TACTILE PRINTER

IITM Technology Available for Licensing

Problem Statement

- Visually impaired people are usually introduced to braille in primary school. However, a **braille** book can only be used for descriptive communication and **not for pictorial communication**.
- **Tactile pins only produces a temporary representation** of the picture and is not suitable when the pictures and figures have to be presented in a book.
- Tactile printing techniques **like thermal embossing, and UV curing adhesive** require a **special type of paper for printing**. This has a higher cost, and is also immutable for the tactility of previously printed books.
- There is a need to develop a **simplified tactile printer** and make **it easily portable to enable widespread use**

Intellectual Property

- IITM IDF Ref. **1951**
- **IN 527680 Patent Granted**

TRL (Technology Readiness Level)

TRL 9 Actual System Proven in operational environment

Technology Category/ Market

Category- Assistive, Test Equipment and Design Manufacturing
Industry Classification:

- **NIC (2008-)- 26204** Manufacture of printers, scanners, including bar code scanners, smart card readers, virtual reality helmets, computer projectors (video beamers)
- **Applications-** Printing, Assistive devices for visually impaired,

Market drivers:
The global tactile printing market size was USD 1537.2 million in 2021 and is expected to reach USD 3257.28 million by 2031, exhibiting a CAGR of 7.7% during the forecast period

Research Lab

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Figure: Photograph of the tactile printer- Tactograph assembly

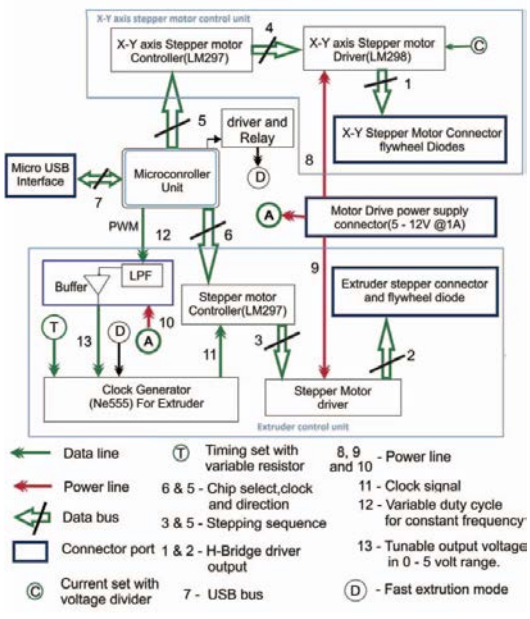

Figure: Illustrates a Control Board used in the operation of the tactile printer

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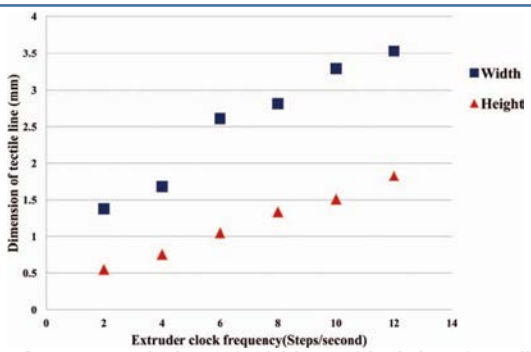

Figure: Variation of width and height of tactile lines with respect to extruder stepping frequency

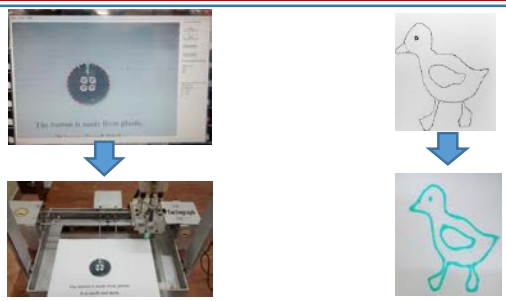

Figure: Special algorithm helps the instructor to print the tactile image in just three mouse clicks. the ability to create digital tactile information give possibility to share the source file, with which any one with tactograph can reproduce the tactile printout..

Technology

The tactile printer comprises a frame to support the print head, the components of the linear mechanism and a camera. The translator moves the print head, which is an extruder, along an x-y plane to produce a tactile image on a substrate.

A controller is configured to control the components and operations of the tactile printer. The tactile line was calibrated for a width of 1.6 mm at 4 steps/second extrusion rate with constant of 0.00175 ml/step fluid flow. By controlling the extruder stepper motors in conjunction with the x−y stage, different complex tactile images were created on a regular A4 paper

By placing the image in a paper to be tactiled on the print area, the overhead cameras capture a snapshot and send to the automated image recolonization module. Where the image content on the paper is recognized by comparing to the stored template image

A graphical user interface configured to enable the user to identify parts of the image that need to be made tactile

Key Features / Value Proposition

- With this approach multiple copies of same images can be printed with just few mouse clicks.
- Assembly of the tactile printer is possible in do-it-yourself (DIY) mode following a given set of instructions. These aspects of the mechanical design are met using a set of nested parts.
- Quality function deployment matrix shows that the IITM invention is rated far better in case of high importance products requirements of adhesive fluid and fluid extruder when compared to Index Braille- a competitor.
- This process is semi-automated through the use of intelligent image recognition module and an interpolation module that can identify the edges of a figure and can produce curves respectively.
- Artificial intelligence and machine learning helps in identifying the parts of the image that should be made tactile for easy interpretation by a user with visual impairment

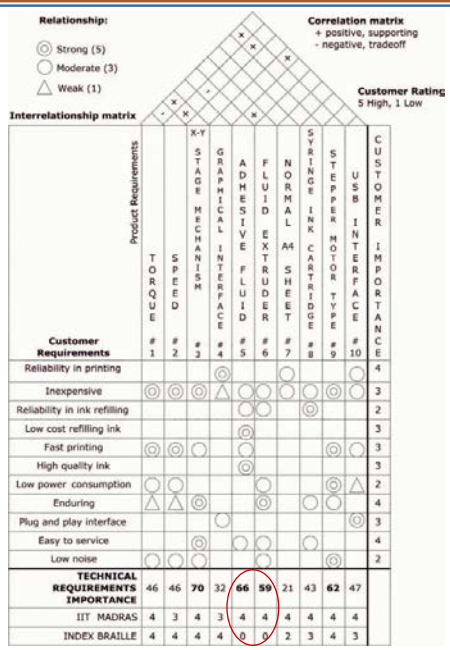

Figure: Quality function deployment matrix shows that the IITM invention is rated far better in two product requirements highly rated in technical requirement importance (circled) when compared to competitor "Index Braille"

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