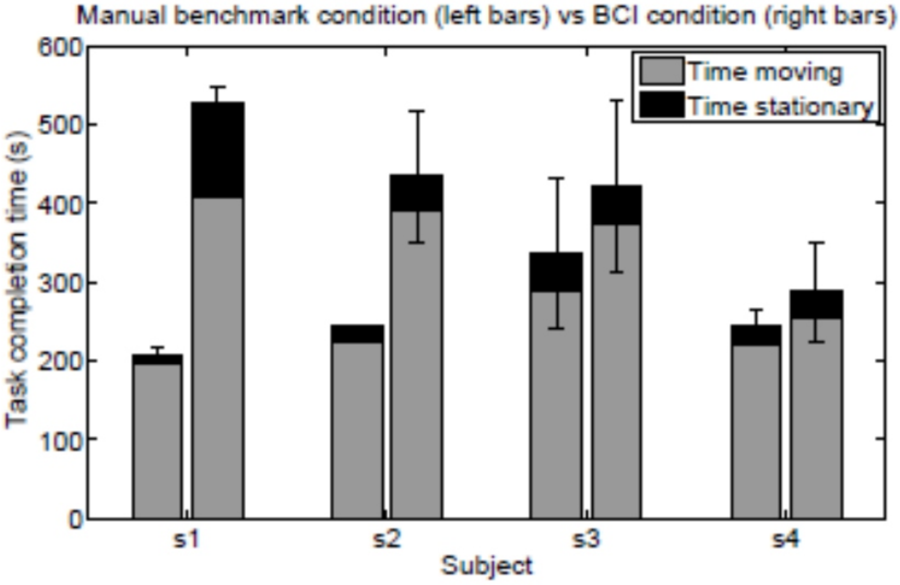

Fig. 5: The average time required to complete the task for each participant in a benchmark manual condition (left bars) and the BCI condition (right bars). The wheelchair was stationary, waiting user input, only for a small proportion of the trial.

Anticipate when they should begin performing a motor imagery task to ensure that the wheelchair would execute the desired turn at the correct moment. Furthermore, they were also more experienced in refraining from accidentally delivering commands (intentional non–control) during the periods where they wanted the wheelchair to drive straight forwards and autonomously avoid any obstacles. Conversely, despite the good online BCI performance of subject's s1 and s2, they had not developed such good mental models and were less experienced in controlling the precise timing of the delivery of BCI commands. Despite this, the use of shared control ensured that all subjects, whether experienced or not, could achieve the task safely and at their own pace, enabling continuous mental control over long periods of time (>400 s, almost 7 minutes). gives users greater flexibility and authority over the actual trajectories driven, since it allowed users to interact with the wheelchair spontaneously, rather than having to wait for external cues as was the case with [5], [6]. Moreover, combining our BCI with a shared control architecture allowed users to dynamically produce intuitive and smooth trajectories, rather than relying on predefined routes [5] or having to remain stationary for the majority of the navigation time [6]. Although there was a cost in terms of time for inexperienced users to complete the task using the BCI input compared with a manual benchmark, experienced users were able to complete the task in comparable times under both conditions. This is probably as a result of them developing good mental models of how the coupled BCI–shared control system behaves. In summary, the training procedure for spontaneous motor imagery–based BCIs might take a little longer than that for stimulus–driven P300systems, but ultimately it is very rewarding. After learning to modulate their brain signals appropriately, we have demonstrated that both experienced and inexperienced users were able to master a degree of continuous control that wassufficient to safely operate a wheelchair in a real world environment. They were always successful in completing a complex navigation task using mental control over long periods of time. One participant remarked that the motor–imagery BCI learning process is similar to that of athletes or musicians training to perfect their skills: when they eventually succeed they are rewarded with a great sense of self–achievement.

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Relative Wireless Rash Driving Detection System

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A B S T R A C T

The main aim of this project is to implement a rash-driving-detection system in cities that alerts traffic control authorities wirelessly in case of speed violation by any vehicle. Nowadays, accidents are taking place frequently in the cities due to over speeding of vehicles resulting in many casualties. In the current systems, to detect rash driving, policemen use a handheld radar gun to record vehicle speed. Our proposed system fulfills that requirement through wireless mechanism as it consists of two blocks: transmitter and receiver; both use a microcontroller of the 8051 family and a rectified-power supply. This project consists of an RF transceiver module operating at 2.4 GHz. Relative Rash driving is detected by the sensor which is interfaced to the microcontroller at the transmitting end and by using the appropriate control signals and equipments, the traffic authorities are notified.

Keywords—Rash-driving-detection,Wireless,Speed,violation,microcontroller,sens

I. INTRODUCTION

A system designed to record and report on discrete activities within a process is called as Tracking System. In the same procedure we have developed a methodology of vehicle speed & direction system for robotics to control and achieve accurate direction speed for a class of non-linear systems in the presence of disturbances and parameter variations by using wireless communication technique. While driving on highways, motorists should not exceed the maximum speed limit permitted for their vehicle. However, accidents keep occurring due to speed violations since the drivers tend to ignore their speedometers. This speed checker will come handy for the highway traffic police as it will not only provide a digital display in accordance with a vehicle‟s speed but sound an alarm if the vehicle exceeds the permissible speed for the highway. The system basically comprises two IR LEDs' Transmitter & receiver sensor pairs, which are installed on the highway,with the transmitter and the receiver of each pair on the opposite sides of the road. The distance between the IR sensors is fixed. The system displays the time taken by the vehicle in crossing the fixed distance from one pair to the other.Subsequently the speed of set of vehicles is considered and the Average can be estimated. The main theme of our system is the Average calculation of the traffic. This will be set as reference value or threshold value for further vehicles to detect rash driving. Microcontroller 8051 is the heart of the system, which controls all the functions of the circuit. It measures the speed and controls the circuit through a programming flashed inside 8051. IR sensors are used as a pair of eye that keep watching the speed of each vehicle crossing the sensors. A seven segment display is used to display the total speed of the vehicle.

II. WORKING PRINCIPLE

A.The Operating Cycle

In this project we use IR sensors to detect the presence of a vehicle. According to this project, 2 IR sensors are placed apart with a fixed known distance. Whenever IR rays are interrupted by a vehicle during first sensor the count up timer is started. When the other IR sensor senses the presence of vehicle, the count up timer is stopped. As the distance and time the IR receiver receives the IR signals is noted by microcontroller and from that we need to calculate speed. Here speed is calculated from the well-known formula of speed which is distance/time. The LCD display is used to display the speed of the vehicle. The microcontroller is used to monitor the all control operations needed for the project.

B.Power System Employed for the Circuit

The 8051 microcontroller works on +5V DC. Now here we have 220V AC as the input. So first of all, we need to step down the voltage using transformer. Here the transformer will step down the 220V AC to 9V AC at 50Hz. To convert AC to DC, a bridge rectifier is placed using 1N4007, a p-n diode. Two capacitor of 470µF & .01µF is used as a filter. Now, this DC output is fed to a 7805 voltage regulator which will convert the DC input into +5V DC. Maintaining the Integrity of the Specifications.

C.Working IC configuration

8051 block consist of the P89V51RD2 microcontroller. It will run on the frequency of about 11.0592 MHz. 8051 is the brain of the system. All the components will drive by the instructions provided by the microcontroller through a programming code burn inside the 8051

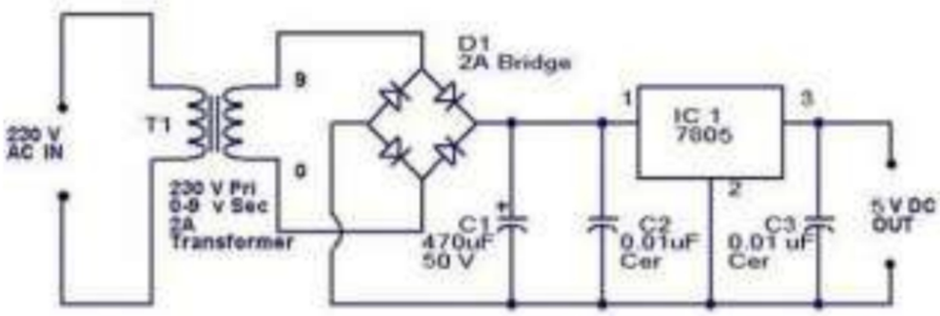

Fig.1:Power System Circuit

III. DESIGN AND DEVELOPMENT

A.Module Designed

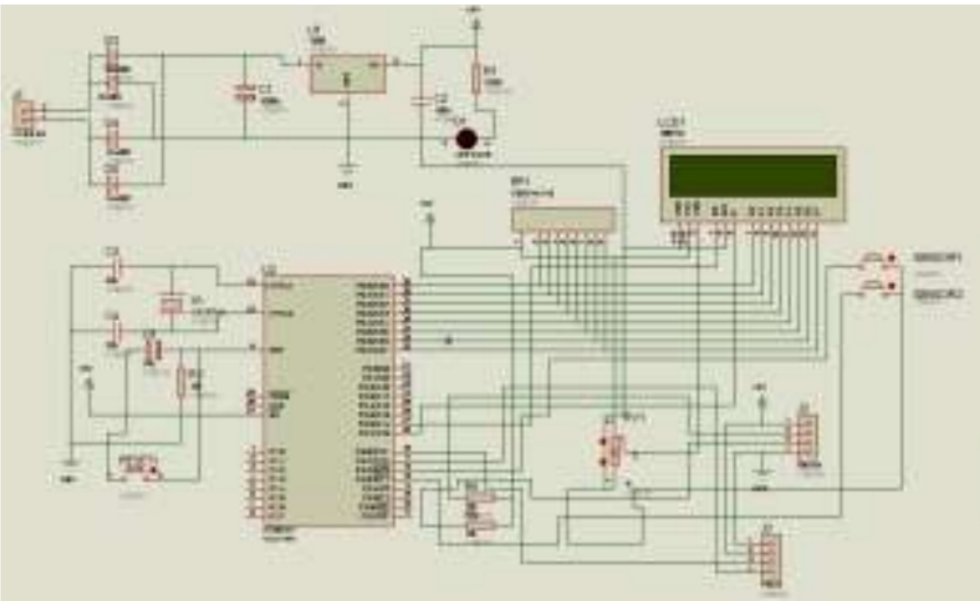

Fig 2.Circuit Configuration for the proposed model

The Integrated circuit model has individual pin configuration works and has a employed module of working The P89V51RD2 is an 8051 microcontroller with 64 kB Flash and 1024 bytes of data RAM.P0.0 to P0.7 - Port 0 is an 8-bit open drain bidirectional I/O port. Port 0 pins that have „1‟s written to them float, and in this state can be used as high-impedance inputs. Port 0 is also the multiplexed low-order address and data bus during accesses to external code and data memory. In this application, it uses strong internal pull-ups when transitioning to „1‟s. Port 0 also receives the code bytes during the external host mode programming, and outputs the code bytes during the external host mode verification. External pull-ups are required during program verification or as a general purpose I/O port.P1.0 to P1.7 - Port 1 is an 8-bit bidirectional I/O port with internal pull-ups. The Port 1 pins are pulled high by the internal pull-ups when „1‟s are written to them and can be used as inputs in this state. As inputs, Port 1 pins that are externally pulled LOW will source current (IIL) because of the internal pull-ups. P1.5, P1.6, P1.7 have high current drive of 16 mA. Port 1 also receives the low-order address bytes during the external host mode programming and verification. P2.0 to P2.7 -Port 2: Port 2 is an 8-bit bidirectional I/O port with internal pull-ups. Port 2 pins are pulled HIGH by the internal pull-ups when „1‟s are written to them and can be used as inputs in this state. As inputs, Port 2 pins that are externally pulled LOW will source current (IIL) because of the internal pull-ups. Port 2 sends the high-order address byte during fetches from external program memory and during accesses to external Data Memory that use 16-bitaddress (MOVX@DPTR). In this application, it uses strong internal pull-ups when transitioning to „1‟s. Port 2 also receives some control signals and a partial of high-order address bits during the external host mode programming and verification.P3.0 to P3.7 -Port 3: Port 3 is an 8-bit bidirectional I/O port with internal pull-ups. Port 3 pins are pulled HIGH by the internal pull-ups when „1‟s are written to them and can be used as inputs in this state. As inputs, Port 3 pins that are externally pulled LOW will source current (IIL) because of the internal pull-ups. Port 3 also receives some control signals and a partial of high-order address bits during the external host mode programming and verification. PSEN -Program Store Enable (PSEN) is the read strobe for external program memory. When the device is executing from internal program memory, PSEN is inactive (HIGH).When the device is executing code from external program memory, PSEN is activated twice each machine cycle, except that two PSEN activations are skipped during each access to external data memory. A forced HIGH-to-LOW input transition on the PSEN pin while the RST input is continually held HIGH for more than 10 machine cycles will cause the device to enter external host mode programming. While the oscillator is running, a HIGH logic state on this pin for two machine cycles will reset the device. If the PSEN pin is driven by a HIGH-to-LOW input transition while the RST input pin is held HIGH, the device will enter the external host mode; otherwise the device will enter the normal operation mode. External Access Enable: EA must be connected to VSS in order to enable the device to fetch code from the external program memory. EA must be strapped to VDD for internal program execution. The EA pin can tolerate a high voltage of 12 V.Address Latch Enable(ALE) is the output signal for latching the low byte of the address during an access to external memory.

B.Components Employed

LCD-Liquid Crystal Display screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD. Click to learn more about internal structure of a LCD.

IR LED-Here the IR transmitter is nothing but the IR LED. It just looks like a normal LED but transmits the IR signals. Since the IR rays are out of the visible range we cannot observe the rays from the transmitter. These are infrared LEDs; the light output is not visible by our eyes. They can be used as replacement LEDs for remote controls, night vision for camcorders, invisible beam sensors, etc.

LED -A light-emitting diode (LED) is a semiconductor light source. LEDs are used as indicator lamps in many devices and are increasingly used for other lighting. Appearing as practical electronic components in 1962, early LEDs emitted low-intensity red light, but modern versions are available across the visible, ultraviolet, and infrared wavelengths, with very high brightness. When a light-emitting diode is forward-biased (switched on), electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence and the color of the lightis determined by the energy gap of the semiconductor.

PRESET-A preset is a three legged electronic component which can be made to offer varying resistance in a circuit. The resistance is varied by adjusting the rotary control over it. The adjustment can be done by using a small screw driver or a similar tool. The resistance does not vary linearly but rather varies in exponential or logarithmic manner. Such variable resistors are commonly used for adjusting sensitivity along with a sensor. The variable resistance is obtained across the single terminal at front and one of the two other terminals. The two legs at back offer fixed resistance which is divided by the front leg. So whenever only the back terminals are used, a preset acts as a fixed resistor. Presets are specified by their fixed value resistance.

C.Software Organization

This section presents the overall software structure, the variables and the Interrupt SubRoutine flowcharts. This software is based on two modules: the initialization and the runmodule. The first one is performed only once at the beginning. The second module is theBLDC control dedicated software. It is based on a waiting loop interrupted by both the PWM Unit and the ADC Unit. The waiting loop can easily be replaced by a user‟sinterface (to get the reference speed and/or to monitor the control variables). Theoverview of this software is given in the flow chart below in fig 3.This gives a complete overview of what actually are the various software links employed in reality. The flow will also depict the workingness of the system as an perspective of its countable loops in the process of detection of vehicles in the case of high speed ways.

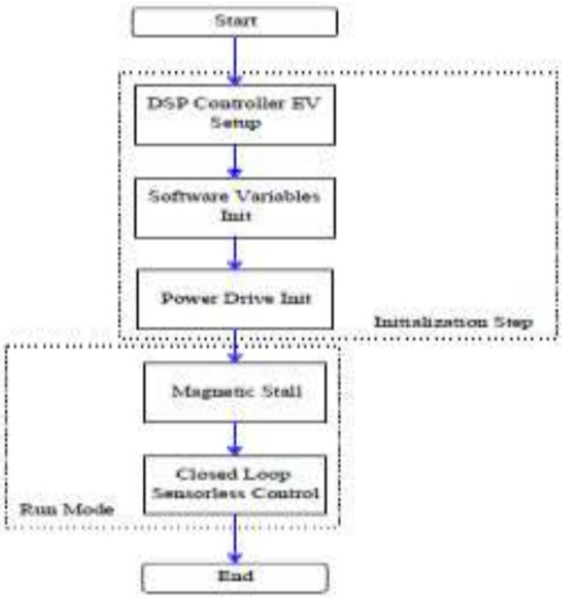

Fig.3: Software loop employed for design.

IV. TESTING AND ISSUES

A. Testing Procedure

First of all we do the continuity test to check whether there is any short circuit or not in our PCB. We don"t apply the power supply to our circuit before testing, without power supply testing is called COLD Testing. We test all the components used in our project. A brief description is given below about testing procedure. In electronics, a continuity test is the checking of an electric circuit to see if current flows (that it is in fact a complete circuit). A continuity test is performed by placing a small voltage (wired in series with an LED or noise-producing component such as a piezoelectric speaker) across the chosen path. If electron flow is inhibited by broken conductors, damaged components, or excessive resistance, the circuit is "open". Devices that can be used to perform continuity tests include multi meters which measure current and specialized continuity testers which are cheaper, more basic devices, generally with a simple light bulb that lights up when current flows. Making sure something is not connected. Sometimes a solder joint will short two connections. Or maybe your PCB has mistaken on it and some traces were shorted by accident.

This meter is very simple. When the probes are not touching, the display shows "1". When you touch the tips together, the display changes to a three digit mode (it's displaying resistance, which we will cover later) It also emits a beep. Set your meter to the continuity/diode "bleep" test. Connect the red meter lead to the base of the transistor. Connect the black meter lead to the emitter. A good NPN transistor will read a junction drop voltage of between 0.45v and 0.9v. A good PNP transistor will read "OL". Leave the red meter lead on the base and move the black lead to the collector. The reading should be the same as the previous test. Reverse the meter leads in your hands and repeat the test. Now connect the black meter lead to the base of the transistor. Connect the red meter lead to the emitter. A good PNP transistor will read a junction drop voltage of between 0.45v and 0.9v. A good NPN transistor will read "OL". Leave the black meter lead on the base and move the red lead to the collector. The reading should be the same as the previous test. Finally place one meter lead on the collector, the other on the emitter. The meter should read "OL". Reverse your meter leads. The meter should read "OL". This is the same for both NPN and PNP transistors. With the transistors on a PCB in circuit, you may not get an accurate reading, as other things in the circuit may affect it, so if you think a transistor is suspect from the readings you have got, remove it from the PCB and test it out of circuit, repeating the above procedure.

B. Issues

Testing of electronic components or circuit is a very interesting work. In our project we have not faced any serious problem. By testing we got a shorted path in our circuit on PCB and there are 3-4 tracks which were broken during the etching process. We joined these tracks by tuning. The initial problem was soldering, it was not easy to solder the components on the PCB.

V. RESULTS & CONCLUSION

The model of "Relative wireless rash driving detection system" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit at the minimum time loss. Secondly, using highly advanced IC"s and with the help of growing technology the project has been successfully implemented. Finally we conclude that "Relative wireless rash driving detection system" is an emerging field and there is a huge scope for research and development. It can be further advanced by using a CCTV camera in the circuit. Whenever any vehicle crosses speed limit, camera captures the image of number plate and through transport database finds the address of the owner and is fined.

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