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SOLAR BASEDWHEEL CHAIR WITH ADVANCE FUNCTION

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Abstract - *A brief survey of research in the development of autonomy in wheelchairs is presented and AAI's R&D to build a series of intelligent autonomous wheelchairs is discussed. A standardized autonomy management system that can be installed on readily available power chairs which have been well-engineered over the years has been developed and tested. A behavior-based approach was used to establish sufficient on-board autonomy at minimal cost and material usage, while achieving high efficiency, sufficient safety, transparency in appearance, and extendability. So far, the add-on system has been installed and tried on two common power wheelchair models. Initial results are highly encouraging. This project is on automatic wheelchair for physically disabled people. A dependent user rf in this wheelchair. In this way we have obtained a automatic wheelchair which can be driven using dpdt and with the possibility of avoiding obstacles by using infrared sensors and down stairs or hole detection by using ir sensors. The wheelchair has also been developed to work on movement of switch which will help for the person whose limbs are not working. Switch can be attached to any part of body of physically disabled person which he can easily move like head , hand etc. It has also provision of joystick for disabled person who can easily move his/her hand. Electronic system configuration, a sensor system, a mechanical model, rf technologies switch control and joystick control are considered. Index Terms.*

1.INTRODUCTION

Though the recent developments of science and technology has drastically changed the way a normal person lives his life , there are certain groups of people who have not been able to be benefit from this development. On particular handicapped people with have limited mobility are still living a miserable life. A smart wheel chair aims to provide aid to those handicapped and physically challenged persons by providing them with some sort of mobility which would greatly help them. Smart wheel chair consists of a major controller unit which allows the user to provide the input in the form of joystick or accelerometer or a voice command. The controller unit then synthesizes the command and takes required action as to move the wheelchair to the particular position.

1.1.1 Input Sensing

The input sensor for the smart wheel chair is an Accelerometer, Joystick, Ultrasonic Sensor, speech synthesizer and gyroscope.

1.1.1 Accelerometer

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full scale range of ±3 g. It can measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion, shock, or vibration. The user selects the bandwidth of the accelerometer using the CX, CY, and CZ capacitors at the XOUT, YOUT, and ZOUT pins. Bandwidths can be selected to suit the application, with a range of 0.5 Hz to 1600 Hz for the X and Y axes, and a range of 0.5 Hz to 550 Hz for the Z axis.

1.1.2 Speech Synthesizer

Speech Synthesizer module EasyVR is the second-generation version of the successful VRbot Module. It is a multi-purpose speech recognition module designed to easily add versatile, robust and cost-effective speech recognition capabilities to virtually any application. The EasyVR module can be used with any host with an UART interface powered at 3.3V – 5V, such as PIC and Arduino boards.

1.1.3 EasyVR features

Supports up to 32 user-defined Speaker Dependent (SD) triggers or commands as well as Voice Passwords. SD custom commands can be spoken in ANY language. Easy-to-use and simple Graphical User Interface to program Voice Commands and audio. Module can be used with any host with an UART interface (powered at 3.3V - 5V) 3 GPIO lines (IO1, IO2, IO3) that can be controlled by new protocol commands' audio output that supports 8-ohm speakers. Sound playback feature.

1.1.4 Working principle of EasyVr

The voice command of user is sent to sample and hold circuit and it is sampled by obeying Nyquist criterion. After that it is

send to ADC which convert the value in digital form. The voice command which we give through module is saved to internal flash memory and we program it through host microcontroller and it compares pre stored command and real time command and perform the specified task.

1.1.5 Actuating

After taking input and processing the input at the speed of 12 MIPS (Million Instructions per Second) process selects the corresponding motor driver and sends the signal which then drives the required part. There are two wipers motors for the movement of the smart wheel chair. The output of the motor driver is fed to the relay switch, the output of relay switches are connected to motors.

Problem Statement:

To design a wheelchair which is controlled with the help of biological waves, in our case we chose the cornea-retinal potential as an input signal. Our aim is to build a smart wheelchair controlled by eye wink of the driver To drive the wheelchair, particular pattern for the winking is as below: Left + Left Left turn Right + Right Right turn Right + Left Backward Left + Right Forward Both eyes closed forcedly Stop

Brief Working

we get a brief idea of the working of the system. Step 1- Acquire the EEG signal of the subject with the help of necessary hardware. Step 2- Continuous real time analysis of the system by the controller for any particular erroneous changes in the signal. Step 3- If something in particular is detected; a decision is made by the controller. Step 4- This decision is then transferred as an input the the motor driving the wheelchair. Step 5- Thus the required output is obtained.

2.1 Working

In the wheel chair project for enegy generation we used a . panel for energy generating we start a wheel chair then the wheel chair operate through the dpdt switch. There is an ir sensor which is used to detect obstacle ,when ir sensor is active then wheel chair stop. In this project we use extra intelligent funtion for handicap help...which work through the rf communication. For RF Tag transmission we have used HT12E Decoder IC. The 212 encoders are a series of CMOS LSIs for remote control system applications. They are capable of encoding information which consists of N address bits and 12_N data bits. Each address/ data input can be set to one of the two logic states. The programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger on the HT12E or a DATA trigger on the HT12A further enhances the application flexibility of the 212 series of encoders. The HT12A additionally provides a 38kHz carrier for infrared systems. For the proper working of this local control section a permanent 5V back up needed continuously. This is achieved by using a 230V to 12V transformer, Bridge rectifier, capacitor filter and 5V regulated power supply from a voltage regulated IC 7805. This 5V source is connected to all ICs and relays.

For receiving RF data we have used HT12D. The date encoded by HT12E is received by 433MHz RF receiver and decoded by HT12D. The 212 decoders are a series of CMOS LSIs for remote control system applications. They are paired with Holtek_s 2^12 series of encoders. For proper operation, a pair of encoder/decoder with the same number of addresses and data format should be chosen.

The decoders receive serial addresses and data from a programmed 2^12 series of encoders that are transmitted by a carrier using an RF or an IR transmission medium. They compare the serial input data three times continuously with their local addresses. If no error or unmatched codes are found, the input data codes are decoded and then transferred to the output pins. The VT pin also goes high to indicate a valid transmission. The 212 series of decoders are capable of decoding information's that consist of N bits of address and 12_N bits of data. Of this series, the HT12D is arranged to provide 8 address bits and 4 data bits, and HT12F is used to decode 12 bits of address information.

Microcontroller manufacturers have been competing for a long time for attracting choosy customers and every couple of days a new chip with a higher operating frequency, more memory and upgraded A/D converters appeared on the market.

However, most of them had the same or at least very similar architecture known in the world of microcontrollers as "8051 compatible". What is all this about?

The whole story has its beginnings in the far 80s when Intel launched the first series of microcontrollers called the MCS 051. Even though these microcontrollers had quite modest features in comparison to the new ones, they conquered the world very soon and became a standard for what nowadays is called the microcontroller.

The main reason for their great success and popularity is a skillfully chosen configuration which satisfies different needs of a large number of users allowing at the same time constant expansions (refers to the new types of microcontrollers). Besides, the software has been developed in great extend in the meantime, and it simply was not profitable to change anything in the microcontroller's basic core. This is the reason for having a great number of various microcontrollers which basically are solely upgraded versions of the 8051 family. What makes this microcontroller so special and universal so that almost all manufacturers all over the world manufacture it today under different name.

As seen in figure above, the 8051 microcontroller has nothing impressive in appearance:

4 Kb of ROM is not much at all.

128b of RAM (including SFRs) satisfies the user's basic needs.

4 ports having in total of 32 input/output lines are in most

cases sufficient to make all necessary connections to peripheral environment.

The whole configuration is obviously thought of as to satisfy the needs of most programmers working on development of automation devices. One of its advantages is that nothing is missing and nothing is too much. In other words, it is created exactly in accordance to the average user's taste and needs. Another advantages are RAM organization, the operation of Central Processor Unit (CPU) and ports which completely use all recourses and enable further upgrade.

High Endurance Non-volatile Memory segments

32Kbytes of In-System Self-programmable Flash program memory

1024Bytes EEPROM

2Kbytes Internal SRAM

Write/Erase Cycles: 10,000 Flash/100,000 EEPROM

Data retention: 20 years at 85°C/100 years at 25°C

Special Microcontroller Features

Power-on Reset and Programmable Brown-out Detection

Internal Calibrated RC Oscillator

External and Internal Interrupt Sources

Six Sleep Modes: Idle, ADC Noise Reduction, Power-save, Power-down, Standby and Extended Standby

Operating Voltages

2.7V - 5.5V for ATmega32L

4.5V - 5.5V for ATmega32

Power Consumption at 1MHz, 3V, 25°C

Active: 1.1mA

Idle Mode: 0.35mA

Power-down Mode: < 1μA

2.2 Software Description

The software controls the operation of the system and hence it is imperative that the software is developed in a flawless manner so as to attain the desired result. In our project, all but one desired coding is stored in the microcontroller. It is the software that controls the overall functioning of the system. The stored program in a microcontroller controls all the basic functionalities of the function and the operation of the devices used in the system. The inputs are taken from sensors and output of the program decides action to be taken by the system. Software, being a crucial part of our project, is going to be discussed in detail in this section.

2.2.1 Software Development Process

It is important to go through a series of predictable steps to build a product or a system. Software process helps to get a series of steps. Software process is automated process that simplifies project management and, what is most important, enhances visibility of the project. It provides stability, control of the project. Software process requires a systematic and consistent approach to the project.

Software engineer or a team of engineers must incorporate a development strategy that encompasses the process for solving the problem. This strategy is often referred to a process model. The development of robotic application systems is usually realized on the basic of iterative process models of which there are many different variants. The selection of an appropriate process is a crucial issue for the success of every system development project, particularly for systems in a highly volatile environment such as mobile application systems. There are different types of process models in the software engineering. These are: - Linear sequential model, prototyping model, Evolutionary process model, incremental models, Spiral model. In our project we have followed these steps , i.e. project identification and selection, project initiation and planning ,analysis, design, Implementation, maintenance on the basics of these models.

2.2.2 Software language

The software or any program used for the operation of any system can be written in any language considering various factors. The choice is made on the basis of following decisive factors.

Memory available

Required execution speed

Accurate control of peripheral devices

Time available

Programming experience of team members

Assembly language is considered to be the best for projects that need minimum memory, the highest execution speed, and precise control of peripheral devices but since writing in this language is a tedious task with more knowledge in C programming, we choose to write our source code in the C language. Not only that C programming is used knowing us the more about it but it has also several advantages over assembly language.

2.2.3 Choosing C++ language

C++ is a powerful, flexible language that provides fast program execution and imposes few constraints on the programmer. It allows low level access to information and commands while still retaining the portability and syntax of a high level language. These qualities make it a useful language for both system programming and general purpose programs. Its flexibility comes from the many ways the programmer has to accomplish the same tasks. C++ includes bitwise operators along with powerful pointer manipulation capabilities. C++ imposes few constraints on the programmer. The main area this shows up is in C's lack of type checking. This can be a powerful advantage to an experienced programmer but a dangerous disadvantage to a novice.

Another strong point of C++ is its use of modularity. Section of code can be stored in libraries for re-use in future programs. This concept of modularity also helps with 'c++' portability and execution speed. The core C++ language leaves out many features included in the core of other languages. These

functions are instead stored in the C++ standard Library where they can be called on when needed. An example of this concept would be C's lack of built in I/O capabilities. I/O functions tend to slow down program execution and also be machine independent when running optimally. For these reasons, they are stored in a library separately from the C language and only 222qincluded when necessary.

3.1 ELEMENTS OF INFRARED DETECTION SYSTEM

1.Infrared Source

All objects above 0 K radiate infrared energy and hence are infrared sources. Infrared sources also include blackbody radiators, tungsten lamps, silicon carbide, and various others. For active IR sensors, infrared Lasers and LEDs of specific IR wavelengths are used as IR sources.

2. Transmission Medium

Three main types of transmission medium used for Infrared transmission are vacuum, the atmosphere, and optical fibers. The transmission of IR – radiation is affected by presence of CO2, water vapour and other elements in the atmosphere. Due to absorption by molecules of water carbon dioxide, ozone, etc. the atmosphere highly attenuates most IR wavelengths leaving some important IR windows in the electromagnetic spectrum; these are primarily utilized by thermal imaging/ remote sensing applications.

- *Medium wave IR (MWIR:3-5 μm)*
- *Long wave IR (LWIR:8-14 μm)*

3. Optical Components.

Often optical components are required to converge or focus infrared radiations, to limit spectral response, etc. To converge/focus radiations, optical lenses made of quartz, CaF2, Ge and Si, polyethylene Fresnel lenses, and mirrors made of Al, Au or a similar material are used. For limiting spectral responses, bandpass filters are used. Choppers are used to pass/ interrupt the IR beams.

4. Infrared detectors.

Various types of detectors are used in IR sensors. Important specifications of detectors are

- *Photosensitivity or Responsivity*

Responsivity is the Output Voltage/Current per watt of incident energy. Higher the better.

- *Noise Equivalent Power (NEP)*

NEP represents detection ability of a detector and is the amount of incident light equal to intrinsic noise level of a detector.

- *Detectivity(D*: D-star)*

D is the photosensitivity per unit area of a detector. It is a measure of S/N ratio of a detector.*

D is inversely proportional to NEP. Larger D* indicates better sensing element.*

In addition, wavelength region or temperature to be measured, response time, cooling mechanism, active area, no of elements, package, linearity, stability, temperature characteristics, etc. are important parameters which need attention while selecting IR detectors.

5. Signal Processing

Since detector outputs are typically very small, preamplifiers with associated circuitry are used to further process the received signals.

An automotive battery is a type of rechargeable battery that supplies electric energy to an automobile. Usually this refers to an SLI battery(starting, lighting, ignition) to power the starter motor, the lights, and the ignition system of a vehicle's engine.

Automotive SLI batteries are usually lead-acid type, and are made of six galvanic cells in series to provide a 12-volt system. Each cell provides 2.1 volts for a total of 12.6 volt at full charge. Heavy vehicles such as highway trucks or tractors, often equipped with diesel engines, may have two batteries in series for a 24-volt system, or may have parallel strings of batteries.

Lead-acid batteries are made up of plates of lead and separate plates of lead dioxide, which are submerged into an electrolyte solution of about 38% sulfuric acid and 62% water. This causes a chemical reaction that releases electrons, allowing them to flow through conductors to produce electricity. As the battery discharges, the acid of the electrolyte reacts with the materials of the plates, changing their surface to lead sulfate. When the battery is recharged, the chemical reaction is reversed: the lead sulfate reforms into lead dioxide and lead. With the plates restored to their original condition, the process may now be repeated.

Battery recycling of automotive batteries reduces the need for resources required for manufacture of new batteries, diverts toxic lead from landfills, and prevents risk of improper disposal.

3.2 Types

Lead-acid batteries for automotive use are made with slightly different construction techniques, depending on the application of the battery. The "flooded cell" type, indicating liquid electrolyte, is typically inexpensive and long-lasting, but requires more maintenance and can spill or leak. Some flooded batteries have removable caps that allow for the electrolyte to be tested and maintained.

More costly alternatives to flooded batteries are "valve regulated lead acid" (VRLA) batteries, also called "sealed" batteries. The absorbed glass mat (AGM) type uses a glass mat separator, and a "gel cell" uses fine powder to absorb and

immobilize the sulfuric acid electrolyte. These batteries are not serviceable: the cells are sealed so the degree of charge cannot be measured by hydrometer and the electrolyte cannot be replenished. They are typically termed "maintenance-free" by proponents, or "unable to be maintained" by skeptics. Both types of sealed batteries may be used in vehicular applications where leakage or ventilation for vented gasses is a concern. However, this article deals with the classic, flooded-type of car battery.

The starting (cranking) or shallow cycle type is designed to deliver large bursts of power for a short time, as is needed to start an engine. Once the engine is started, the battery is recharged by the engine-driven charging system. Starting batteries are intended to have a low depth of discharge on each use. They are constructed of many thin plates with thin separators between the plates, and may have a higher specific gravity electrolyte to reduce internal resistance.

The deep cycle (or motive) type is designed to continuously provide power for long periods of time (for example in a trolling motor for a small boat, auxiliary power for a recreational vehicle, or traction power for a golf cart or other battery electric vehicle). They can also be used to store energy from a photovoltaic array or a small wind turbine. Deep-cycle batteries have fewer, thicker plates and are intended to have a greater depth of discharge on each cycle, but will not provide as high a current on heavy loads. The thicker plates survive a higher number of charge/discharge cycles. The specific energy is in the range of 30-40 watthours per kilogram.

Some cars use more exotic starter batteries–the 2010 Porsche 911 GT3 RS offers a lithiumion battery as an option to save weight over a conventional lead-acid battery

3. CONCLUSIONS

This project work was carried on to fulfill the requirement of minor project of Bachelor in Electronics and Communication Engineering. Smart Wheel Chair was chosen to be done as it incorporated designing an embedded system that was real time and also due to the sensor that was to be used in it. Most modern day technologies use sensors such as accelerometer, gyroscope, to take interactive input and in this project we also have tried to make the robot interactive and close to human. Also we wanted to know about the accelerometer, Gyroscope, Joystick, Ultrasonic Sensor and its working in detail and also wanted to develop a fast and real time project that can help others people. These conditions made Smart Wheel Chair a suitable project for us. Completion of this project needed sheer determination as there were many things that could go wrong. As the mechanical design meant a lot in this project, creating a mechanical structure proved to be a difficult task being electronics student. Though some difficulties aroused and many remodeling was needed and the chair had some limitations which we learned while building it, at last the Smart Wheel Chair created very close to the adapted design philosophy.

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