Archives available at journals.mriindia.com

International Journal on Advanced Electrical and Computer Engineering

ISSN: 2349-9338

Volume 14 Issue 01, 2025

AI-Based Android Keyboard: Auto-Suggestion and Grammar Correction

[1]Dr. S.T. Shirkande, [2]Shende Harshada Gajanan, [3]Shendge Sakshi Shivaji, [4]Shikalkar Alisha Usman, [5]Shirke Samiksha Rahul

[1 2 3 4 5] *S. B. Patil College of Engineering, Indapur*

Email: Shri.shirkande8@gmail.com sakshishendge477@gmail.com harshada2374@gmail.com alishashikalkar2003@gmail.com ssamiksha214@gmail.com

Peer Review Information

Submission: 11 Sept 2025

Revision: 10 Oct 2025

Acceptance: 22 Oct 2025

Keywords

Android Keyboard, Auto-suggestions ,Grammar Correction, Natural Language Processing (NLP), Machine Learning (ML), Human–Computer Interaction (HCI), Mobile Application Development, On-device Models, Cloud Integration, Typing Efficiency.

Abstract

The project addresses the limitations of traditional Android keyboards, which often fail to provide accurate context-aware suggestions and grammar correction. It proposes a Java-based Android keyboard application integrated with NLP (Natural Language Processing), machine learning models, and grammar correction tools. The system consists of A customizable keyboard interface (front-end).A suggestion and grammar correction engine (back-end).It provides real-time predictions, spelling corrections, and grammar improvements, with optional cloud integration for scalability. The solution enhances typing accuracy, speed, and communication efficiency.

Introduction

In the introduction, the paper emphasizes the increasing reliance on smartphones for daily communication and the limitations of current mobile keyboards. While they provide basic auto-suggestions and spelling corrections, they fall short in handling advanced grammatical structures and personalized inputs. This project proposes the development of a Java-based Android keyboard application that integrates NLP libraries, machine learning models, and grammar correction tools. The system consists of a customizable front-end keyboard and a powerful back-end engine for suggestion generation, spelling correction, and grammar

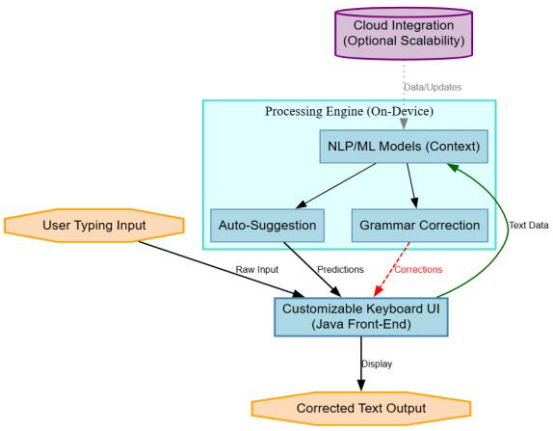

Fig 1: Intelligent Keyboard System Architecture

enhancement. By offering features such as real-time predictions, context-aware suggestions, and optional cloud integration, the solution aims to enhance typing accuracy, efficiency, and user communication experiences.

Literature Survey

AI-Powered Grammar Correction in Keyboards: Transforming Mobile Communication (Blog) – Bruno Fakhouri, 2025

Grammar correction in mobile devices. It reviews on-device NLP/ML methods, This study presents an overview of the need for context-aware, privacy-preserving context modeling, and privacy-preserving techniques. Future work suggests personalization, multimodal input handling, and multilingual support.

Personalized English Grammar Correction Systems Using Deep Neural Networks – Gulnaz Fatma et al., 2025

The researchers pointed out that off-the-shelf grammar models lack personalization and perform poorly with domain-specific errors. They proposed a BERT–LSTM hybrid architecture for generating feedback and personalized corrections. The future scope includes real-time mobile optimization, domain adaptation, and deployment on constrained devices.

Proofread: Fixes All Errors with One Tap – Renjie Liu et al., 2024

This work focuses on enabling mobile keyboards to correct diverse grammatical and typing errors with a single, reliable action. The researchers used a server-side LLM (PaLM2-XS) model with supervised fine-tuning and reinforcement learning. It was deployed within Gboard. The study suggests future improvements like on-device deployment, reduced latency, expanded error coverage, and multilingual support.

Private Federated Discovery of Out-of-Vocabulary Words for Gboard – Ziteng Sun et al., 2024

The paper tackles the challenge of discovering out-of-vocabulary (OOV) words while ensuring user privacy. The approach used federated analytics with local differential privacy (LDP) and anonymous aggregation. Future directions include multilingual OOV discovery and integration with grammar/style suggestions

On-Device Emoji Classifier Trained with GPT-based Data Augmentation for a Mobile Keyboard – Hossam Amer et al., 2024

This work addresses the problem of emoji prediction and classification by training a MobileBERT model with GPT-generated labels for data augmentation. The study suggests applying GPT-based augmentation methods to grammar/word-suggestion tasks while enhancing personalization and multilingual support**.**

Tap Type: Ten-finger text entry on everyday surfaces via Bayesian inference-Paul Streli et al.,2024

New input modalities (e.g., surfaces) challenge traditional Keyboard models and suggestions systems.

Federated Learning of Gboard Language Models with Differential Privacy- Zheng Xu et al.,2023

Training high quality language models from user data while preserving privacy is difficult.

Private Federated Learning in Gboard-Yuanbo Zhang et al.,2023

Balancing model performance and user privacy in keyboard ML pipeline remains an open problem. DP-FTRL, secure aggregation and client-side updates to train language models without raw data collection.

Deep Type: On- Device Deep Learning for Input Personalization Service with Minimal Privacy Concern.,2019

Personalization requires on device models that respect privacy and run efficiently on limited hardware.

Neural Networks for Text Correction and Completion in Keyboard Decoding., 2019

Decoding and correcting noisy keyboard input requires robust sequence models and decoding strategies. End to end neural decoding models(RNNs/CNNs),beam search,language model fusion for correction and completion

Research Gap

- From the reviewed literature, it is clear that while significant advancements have been made in mobile keyboard input systems, there remain key challenges.
- Many solutions rely heavily on server-based models, which increase latency and raise privacy concerns. On-device models, while efficient, are often limited in their computational capability and scalability.
- Furthermore, existing grammar correction systems are not adequately personalized and fail to address domain-specific errors effectively. Multilingual grammar correction and real-time

optimization for constrained mobile devices are still underdeveloped areas.

• Thus, there exists a clear gap for a lightweight, real-time, privacy-preserving grammar correction and auto-suggestion system tailored specifically for Android keyboards.

Problem Statement

The problem statement addresses the shortcomings of existing Android keyboards, which often lack context-aware suggestions and advanced grammar correction features. Traditional input methods fail to integrate modern NLP techniques effectively, resulting in frequent typing errors, slower input speeds, and communication inefficiencies. These issues emphasize the growing need for an intelligent, user-friendly keyboard that balances accuracy, personalization, and real-time responsiveness.

Conclusion

In conclusion, the proposed project aims to design a Java-based Android keyboard that integrates NLP and ML techniques for intelligent auto-suggestions, grammar correction, and spelling improvements. By combining a customizable user interface with a robust suggestion engine, the system provides real-time, context-aware predictions while maintaining low latency. Optional cloud integration further enhances scalability and performance. This approach promises to improve typing speed, accuracy, and communication quality for users while ensuring privacy and personalization.

References

Bruno Fakhouri, AI-Powered Grammar Correction in Keyboards: Transforming Mobile Communication, 2025.

Gulnaz Fatma et al., Personalized English Grammar Correction Systems Using Deep Neural Networks, 2025.

Hossam Amer et al., On-Device Emoji Classifier Trained with GPT-based Data Augmentation for a Mobile Keyboard, 2024.

Renjie Liu et al., Proofread: Fixes All Errors with One Tap, 2024.

Ziteng Sun et al., Private Federated Discovery of Out-of-Vocabulary Words for Gboard, 2024.

Paul Streli et al., TapType: Ten-finger Text Entry on Everyday Surfaces via Bayesian Inference, 2024.

Zheng Xu et al., Federated Learning of Gboard Language Models with Differential Privacy, 2023.

Yuanbo Zhang et al., Private Federated Learning in Gboard, 2023.

Various Authors, DeepType: On-Device Deep Learning for Input Personalization Service with Minimal Privacy Concern, 2019.

Various Authors, Neural Networks for Text Correction and Completion in Keyboard Decoding, 2019.