SLR Data Extraction Form

Large Language Model-based Tools and Junior Software Developers.

<u>Junior software developers</u> are defined as professionals with **less than or equal to five years of industry experience**, based on:

- Storey, M. A., et al. (2019). *Towards a theory of software developer job satisfaction and perceived productivity.* IEEE Transactions on Software Engineering, 47(10), 2125-2142.
- Greiler, M., Storey, M. A., & Noda, A. (2022). An actionable framework for understanding and improving developer experience. IEEE Transactions on Software Engineering, 49(4), 1411-1425

* In	dicates required question	
1.	Email *	
2.	Paper ID *	_
3.	Paper Title *	
4.	Authors' Name *	

5.	First Author's Affiliation Country *			
6.	Published Year *			
7.	Published Venue *			
8.	Source Type *	_	\odot	Dropdown
	Mark only one oval.			
	ACM DL			
	IEEE Xplore			
	SpringerLink			
	Wiley			
	Scopus			
	ScienceDirect			
	Arxiv			
	Backward Snowballing			
	Forward Snowballing			
9.	Type of study *			Drondown
9.			\odot	Dropdown
	Mark only one oval.			
	Journal publication			
	Conference paper			
	Workshop paper			
	Magazine paper			
	Report			

10.	Domain *
	Tick all that apply.
	Human-Al interaction
	Computing Education
	Virtual Reality Development
	Embedded Systems
	Security
	Game development
	Code Quality
	Learning Agent-based Modeling
	Other:
11.	Ranking of the Venue (<u>CORE</u> for Conference paper/ <u>Scimago</u> for * Dropdown
	Journal paper)
	Mark only one oval.
	A*
	\bigcirc A
	В
	Australasian B
	С
	Q1
	Q2
	Q3
	Q4
	NOT RANKED
	NOT PUBLISHED (ArXiv)
	National: Romania
	◯ N/A

RQ1: Motivations and Methodological Approaches

3	tudy Motivation (or N/A) *
_	
S	tudy Aim / Goal (or N/A) *
_	
_	
R	esearch Questions (or N/A) *
_	

15.	Research Method (Use Other to add other research methods). *	
	Tick all that apply.	
	Survey/Questionnaire	
	Controlled experiment	
	Case Study	
	Semi-structured Interview	
	Observation	
	Retrospective Interview study	
	Design Probe study	
	Within-subject comparative study	
	Action Research	
	Fieldwork	
	Task-based user study	
	Other:	
16.	Type of Research Method *	Dropdown
	Mark only one oval.	
	Qualitative	
	Quantitative	
	Mixed Methods	

17.

What Data Analysis Technique are used in the paper? Use Other to add other

data analysis techniques. Tick all that apply. coding categorization open coding open-ended coding thematic analysis content analysis grounded theory socio-technical grounded theory conversation analysis descriptive anaylsis student t-test paired t-test multivariate regression analysis logistic regression analysis Mann Whitney U test Pearson correlation Spearman correlation Wilcoxon test Shapiro Wilk test Friedman test ANOVA test Chi-squared test Krippendorff's Partial Least Squares-Structural Equation Modeling Heterotrait-Monotrait ratio of correlations (HTMT) Cronbach's alpha average variance extracted (AVE) Collinearity Analysis N/A Other:

18.	Does the study has Ethics Approval? *	Dropdown
	Mark only one oval.	
	Yes	
	Not identified	
19.	Number of Participants *	
20.	What are the Participants' Profiles in the paper?	*
	Junior software developers are defined as professionals with less the	an or equal
	to five years of industry experience, based on:	a b
	Storey, M. A., et al. (2019). <i>Towards a theory of software developer josatisfaction and perceived productivity.</i> IEEE Transactions on Software	
	Engineering, 47(10), 2125-2142.	
	Greiler, M., Storey, M. A., & Noda, A. (2022). An actionable framework understanding and improving developer experience. IEEE Transaction Software Engineering, 49(4), 1411-1425	
	Tick all that apply.	
	Computer Science Students	
	Junior Developers	
	Senior Developers	
	Professional Software Developers: Unclear	
	Unclear/Not stated	

(If applicable) What are the other profiles? Use Other to add other profiles.

21.

	Tick all that apply.
	Manager Artist Researcher Professor/Instructor Product Owner Data Scientist Marketer Other:
22.	(If applicable) Level of the Computer Science Students Tick all that apply. Undergraduate Graduate Unstated/Unclear
23.	Do the authors make clear the definition applied for "junior software developer"? Mark only one oval. Yes No
24.	If Yes, tell about how the study defines?

25.	Does the study come up with any framework/ model/ theory/ a set of guidelines as the final outcomes? (Explain about it)
26.	(If applicable) How do they evaluate their results/ framework/ model?
27.	Is the study based in Academia or Industry? *
	Mark only one oval. Academia
	Industry
	Mixed
	Unspecified

RQ2: Key Software Development Tasks

28. What key software development tasks are Junior Software Developers/CS Students using LLM-based tools for?

Tick all that apply.
to understand Computer Science-related concepts (conceptual understanding)
for brainstorm
to understand the problem (problem understanding)
to produce game content
to generate boilerplate code / starter code / repetitive code
to generate regular expression
to generate log messages
to correcting syntax
to improve code style
to improve code performance
to understand code
refactoring code (e.g., rewrite code with new conventions)
research / searching (e.g., replacing Google or Stack Overflow)
test case generation
to generate data for tests
unit test generation
debugging
rubber duck debugging
to generate documentation
to generate comments
code analysis (e.g., runtime analysis)
convert code from a language to another
□ N/A
Other:

29.	(If applicable) What key educational-related tasks are Computer Science students using LLM-based tools for?
	Tick all that apply.
	for programming assignments for Non-CS related assignments
	to study (e.g., study buddy)
	writing assistant
	assisting during project work
	Other:
30.	What are the LLM-based tools being used by the Software Developers/Teams? *
	Tick all that apply.
	ChatGPT
	Github Copilot
	Big Chat (Microsoft Copilot)
	Bard (Gemini)
	Tabnine
	Kite
	Codewhisperer
	Phind
	Perplexity
	Codex
	DeepCode
	Polycoder
	AiXcoder
	MidJourney
	Dall-E
	□ N/A
	Other:

RQ3: Perceptions about LLM4SE

۱.	Software Developer/Team's Perspective (e.g., usefulness, trust, engagement, privacy, security) Use Other to add other perceptions.	*
	Tick all that apply.	
	usefulness	
	trust	
	engagement	
	privacy	
	security	
	motivation	
	improvements	
	emotions (e.g., fear, frustration, surprise, hesitation, pessimism, satisfaction)	
	job market	
	evolution/progress stage	
	collaboration	
	easy to use	
	education	
	productivity	
	impact on developers' skills	
	culture	
	fairness / bias	
	ethical aspects (e.g., copyrights)	
	output quality	
	Other:	
	What are the major benefits/ advantages reported of Junior Software Developers/CS Students adopting LLM-based tools?	

Students adopting LLM-based tools?
What are the major recommendations/ best practices reported for Junior Software Developers/CS Students ?
What are the major recommendations/ best practices reported for Educa

37.	(If applicable) Does the study suggest any approach to mitigate the negative impact?		
38.	What is the nature of the impact of LLMs for SE from study participants' perception?	* Dropdown	
	Mark only one oval.		
	Positive		
	Negative		
	Undertermined		
	Mixed		
	◯ N/A		
RO	Q4: Limitations and Future Research Needs		
39.	Main Findings/Outcomes (or Not Identified) *		

40.	(For controlled experiments) does participant using LLM-based tools demonstrate significant difference to non-users?
	Mark only one oval.
	Yes
	◯ No
	Mixed
	Unspecified
41.	Main Limitations (or Not Identified) *
42.	Future Research Needs (or Not Identified) *

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