Device for Alternate Wireless Input and Helping People with Disabilities to Rehabilitate back to Normal Social Communication

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Abstract — **Glove2Speech is a device whose mission is helping people with speech problems to rehabilitate to a normal life. Glove2Speech consists of 2 gloves, connected wireless to each other to provide maximum mobility. The device has a display on one of the gloves which informs user of current status and selected options. Glove2Speech provides up to 100 unique hot-keys combinations such as "please", "thank you", "can you help me?", in order to save users time typing the most frequently used words. Each combination of fingers flexing is calculated according to the most frequently appearing letters in order to reach a maximum efficiency and speed in choosing letters. Words and phrases can be accompanied by a soundtrack, hearable by people around using incorporated speaker. The Glove2Speech can be easily connected to PC or other device using Bluetooth that gives possibility to use it as a wireless keyboard. Glove2Speech probably won't replace QWERTY keyboards for desktops or laptops, at least not anytime soon. For those types of devices, a full keyboard and regular mouse make perfect sense, and typical users won't see a benefit in a glove-based input device.**

Index Terms — **Microcontroller, wireless, keyboard, human robot interaction, disabled people rehabilitation.**

I. INTRODUCTION

The handicapped people have difficulties in everyday communication. For deaf people the main way to communicate is their special language. People are progressing, that's why they are searching for new ways to extend their possibilities. For One of the way to communicate with computer that present Glove2Speech device that brings mobility to everyone. To provide maximum simplicity and flexibility, Glove2Speech is communicating completely wireless, making user absolutely free to move because he will not have to struggle with any wires. Glove2Speech can be used various fields such as medicine for people with disabilities, industrial machinery and robotics for remote controlling various units and input interface for different platforms.

II. BASIC CONCEPT

The basic concept of the Glove2Speech is generating input signals by touching unique combinations of conductive sensors together which are sent to receiving device with the help of the microcontroller. These sensors are mounted on the fingers of the glove in strategic points which allow creating maximum possible number of combinations. Some of these combinations are more physically difficult than others, and so these are intended to be used less frequently.

Since some sensors will be unintentionally connected while executing some combinations, the software will take care of precedence settings to control which connections are ignored under certain circumstances. Additionally, a sensitivity threshold can be adjusted to control how long the sensors must be touched together to be considered intentional. Depending on your dexterity and desired speed, this might be anything from a few milliseconds to a whole second.

III. FIELDS OF USE

3D spatial or VR interaction: Because the Glove2Speech is a mobile device, it can be used for military or civil UAV aircrafts giving access to the basic operations such as controlling altitude, speed, roll and on-board camera control such as pan, tilt and zoom.

Specialized device control in extreme or industrial situations: the Glove2Speech can be a simple, no-eyes-required input device that is easy to keep track of (since you'll be wearing it!) and hard to lose, perfect for intense activity or dangerous areas where a regular keyboard and mouse wouldn't survive intact for long. An example of use can be an operator of a heavy lifting machine that will be able to control it not only from fixed control panel, but also from any desired location.

Handicapped or limited-mobility users: Some people can't manage the motions necessary for typing on a regular keyboard. The Glove2Speech is designed in such way that it can overcome many of these problems and give a part of computer control back to people who have lost it.

Graphic interface: Glove2Speech has got an LCD display where the user can find all the information about the wireless link, battery status, what letters are accessed at the moment, is the audio support activated and what hot-key phrase is accessed.

Gaming: If you find yourself using keyboard commands to do things in the games you play, the Glove2Speech is the perfect device to allow the same control with much less effort and much more efficiency. Anything you can do with a keyboard can be done with a Glove2Speech, giving immediate availability — you'll

never need to find the right position on the keyboard again, since your keyboard is fitted to your fingers!

Figure 1. View of the glove from the side of flat of the hand. Here are situated contacts points which permits creating input signals for microcontroller which translates them into letters/words/phrases and send them wireless to desired device.
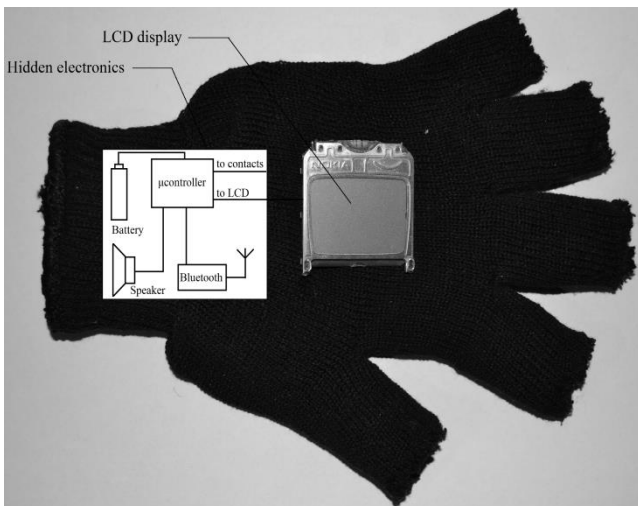

Figure 2. View of the glove from the back of the hand. Here we can see electronic components of the glove – microcontroller, LCD display, speaker and Bluetooth module. Also we can see the battery which supplies energy to all of the components mentioned.

Mobile devices like smartphones and tablets: Some people can get by with miniaturized QWERTY hardware or on-screen keyboards — in fact, some people can use them with amazing dexterity and accuracy. Others aren't so devoted to learning the skill. The Glove2Speech can act as a wireless input device for most smartphones and tablets, depriving the need to use other, sometimes difficult input options.

IV. CONCLUSION

The device was prototyped and successfully tested. The results were promising and this gives the point to improve further possibilities, usability and design.

REFERENCES

[1] Arduino, open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. Avalaible: http://arduino.cc

[2] Enable Talk, student project, which translate sign language into speech. Available: http://enabletalk.com

[3] A wearable, wireless, open-source input device. Available: http://www.keyglove.net/

[4] PCD8544, library for the Arduino to interface with LCDs based on the Philips PCD8544 controller. Available:: http://code.google.com/p/pcd8544/

[5] Tutorial explaining how to do simple playback of short (~4 second), low-bitrate (8 KHz) audio samples from Arduino using only a speaker based on the PCMAudio code by Michael Smith. Available: http://hlt.media.mit.edu/?p=1963

[6] AAC Keys, keyboard and mouse emulation program for Microsoft Windows-based and Macintosh computers. Available: http://www.aacinstitute.org/Resources/ProductsandServices/AACKeys/AACKeys.html