Reima Smart Shout concept and prototype

Jussi Mikkonen, Jukka Vanhala
Tampere University of Technology
{jvm}{jv}@ele.tut.fi

Akseli Reho, Jussi Impiö
Clothing+
{akseli.reho}{jussi.impio}@reima.fi

Abstract

This paper describes the concept and functions of Reima Smart Shout (RSS) group communication enabler. It is a communication device that was designed primarily for snowboarders. Basic block diagram is also described. Smart Shout is a wearable device, which is worn on the snowboarding outfit and can be used to record and transmit voice messages to multiple recipients.

1. Introduction

Snowboarding has become popular enough to be considered a potential target for specialised communication equipment. Snowboarders can drift apart during snowboarding, thus creating a communication hazard. If the snowboarders were not too far apart, they could yell to each other. On the other hand, yelling might cause a sore throat, if it would happen during a cold day. It also creates problems with privacy, if the message was intended to a small portion on a group of people. In a situation where the snowboarders have drifted too far to even yell, some means to enable communication should be at hand. As there was no interest in creating a new communication link, we decided to use the GSM-phones and networks to relay voice messages.

2. The prototype

Since most snowboarders use thick gloves and thick jackets, the user interface had to be designed with this in mind. The user interface should neither be difficult to use, nor it should strain the user in the long term, because it would make snowboarding unpleasant. On the other hand, if someone wanted to use only the shouting device without the jacket, it should also be made easy and reasonable. In addition to that, the belt should be lightweight and comfortable to wear and use. Shape that easily fits these requirements is a sash. Instead of making a whole suit to be partly filled with the electronics, as in the Cyberia project [1], this left fewer options for the placement of the internal electronics, as well as the GSM-phone and voice I/O-components.

Internal electronics, as well as the rf-module, were placed on the bottom part of the belt. On the topside of the electronics compartment reside the charging socket and external headphone socket. The Nokia GSM phone will be inserted under the user interface, into a small pocket. The user interface has few tabs, which can be used by pulling and connecting them into a button. The tabs also provide visual feedback on the state of the device, which is necessary for good control [2]. The loudspeaker has been placed on the shoulder, since it is an optimal place for playing sounds directly to the ear without using an earplug. A small acoustic chamber is needed for the sound to be amplified without the need for a large voltage on the amplifier. The microphone has been placed a little bit lower.

2.1 The user interface

The primary user interface consists of three pulling tabs [Figure 1]. Tab is basically a switch, which can be pulled, or pulled and fastened to a button. The main tab is used to control all instant actions related directly to GSM-phone or voice messages. It is marked in the Figure 1 with 1. The other tabs, the group tab (Figure 1, 2) and volume tab (Figure 1, 5) are used to change the state of the RSS.

Depending on the settings of the group tab, the main tab can be used to receive calls and to send messages to others, or to make a phone call to a predetermined number.

When the main tab is used, it is simply pulled down a bit. The group tab is used to set group settings, and to initiate or purge a group. If the group tab is pulled and connected to button 3, then the RSS works in a closed group mode, which doesn't allow shouts to get through, altough the user remains in a group.

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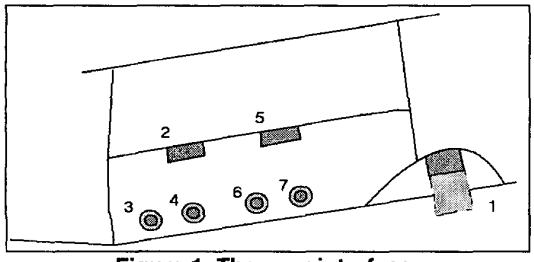

Figure 1. The user interface

The normal group mode is set, when the tab is connected to button 4. The group can be initiated by connecting the tab to either of the buttons. When the tab is left untouched, the user will leave the group. The volume tab is used to set the volume of the loudspeaker. When the volume tab is left unconnected, the volume will be at maximum. When the tab is connected to the button 7, the volume is 50% of the maximum. The smart shout can be silenced, when the tab is connected to button 6.

3. Hardware structure

The basic functional blocks of the prototype of the RSS are shown in figure 2. The microprocessor unit controls all other electronics and functional blocks in the smart shout. To the user, the most visible of these is the user interface. The MPU block controls the audio signal-processing block, which handles all the audio related tasks, communicates with GSM-phone attached to the RSS, and also controls the RF-link, which is used when the communication group is initialised.

The audio signal processing –block is used to process audio signals gathered by microphone in to digital form, which is then stored into the memory. The block also converts the stored messages into audio signal, which is then passed to the amplifier and further to the loudspeaker. The audio signal processing –block is connected to the GSM along with the MPU-block to enable the primary function of the device, i.e. send voice messages to others.

The RF-Link –block contains low-power RF-transceiver, which uses specific protocol designed for this application. It operates on the free lower ISM-frequency bands [3]. The rf-link is used during the group formation to transmit telephone numbers to other group members. During other time, it is held in power down –mode to conserve power.

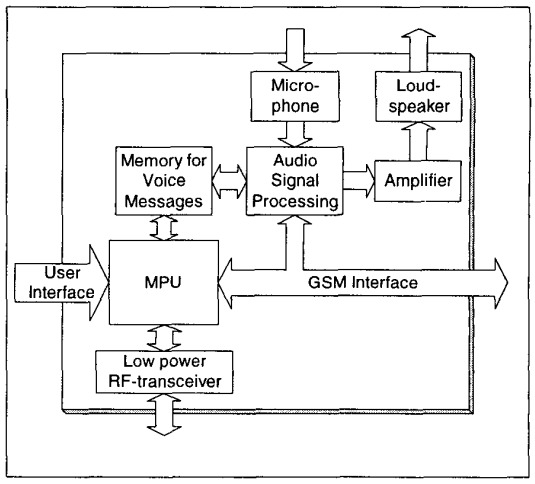

Figure 2. Block diagram

4. Discussion

The Smart Shout is on the production phase. The prototype has been used to integrate the group communication enabler to the existing snowboarding concept at Reima. There are some blocks, which could have been designed differently, for example the RF-module could have been done with Bluetooth [4], should it have been ready at the beginning of the project. Because the group formation relies heavily on the RF-module, it could have been replaced with physical contact.

Acknowledgements

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References

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