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### **Voice Recognition System for Improving Coordination of Emergency Services Work**

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#### **ABSTARCT**

*A concept of system aiding and improving the action of emergency medical services is presented in this paper. A module of voice recognition and automatic replenishment of patient card is described. The main purpose of this system is efficient handling of the victim and avoiding mistakes in medical records.*

**Key Words:** Command Support System, medical rescue, patient ID card, voice operated exchange

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#### **INTRODUCTION**

There are many existing systems supporting emergency medicine services on the market. Unfortunately it is not possible to find any existing system that is controlled by voice, what would make the work much easier for paramedics. Therefore an idea was born to create such a system controlled by voice to support the communication of emergency medicine employees, a system that will recognize the human voice and decode it to a text format.

If one would like to introduce a system of supporting emergency services that is controlled by voice, it is necessary to create an appropriate design. The aim of the project is to extend the variety of emergency services by creating the ability of turning the voice of a paramedic into a text format, which then will be send to an appropriate destination. The idea is as following: the voice of paramedic working on the site of the accident will be recorded, then it will be send to a computer equipped with a proper software by wireless connection, and then the voice will be turned to a text format using this software. Then another software will fill the medical card. According to the initial assumptions the system will be designed for the usage by volunteer emergency medicine groups, what is justified by lesser amount of duties fulfilled by these groups, when compared with vocational emergency services. The system may be used in any situation and anywhere if the technical conditions will be fulfilled. For volunteer emergency medicine groups these situations are usually one of the following: supporting mass events, searching for people in the terrain and collapsed civil engineering structures , natural disasters etc.

The idea of the system described above is based in some sense on existing software called Commandership Support System (in Polish: System Wspomagania Dowodzenia – SWD) created by WASKO company [1][2]. The following system is supported by a palmtop or laptop where on the touchscreen the paramedic may select the activities that had been fulfilled by him, the possible dangers that were recognized, or any other information that after the paramedic enters the ambulance are printed automatically on medical card. The author is convinced that the SWD software has one important disability: it is the fact that one paramedic is needed to serve the system, while the other one is performing medical activities on a particular victim. In this arrangement a pair of hands is lost just to handle the software, what is an inefficient solution from point of view of volunteer emergency groups, which are often working in the terrain in 2-3 person groups in situations when every paramedic in the group may be required to perform medical activities, not just to handle the software exclusively. In the discussed software the author would like to connect both activities in hands of just one paramedic, what will make the work more efficient. The whole group will be able to proceed medical activities, and in the same time, the medical card will be filled with appropriate information.

### **MATERIAL AND METHODS**

There are four possible options for voice recording. Limiting the voice recording options to just one possibility would have a negative effect on the performance of the system, because of variety of situations where it may be used. These voice recording options are as follows:

- Micro headphone with bone conduction
- Headphones with bone conduction and microphone with bone conduction
- Headphones with bone conduction and tactical microphone
- Throat microphone with bone conduction headphone

All of the instruments described above were supplied by RTcom company to volunteer emergency group “OSP Starówka” in which the author of the article is serving too [3]. Because of this fact all these devices were tested personally. In all of these devices it is possible to transmit the voice by pressing the PTT button, or automatically by VOX system, that sends the voice immediately after it is detected.

In the devices described above the voice transmission technology is supported by the sound resonance effect in the skull bones [4]. The technology itself originates from the animal world, and is used since many years in the hearing medicine. This technology is called resonance or bone conduction.

On the picture below it is presented how the voice transmission is executed by the resonance in skull bones. However it is not familiar with the voice transmission system presented by Temco company, the difference is that the microphone may be placed in many parts of the human skull.

The method of voice transmission to the recording device is also not limited only to one possible option. It would be not reasonable from the practical point of view. The system will be working on the base of telephone connection or Voice Over IP internet technology. However, there are situations when the telephone or internet connection will not be available, therefore the system is also adapted to a two-way radio technology.

To recognize the words and convert the voice to a text format in the designed system, an existing software for voice-text conversion will be used. After extensive research it was decided that SkryBot software will be used. Bearing in mind the functionality of this software I conclude that it will be appropriate for the discussed system design.

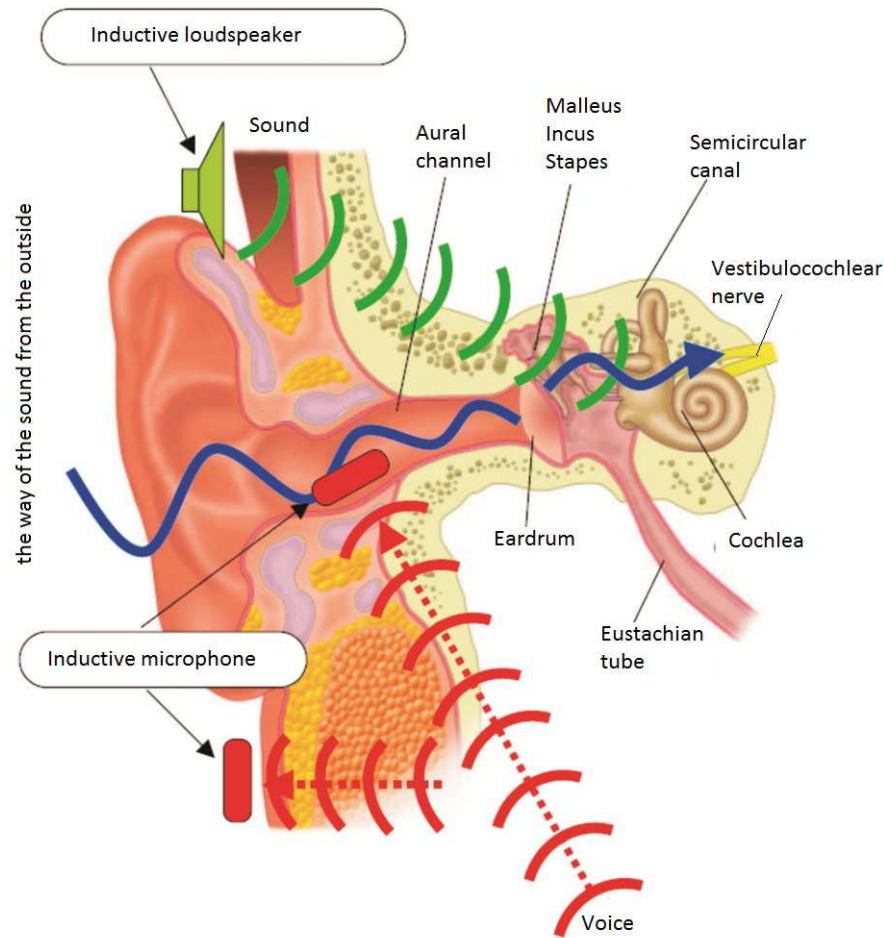


Fig.1. The scheme shows how the sound is transmitted by bones [5]

SkryBot is a complete software for voice detection and conversion to a text format. SkryBot includes a descrambler, acoustic and linguistic models. It also includes a variety of tools for the purpose of updating.

In the purpose of filling the medical card it will be necessary to design an appropriate software. It will be a simple software, based mostly on the 'if' command. When the software detects the desired word, it will fill the proper column in the medical card. Medical cards are available in printed or digital format. The software design will be based on these cards, because it is a PSP standard, and also in other volunteer emergency groups. A possible optional function will be the possibility of automatic equipment stock-taking. The another option will be the communication with medical point by the software, without the necessity of using another equipment.

## RESULT AND DISCUSSION

As the effect of connection of many elements, we obtain a system design, that will fill the medical card of the performed medical activities. The paramedic serving the software will be equipped with headphones and a microphone, therefore he will be able to contact with the medical point, and also give direct orders, which will be transmitted by wireless to the appropriate emergency display station. The possible connection options will depend on each emergency group, they can choose from technology based on mobile telephone connection, an internet and two-way radio. After

connection with display station, and pressing the PTT button, each paramedic will be able to start giving orders, which will be transmitted to the emergency medicine point, where we will have a receipt terminal connected with a computer with appropriate software. With SkryBot software the voice will be converted to a text format, the words will be sorted and recorded in the software, and then the medical card of the patient will be filled. The time and date of the performed medical activities will be also recorded by the software. Additionally, the software will perform an automatic equipment stock-taking. The medical materials, their type and amount, used during performing medical activities, will be recorded as well.

At last, the software will record the following data:

- A text document containing the words recorded by SkryBot MED
- A text document with the words recorded by sorting software (deleting of incorrect commands said by paramedic, and also communication of paramedic with the medical point)
- Filled medical card in \*-doc format
- Filled medical card in PDF format- ready for printing

### CONCLUSION

The system of supporting the emergency medicine activities will increase the efficiency and performance of emergency groups by creating the viability of automatic filling of medical cards, and also will enable the connection between groups working in the terrain and groups working in the medical point.

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