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Developer and LLM Pair Programming: An Empirical Study of Role Dynamics and Prompt-Based Collaboration

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Abstract: *With the introduction of large language models (LLMs) as coding partners, the classic pair programming dynamics are being rewritten. This research empirically examines the collaboration between software developers and LLMs on software tasks, uncovering a dynamic role toggling informed by prompt accuracy and contextual cues. Instead of deterministic driver-navigator dichotomies, we find an emergent interdependence where programmers function as orchestrators of intent and LLMs oscillate between executor, interpreter, and creative collaborator. Prompt design has emerged as a critical skill for orchestrating collaboration, shifting the focus from code authorship to dialogical problem-solving. This perspective introduces a new vision of human-AI co-creation in coding, highlighting its potential within future intelligent development environments.*

Keywords: Pair Programming, Large Language Models, Human-AI Collaboration, Prompt Engineering, Software Development, Code Co-Creation, Programming Roles, Intelligent IDEs.

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