Wireless voice communication over ZigBee network for T-Asha

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Abstract—The aim is to achieve low-cost, wireless voice data transmission and develop an intelligent network of transmitters for tracking vehicles enabled by Traffic Auditory signal hearing aid (T-Asha) devices which are fitted inside special crash helmets. A Texas Instruments (TI) microcontroller (MCU), MSP430 series, is used to reproduce encoded audio information.

I. INTRODUCTION
This paper describes use of MSP430 - F2013, a low-power MCU by Texas Instruments, to play back voice information previously stored as RAW audio data in its flash memory. This accounts for relaying of information to the user of T-Asha helmet.

II. REQUIREMENTS
Transmission of low bit-rate audio information via the ZigBee Tx/Rx Modules, since the bandwidth available for actual data (Total Bandwidth – Protocol Overheads) is quite less (~ 50kbps). The MCU should convert the digital data (received via RF) into analog audio output.

III. METHODOLOGY
The digitized voice data is stored sequentially in the flash memory as uncompressed RAW Audio. If need be, this memory can be supplemented by an external memory card (SD, MMC, etc.) [2]. The CPU will read this data held in the flash memory and pass it on to the USART module inside the same MCU.

The digital data is now relayed to the serial DAC (Digital to Analog converter). This DAC interfaces with the integrated hardware USART of the MSP430 configured in SPI mode. The output of the DAC is a noisy and weak analog signal. This signal is subsequently filtered using a filter circuit. The filtered output is amplified using an audio power amplifier. This filtered and amplified signal drives the speaker or earphones [1].

IV. FURTHER WORK
The transmission of the voice data information over the ZigBee network is the next challenge the authors need to overcome. The information will be broadcast to many receivers from a single transmitter; every receiver will relay only the relevant information to its user. This can be done by using flags appended to the information being transmitted. Once the RF information is obtained by the receiver, conversion from digital data to the analog audio signal is done using the method described in the previous section. Also an added feature can be the tracking of a users module dynamically, with a fair amount of accuracy, for user-specific data transmission inside the T-Asha network.

V. ACKNOWLEDGMENTS
The authors gratefully acknowledge the contribution of Dr. Narayana Karkera for giving them a novel idea to work upon; Manipal Institute of Technology and BOP Phillips for their financial support. Also, they thank Texas Instruments for providing a platform where they could implement their ideas using MSP430 MCUs.

REFERENCES