



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
PhD-17 SHORT ABSTRACT OF THESIS

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Thesis Title: Strategies to design user-centered Electric Bus Dashboard Interfaces for the Indian context

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**SHORT ABSTRACT**

The use of electric buses, or e-buses as they are popularly called, in public transportation is rapidly expanding in India. At the same time, their dashboard user interfaces continue to replicate legacy layouts designed for diesel-based vehicles. As a result, we observe critical information being fragmented across multiple displays and controls. This requires greater cognitive effort and limits effective decision-making during operations on the part of drivers. Industry stakeholders, when probed as part of this research, attribute this to the lack of appropriate knowledge of design strategies amid factors such as cost constraints, reliability concerns, and assumptions about drivers' digital readiness. This knowledge gap corroborates the research literature on e-vehicle interfaces, which is further sparse and underdeveloped regarding the use of e-buses in public transport in developing regions like India. To address this knowledge gap, focusing on designing e-bus dashboard interfaces for drivers in India, this study adopts a user-centered design research methodology. The study's aim is to systematically investigate existing e-bus dashboard interfaces to generate domain-specific design knowledge that is both useful and valuable to stakeholders, including designers and researchers. The research hypothesizes that dashboard user interfaces, when designed according to the fundamental tenets of user-centered design, will be more effective at enhancing the capabilities of e-bus drivers in the context of public transport in India. There are four logical milestones in this study's research journey. First, an investigation of the existing dashboard interfaces by means of observation, survey, and interview-based methods by approaching stakeholders in person. Second, synthesize the findings derived at the first stage to generate knowledge for research-based interventions and knowledge. Third, systematic and iterative design of research prototype(s) and their evaluation among stakeholders at their locations. The research prototype(s) integrate key operational modules, including trip management, vehicle status monitoring, alerts, and reporting, within a consolidated interface that mimics electric buses' operational workflows. Prototype(s) evaluation is conducted through a field-based usability study with 32 professional bus drivers. And, fourth, deducing the findings from the earlier stage(s) into the form of knowledge that is not only applicable for stakeholders, including

the designers and the researchers, but is also positioned appropriately in the light of available literature.

The study contributes to the existing knowledge on e-bus dashboard design by illustrating that the research prototype(s) of the dashboard user interface in e-buses significantly improve perceived usability, reduce mental workload, and achieve higher acceptance amongst the professional drivers in comparison to the existing dashboard interfaces in the context of public transport in India. We find compelling evidence in support of UCD-based research prototypes that favor intuitive first-time interactions, reduced learnability challenges, highlighted localization, reduced training, and better customization, as measured on scales of confidence and long-term adoption.

