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**Eoculus: Color Learning System for Visually Impaired Students Using  
Internet of Things (IoT)**

A dissertation by

Mr. Prasadika Balage

Supervised by

Mr. Nuwan Jayawardene

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## ABSTRACT

"Visual impairment" is defined as a loss of vision, whether someone cannot see at all or has a partial vision loss. The reason may be an accident, an eye disease, or disorders present at birth. The challenges and issues they face in society are not well understood. Studies depict that a considerable number of visually impaired people are school-aged children. Information collected through sight is essential in helping children to observe and understand things. Therefore, students with visual impairments face challenges in education, including identifying concepts like colors and shapes, performing tasks, understanding lessons, etc.

After extensive research on the Internet of Things (IoT) and related technologies, the author proposes an electronic sensor-based approach to implement the color learning system based on IoT. It will contribute to closing the achievement gap for visually impaired students.

The research project proposed a system that is a combination of electronic sensors, microcontroller platforms, cloud computing, and mobile technologies using the three-layer architecture of the IoT and can function in any lighting condition. It will recognize color and provide its information as audio output using a mobile application in English, Sinhala, and Tamil. Since the output of the research project is relevant to visually impaired students, the author was highly concerned about HCI principles while developing the system. Therefore, this research will help visually impaired students learn colors and understand the concepts behind them while contributing to the computer science and technology domain. Further, this study has raised many potential areas that require further investigation.

### Subject Descriptors:

- CCS → Human-centered computing → Human computer interaction (HCI) → Interaction devices → Sound-based input / output
- CCS → Hardware → Communication hardware, interfaces, and storage → Sensor applications and deployments
- CCS → Hardware → Communication hardware, interfaces, and storage → wireless devices

Keywords: IoT, HCI, Microcontroller platform, Cloud computing