

# SAKSHAR-IDTV: A Device to teach children in a funny way.

## 1. Background

The SAKSHAR-IDTV device uses a projector to produce a virtual display on a flat surface. For enabling interaction, the information about a user's hand movement is obtained from a single two-dimensional scanning laser range finder in contrast with a camera sensor used in many earlier applications. This system is calibrated to obtain exact transformation from projected screen coordinate system to sensor coordinate system. This permits production of large interactive displays with minimal cost. Additionally, it makes the entire system portable, that is, display can be produced on any planar surface like floor, tabletop, and so on. The calibration and its performance have been evaluated by varying screen sizes and the number of points used for calibration. The device was successfully calibrated for different screens. A novel learning-based methodology for predicting a user's behaviour was then realized to improve the system's performance. This has been experimentally evaluated[1] and the overall accuracy of prediction was about 96%. An application was then designed for this set-up to improve the learning of alphabets by the children through an interactive audiovisual feedback system. It uses a game-based methodology to help students learn in a fun way. Currently, it has bilingual (Hindi and English) user interface to enable learning of alphabets and elementary mathematics. A user survey was conducted after demonstrating it to school children. The survey results are very encouraging. Additionally, a study to ascertain the improvement in the learning outcome of the children was done. The results clearly indicate an improvement in the learning outcome of the children who used the device over those who did not.



Figure 1 SAKSHAR whole set-up at MECHATRONICS lab IIT Delhi

## 2. Scope

It has been in current discussions that the traditional procedural education system does not help improve literature and arithmetic skills creatively. In developing countries, students are prone to dropping out of school, mostly because of lack of motivation. Therefore, making education interactive and engaging is of prime importance. The project has evolved since 2013 from the collaboration work between Prof.T.Matsumaru of Waseda IPS and Prof.S.K.Saha of IIT Delhi. The main target of this project are children who are new to schools. The system works in the form of a game to help the student learn the alphabet. On each new letter to learn, four images of well-known objects are proposed. The student gets to choose which object represents the letter, and in

the testing mode, the student is challenged to remember the learned letters by remembering the corresponding objects.

### 3. Specifications

Device	SAKSHAR-IDTV
Height of stand	36 cm
Material of stand	Aluminum
Computer	Any PC/Laptop with minimum i3 processor
Software	Visual studio with .Net framework. Visual studio community may work.
Sensor	Hokuyo URG
Projector	Epson

### 4. Salient Features and Advantages of Developed Setup:

- The proposed solution in this project is SAKSHAR-IDTV, which consists of a computer, a laser sensor and a projector to produce graphics on the screen.
- The game was designed in the Hindi and English language.
- To track the finger of the user throughout the game, Hokuyo-URG sensor is used.
- Whole set-up is portable.

### 5. Demonstration Capabilities

It can be demonstrated in schools to garner interest for learning among kids. It can also help autism patients in their recovery process.

### 6. Cost

Rs 2.0 lakhs which includes a Laptop or PC, an LCD projector, a Hokuyo-Urg sensor and other accessories plus 18%GST.

### 7. For procurement :

Contact Mr. Alinjar Dan or Mr. Sasanka Sekhar Sinha and Prof. S.K.Saha, Dept of Mechanical Engineering, IIT Delhi , Hauz Khas, New Delhi, 110016.

### 8. References

[1] Boby, R. A., Prakash, R., Saha, S. K., Matsumaru, T., Sharma, P., & Jaitly, S. (2017). Calibration and statistical techniques for building an interactive screen for learning of alphabets by children. *International Journal of Advanced Robotic Systems*, 14(3), 1729881417703939.

