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Article *in* International Journal of Pure and Applied Mathematics · May 2018

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International Journal of Pure and Applied Mathematics
Volume 118 No. 24 2018
ISSN: 1314-3395 (on-line version)
url: http://www.acadpubl.eu/hub/
Special Issue

http://www.acadpubl.eu/hub/

A Novel Approach for Communication among Blind, Deaf and Dumb People

Sharad Agarwal, Falgun Patel,
Prakhar Chaturvedi, Dr. Asha S
School of Computing Science and Engineering
VIT, Chennai
Tamil Nadu, India
Emails: asha.s@vit.ac.in

May 22, 2018

Abstract

Science and Technology have made Human life addictive to comfort but still there exists an underprivileged group of people who are fighting for finding an innovative way that can make the process of communication easier for them. According to the World Health Organization, about 285 million people in the world are blind, 300 million are deaf and 1 million are dumb. In this project, we are going to propose a new system-prototype called the SHARO] AN BRIDGE in an effort to bridge the gap in the process of communication between the Blind, Deaf and Dumb people. The SHARO]AN BRIDGE will make use of the Wearable Technology, Texas Instrumentation Circuitry and Arduino Circuit Boards to provide a means of communication to differently-abled people having one or all of the above mention disabilities. It is assumed that a person who is deaf is also dumb but vice versa is not true.

***Index terms*:**Accelerometer, Arduino Circuit Boards, Blind, Deaf, Dumb, Flex Sensors, Gesture, Microcontroller, Tactile Sensors, Wearable Technology.

1 Introduction

Science and Technology have made Human life addictive to comfort but still there exists an underprivileged group of people who are fighting for finding an innovative way that can make the process of communication easier for them. According to the World Health Organization, about 285 million people in the world are blind, 300 million are deaf and 1 million are dumb. In this project, we are going to propose a new system-prototype called the SHARO] AN BRIDGE in an effort to bridge the gap in the process of communication between the Blind, Deaf and Dumb people. The SHARO]AN BRIDGE will make use of the Wearable Technology, Texas Instrumentation Circuitry and Arduino Circuit Boards to provide a means of communication to differently-abled people having one or all of the above mention disabilities. It is assumed that a person who is deaf is also dumb but vice versa is not true.

2 REQUIREMENT OF A NEW DEVICE

This research investigates a new way that can be productize so that a new gadget can be developed that can bridge the gap in communication among differently abled people who suffer from any of the possible combinations of the disability of Blindness, Deafness and Dumbness. For this we are looking for some sort of wearable technology that can satisfy our purpose.

3 TRADITIONAL SYSTEM

This project was proposed in order to achieve the need to convert different modalities into common medium shared and understandable by deaf and blind individuals, for instance, converting images into Natural Language (NL) text. [5]. This project gave a prototype that consisted of cameras attached to dark glasses along with speaker and microphone and a portable Pc. Motivation: We came across various technologies that can help differently abled people to communicate among themselves and with the normal world easily

but all of the technologies studied so far were focusing only a certain parameter or extent of disability among the three of Blindness, Deafness and Dumbness. None of the technology was so developed that it can be used as a general approach that can tackle any combination of these three disabilities. So to solve this purpose, we proposed an approach that can be used as a general way in which people suffering from any type of combination of these three disabilities can think themselves as a part of this beautiful world.

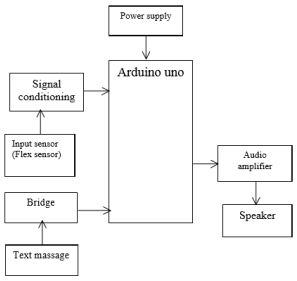

Fig 1.1 Block diagram

Table .1 COMPARISON OF EXISTING AND PROPOSED SYSTEM

Existing system	Proposed system
Ø In existing system Sign Language is the only way of communication for speech impaired people Ø But general people can't understand the sign language so it becomes difficult for a speech-impaired person to communicate with them. Drawbacks Ø There is no system to communicate speech impaired people	Ø The main motive of our paper is to introduce an idea that can help to ease the way the disabled people use to communicate with each other or with the world Ø In this project an electronic speaking system was developed to ease the communication process of speech impaired people. Ø A glove was developed which consists of five flex sensors.

Advantages

- The communication between a normal person and a speech impaired person become easier.
- As here LCD is used to show the user command so one speech impaired person can also communicate with a deaf person.

- There is an option for user input. This device is portable. So user can bring it anywhere he/she wants.
- It is cost effective. So everyone can afford it.

4 WORKING PRINCIPLE

We have taken into consideration that can arrive in case of the three types of disabilities and facilitate every disabled person and the normal person to communicate with the disabled ones. The person can communicate and transfer the message as per his ability and desire. The dumb can use their Sign language to transmit the message while those who are unable to understand the Sign Language can make use of the device to get the output in the audio form for normal or blind people and in the form of Braille Language for Blind and Deaf person. Moreover the message can also be displayed in the form of text on the LCD screen for Deaf people and even the transmission of the message can be made over large distances by the use GSM Wireless Networks. Thus this approach can tackle to any type of difficulty that can come across the process of communication among differently abled people and the normal world.

5 MODULE EXPLANATION AND DIAGRAM:

FLEX SENSOR MODULE

1. Arduino Microcontroller with Power Supply

Overview

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.. You can tinker with your UNO without worring too much about

doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

Power

The Arduino/Genuino Uno board can be powered via the USB connection or with an external power supply. The power source is selected automatically.

External (non-USB) power can come either from an AC-to-DC adapter (wall-wart) or battery. The adapter can be connected by plugging a 2.1mm center-positive plug into the board's power jack. Leads from a battery can be inserted in the GND and Vin pin headers of the POWER connector.

The board can operate on an external supply from 6 to 20 volts. If supplied with less than 7V, however, the 5V pin may supply less than five volts and the board may become unstable. If using more than 12V, the voltage regulator may overheat and damage the board. The recommended range is 7 to 12 volts.

The power pins are as follows:

ϕ Vin. The input voltage to the Arduino/Genuino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source).

You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin.

ϕ 5V.This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack (7 - 12V), the USB connector (5V), or the VIN pin of the board (7-12V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage your board. We don't advise it.

ϕ 3V3. A 3.3 volt supply generated by the on-board regulator. Maximum current draw is 50 mA.

ϕ GND. Ground pins.

ϕ IOREF. This pin on the Arduino/Genuino board provides the voltage reference with which the microcontroller operates. A

properly configured shield can read the IOREF pin voltage and select the appropriate power source or enable voltage translators on the outputs to work with the 5V or 3.3V.

Memory

The ATmega328 has 32 KB (with 0.5 KB occupied by the bootloader). It also has 2 KB of SRAM and 1 KB of EEPROM (which can be read and written with the EEPROM library). Input and Output

See the mapping between Arduino pins and ATmega328P ports. The mapping for the Atmega8, 168, and 328 is identical.

Each of the 14 digital pins on the Uno can be used as an input or output, using pinMode(),digitalWrite(), and digitalRead() functions. They operate at 5 volts. Each pin can provide or receive 20 mA as recommended operating condition and has an internal pull-up resistor (disconnected by default) of 20-50k ohm. A maximum of 40mA is the value that must not be exceeded on any I/O pin to avoid permanent damage to the microcontroller. In addition, some pins have specialized functions:

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. These pins are connected to the corresponding pins of the ATmega8U2 USB-to-TTL Serial chip.
- External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attachInterrupt() function for details.
- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analogWrite() function.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication using the SPI library.
- LED: 13. There is a built-in LED driven by digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.
- TWI: A4 or SDA pin and A5 or SCL pin. Support TWI communication using the Wire library.

The Uno has 6 analog inputs, labeled A0 through A5, each of which provide 10 bits of resolution (i.e. 1024 different values). By default they measure from ground to 5 volts, though is it possible to change the upper end of their range using the AREF pin and the analogReference() function.

There are a couple of other pins on the board:

- AREF. Reference voltage for the analog inputs. Used with analogReference().
- Reset. Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

Communication

Arduino/Genuino Uno has a number of facilities for communicating with a computer, another Arduino/Genuino board, or other microcontrollers. The ATmega328 provides UART TTL (5V) serial communication, which is available on digital pins 0 (RX) and 1 (TX). An ATmega16U2 on the board channels this serial communication over USB and appears as a virtual com port to software on the computer. The 16U2 firmware uses the standard USB COM drivers, and no external driver is needed. However, on Windows, a .inf file is required. The Arduino Software (IDE) includes a serial monitor which allows simple textual data to be sent to and from the board. The RX and TX LEDs on the board will flash when data is being transmitted via the USB-to-serial chip and USB connection to the computer (but not for serial communication on pins 0 and 1. A Software Serial library allows serial communication on any of the Uno's digital pins. The ATmega328 also supports I2C (TWI) and SPI communication. The Arduino Software (IDE) includes a Wire library to simplify use of the I2C bus; see the documentation for details. For SPI communication, use the SPI library. 2. Sensing A Bend With A Flex Sensor + Arduino: We spend so much time talking about sensing things less mechanical, that is easy to forget the accelerometer isnt the only part in town. The flex sensor is one of those parts often overlooked by the advanced user. But what if you need to check if something bent? Like a finger, or a doll arm. (A lot of toy prototypes seem to have this need). Anytime you need to detect a flex, or bend, a flex sensor is probably the part

for you. They come in a few different sizes (small, large). The flex sensor is basically a variable resistor that reacts to bends. Unbent it measures about 22KΩ, to 40KΩ when bend 180°. Note that the bend is only detected in one direction and the reading can be a bit shaky, so you will have best results detecting changes of at least 10°. Also, make sure you dont bend the sensor at the base as it wont register as a change, and could break the leads. I always tape some thick board to the base of it to make it wont bend there. Hooking it up, and why The flex sensor changes its resistance when flexed so we can measure that change using one of the Arduinos analog pins. But to do that we need a fixed resistor (not changing) that we can use for that comparison (We are using a 22K resistor). This is called a voltage divider and divides the 5v between the flex sensor and the resistor. The analog read on your arduino is basically a voltage meter. at 5V (its max) it would read 1023, and at 0v it read 0. So we can measure how much voltage is on the flex sensor using the analogRead and we have our reading. The amount of that 5V that each part gets is proportional to its resistance. So if the flex sensor and the resistor have the same resistance, the 5V is split evenly (2.5V) to each part. (analog reading of 512) Just pretend that the the sensor was reading only 1.1K of resistance, the 22K resistor is going to soak up 20 times as much of that 5V. So the flex sensor would only get .23V. (analog reading of 46) And if we roll the flex sensor around a tibe, the flex sensor may be 40K or resistance, so the flex sensor will soak up 1.8 times as much of that 5V as the 22K resistor. So the flex sensor would get 3V. (analog reading of 614)

AMPLIFIER MODULE

1.Audio Amplifier:

An audio amplifier is an electronic device that increases the strength (amplitude) of audio signals that pass through it. An audio amplifier amplifies low-power audio signals to a level which is suitable for driving loudspeakers. The input signal of an audio amplifier may only measure a few hundred microwatts, but its output may be tens or even thousands of watts. Design parameters for audio amplifiers include gain, frequency response, distortion and noise.

Types of Audio Amplifiers

There are many different kinds of audio amplifiers and at Future

Electronics we stock many of the most common types categorized by gain, nominal gain bandwidth, output power, maximum supply voltage, packaging type and number of channels. The parametric filters on our website can help refine your search results depending on the required specifications.

The most common sizes for gain are 20 dB, 26 dB, 30 dB, 36 dB and 48 dB. We also carry audio amplifiers with gain as high as 115 dB. The number of channels can be between 1 and 10, with the most common audio amplifier semiconductor chips having 1, 2 or 4 channels. Audio Amplifiers from Future Electronics Future Electronics has a full selection of programmable audio amplifier chips from several manufacturers that can be used to design a home audio amplifier, mini audio amplifier, audio amplifier IC (integrated circuit), car audio amplifier, digital audio amplifier, inline audio amplifier, low power audio amplifier, PC audio amplifier, TV audio amplifier or stereo audio amplifier. Simply choose from the audio amplifier technical attributes below and your search results will quickly be narrowed to match your specific audio amplifier application needs. If you have a preferred brand, we deal with several manufacturers such as New Japan Radio, NXP, ON Semiconductor, STMicroelectronics or Wolfson Microelectronics, among other manufacturers. You can easily refine your audio amplifier product search results by clicking your preferred audio amplifier brand below from our list of manufacturers.

Applications for Audio Amplifiers:

Applications for audio amplifiers include home audio systems, concert and theatrical sound reinforcement and public address systems. The sound card in a personal computer, every stereo system and every home theatre system contains one or several audio amplifiers. Other applications include instrument amplifiers such as guitar amplifiers, professional and amateur mobile radio and portable consumer products such as games and childrens toys.

APR VOICE

ϕ APR33a3 Voice play back provides high quality recording and playback with 11 minutes audio at 8 KHz sampling rate with 16 bit resolution. The aPR33A series C2.x is specially designed for simple key trigger, user can record and playback the message averagely for 1, 2, 4 or 8 voice message(s) by switch, it is suitable in simple interface or need to limit the length of single message.

ϕ The aPR33A series are powerful audio processor along with high performance audio analog-to-digital converters (ADCs) and digital-to-analog converters (DACs). The aPR33A series are a fully integrated solution offering high performance and unparalleled integration with analog input, digital processing and analog output functionality. The aPR33A series incorporates all the functionality required to perform demanding audio/voice applications. High quality audio/voice systems with lower bill-of-material costs can be implemented with the aPR33A series because of its integrated analog data converters and full suite of quality-enhancing features such as sample-rate convertor.

FEATURES

- Operating Voltage Range: 3V 6.5V
- Single Chip, High Quality Audio/Voice Recording & Playback Solution
- No External ICs Required
- Minimum External Components
- User Friendly, Easy to Use Operation
- Programming & Development Systems Not Required
- 680 sec.(11 Minutes) Voice Recording Length in APR33A3-C2
- Powerful 16-Bits Digital Audio Processor.
- Nonvolatile Flash Memory Technology
- No Battery Backup Required
- External Reset pin.
- High Quality Line Receiver
- High Quality Analog to Digital and PWM module
- Resolution up to 16-bits
- Simple And Direct User Interface

FLEX SENSOR

Spectra Symbol's flex sensor is a 4.5 bendable substrate that gives higher resistance readings as it flexes to a tighter radius. This 10 K sensor has low power requirements for its output feedback. The resistance can increase up to 5-times the base or flat state reading. Users can calculate the degree of flexure or the bend radius using resistance.

Common uses include measuring finger traction, robotics and gaming. The low profile of the flex sensor allows it to wrap around surfaces or to fit in tight spaces. With a life cycle of over 1 million flexes, its durability is suitable for many consumer applications.

Flex sensors are passive resistive devices that can be used to detect bending or flexing. It is a bi-directional flex sensor that decreases its resistance in proportion to the amount it is bent in either direction. The Flex Sensor achieves great form-factor on a thin flexible substrate.

When the substrate is bent, the sensor produces a resistance output correlated to the bend radius the smaller the radius, the higher the resistance value. It can be interfaced with the microcontroller unit. The output from the sensor is analog.

6 SOFTWARE REQUIREMENTS AND EXPLANATION

Arduino IDE

The Arduino/Genuino Uno can be programmed with the (Arduino Software (IDE)). Select "Arduino/Genuino Uno from the Tools ¿ Board menu (according to the microcontroller on your board). For details, see the reference and tutorials.

The ATmega328 on the Arduino/Genuino Uno comes preprogrammed with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files).

You can also bypass the boot loader and program the microcontroller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar; see these instructions for details.

The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware

source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU boot loader, which can be activated by:

- On Rev1 boards: connecting the solder jumper on the back of the board (near the map of Italy) and then rese ing the 8U2.
- On Rev2 or later boards: there is a resistor that pulling the 8U2/16U2 HWB line to ground, making it easier to put into DFU mode.

You can then use Atmel's FLIP software (Windows) or the DFU programmer (Mac OS X and Linux) to load a new firmware. Or you can use the ISP header with an external programmer (overwriting the DFU boot loader). See this user-contributed tutorial for more information. Warnings The Arduino/Genuino Uno has a resettable polyfuse that protects your computer's USB ports from shorts and overcurrent. Although most computers provide their own internal protection, the fuse provides an extra layer of protection. If more than 500 mA is applied to the USB port, the fuse will automatically break the connection until the short or overload is removed. Differences with other boards

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

7 CONCLUSIONS

In this paper we have proposed the basic approach of the system we named as SHAROJAN BRIDGE, which can be a useful tool in banishing the barrier of disabilities in communication of the people suffering from any of the possible combination of Blindness, Deafness and Dumbness among themselves as well as normal people. We have taken into consideration that can arrive in case of the three types of disabilities and facilitate every disabled person and the normal person to communicate with the disabled ones. The person can communicate and transfer the message as per his ability and desire. The dumb can use their Sign language to transmit the message while those who are unable to understand the Sign Language can make use of the device to get the output in the audio

form for normal or blind people and in the form of Braille Language [10] for Blind and Deaf person. Moreover the message can also be displayed in the form of text on the LCD screen for Deaf people and even the transmission of the message can be made over large distances by the use GSM Wireless Networks. Thus this approach can tackle to any type of difficulty that can come across the process of communication among differently abled people and the normal world

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