



Smart card for visual impaired people aid

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Background, Motivation and Objective. Blind people depend on other people to identify roads, addresses, public transportation routes, notice obstacles and others visual references. These hazards are also inside college environment due to several obstacles such as stairs, slopes, people walking on corridors, and so on. According with Borges [1], the majority of limitations may be mitigated by two actions: an adapted education for the reality of these people and using technology to reduce barriers. Then, aid devices with few need of training and compatible with the conventional stick are extremely necessary. With this perspective, the proposed project aims the development of a smart card that will be a good alternative for visual impaired people to identify environments inside public institutions, as classrooms, laboratories and bathrooms without using the tact. Providing independence for blind people, expanding their wellness, self-esteem and increasing accessibility at many public institutions.

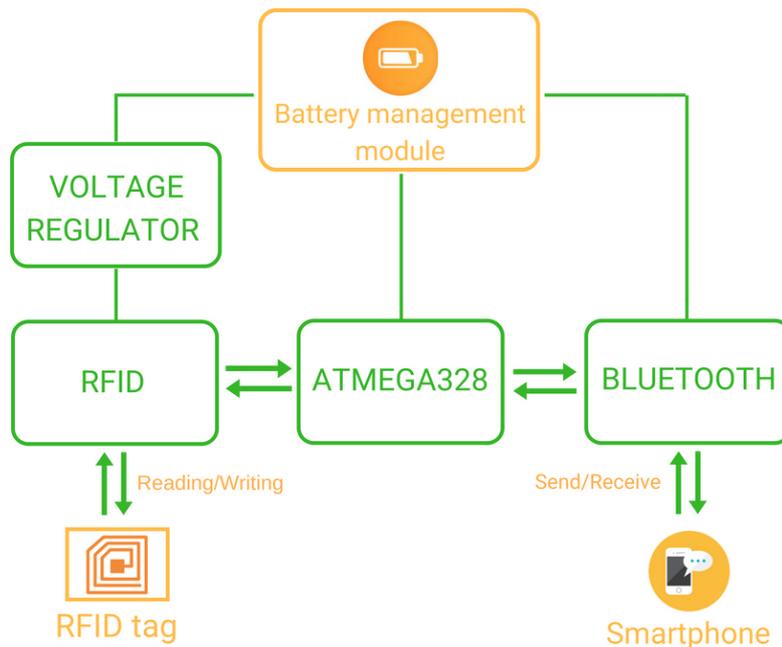
Methods. The Smart Card uses RFID for identify specific rooms and a Bluetooth link with an Android device to inform the user, by audio messages, what type of room he is in front of. The device has three modules: the battery management module, the Bluetooth communication module and the RFID module. The battery management module has the purpose of manage the energy consumption of the circuit and charges the battery using a USB cable. The RFID module reads data from RFID Tags which contain information about the environment. The read data is sent to Android device using Bluetooth communication and the received information from the RFID reader is transformed in audio messages by an Android Application which manages the Bluetooth communication and the audio messages. To handle those tasks in the Smart Card a low cost microcontroller, ATMEGA328, was used. The used methodology to accomplish this project was divide the project in subtasks such as : electronic circuit development, firmware development containing communication protocol with a smartphone, Android Application development, software for write information in RFID tags, PCB design and prototype evaluation.

Results. Each module was developed separated and after joined to work together. The device works in two ways, the record mode and read mode. The block diagram of project is shown in Figure 1. The firmware was developed in C language, using the ARDUINO/IDE platform. Two Android applications were also developed using Java for Android programming, the first was only designed for developers and the second application was designed for blind users. Both operational modes were tested using the circuit mounted on a protoboard showing satisfactory results such as: communication between the circuit and smartphone without errors, processes of reading and writing tags were successful and after the functionalities tests were done, a PCB layout, with dimensions of 93,98mm x 55mm, was designed using Protheus ISIS/ARES software for the manufacturing of the first prototype.

Discussion and Conclusions. The project is able to help visual impaired people to locate themselves inside public institutions, increasing the accessibility level of these institutions and also

providing better life conditions for blind people. Thus, the project has a great contribution for the accessibility and the social inclusion in public and private establishments where the project may be installed. The currently project status is fabrication of the first prototype. In the future, it is intended to extend the RFID antenna range for better detection of establishment rooms in order to make the device use more comfortable by avoiding the user approximate of the room entrance, and miniaturize the device and lower power consumption for increase autonomy.

Figure 1: Block diagram.



Keywords. Assistive Technology; RFID; Bluetooth; Blind people.

References.

[1] BORGES, J. A. Dosvox – um novo acesso dos cegos à cultura e ao trabalho. **Revista Benjamin Constant**, Maio 1996. ISSN 3.