

# Live Demonstration : A tactile audio gallery for visually impaired students

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**Abstract**—The tactile audio gallery device is an interactive educational device, developed to enhance the learning experience for visually impaired students. The device enables better perception of graphical information for visually impaired students. The device consists of a platform designed with an embedded array of capacitive sensors and an in-built audio content delivery module. Selective audio content is delivered simultaneously in accordance to the parts of the diagram felt by the user touch. The device accepts multiple tactile diagrams, each labelled with a unique RFID tag to identify and deliver relevant audio content. Thus, the tactile audio gallery device provides students a flexibility to study diagrams of their choice. The tactile audio gallery device is a simple portable reading solution for graphics based information. The device is aimed to deliver consolidated information to visually impaired students with minimum external assistance.

## I. DEMONSTRATION SETUP

The tactile audio gallery system is a compact portable device consisting of array of sensors wired to multiplexer, secure card (SD) memory module, and the RFID tag reader unit [1], [2], [3]. The system is currently designed and powered by either laptop, power bank or a 5V battery. For the live demonstration, a power plug and table to setup the system is required. Additionally, a speaker is used to relay audio feedback, while index finger moves around the raised diagrams. The device consists of a box of size  $1\text{ft} \times 1\text{ft}$ , to enclose the embedded electronics design. An acrylic board is mounted, which contains the raised tactile diagrams. The sensory system is currently designed as an array of copper patches on the rear side of the planar plastic board, as shown in the Figure 1. Each sensor in the array maps to particular information in the embossed diagram, printed in the card.

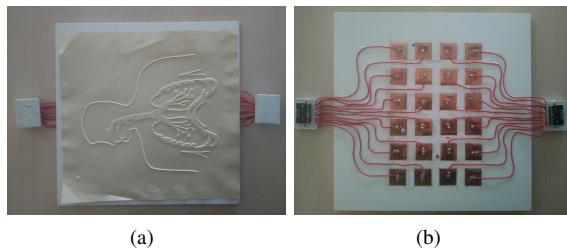


Fig. 1: Photograph of (a) tactile diagram placed on the front side, and (b) the grid of copper patches designed on the rear side of the board.

## II. VISITOR EXPERIENCE

Visitors will be made aware of the studying methodologies of visually impaired students and the challenges faced towards STEM education. The tactile audio gallery provides audio

information through a speaker, in accordance to the user touch at different parts of the pictorial profile. Use of headphone will also be made available for visitors to seek information clearly in a crowded buzz. The flexibility and versatility of the device will be made evident, for visitor by making them pick a diagram from the three different 3D printed diagrams as shown in the Figure 2, and also demonstrate the ease of replacing the diagram from the system with the help of the RFID tag setup for each model [1]. The device operates in two modes: (a) concise nomenclature of labels, and (b) detailed explanation of the labels in the diagram. Through these two modes, the visitors will be given a quick tour of the device functionality, as well as accommodate visitors interested in comprehensive information.

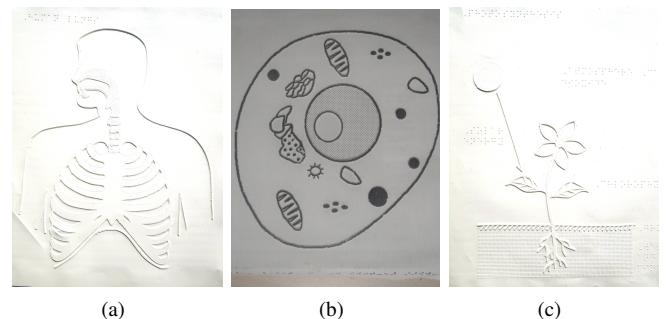


Fig. 2: Different tactile diagrams showing (a) human respiratory system, (b) animal cell, and (c) photosynthesis, which will be used for the demonstration.

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