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An analysis of the usage of ChatGPT and other generative AI software among IT developers

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Abstract

ChatGPT, a language model developed by OpenAI, has shown significant potential in supporting developers in various tasks, from coding to documentation and developing implementation plans. Other competing generative AI (Artificial Intelligence) models, such as Bard and Wolfram Alpha, have been used to a varying degree as aids to developers. Our study explores the use of ChatGPT and other LLMs (Large Language Models) by professional developers using the Stack Overflow 2023 survey and finds that there are significant differences in usage by age, with younger users significantly more likely to use LLMs than older individuals. Other major findings explore the usage by developer type, professional status and the effect of user sentiment and trust in AI on the usage of ChatGPT for developers.

Keywords: generative AI, trust in AI, IT developers, ChatGPT, generational differences

Introduction

This study looks at factors that may be related to a lack of adoption or low utilization of Large Language Model (LLM) capabilities. These factors are age, education, and trust of Artificial Intelligence (AI). Survey data of software developers' use of ChatGPT is analyzed to determine any relationships between these factors and the use of ChatGPT. There is a lot of overlap in consumer and software developer concerns regarding generative AI and LLMs. The results of this study can also be used to start a discussion regarding consumer hesitancy in the adoption of generative AI.

OpenAI's ChatGPT was recently identified as the "fastest growing app in the history of web applications" for consumers, reaching over one million users in the first five days after launch (Gordon, 2023). ChatGPT is a type of generative AI that uses an LLM to understand and produce human-like text responses. This widespread and fast-growing adoption has fostered research regarding the actual and/or perceived advantages, disadvantages, trust, ethics, and consequences of the use of generative AI (Gupta, Nair, Mishra, Ibrahim, & Bhardwaj, 2024; Paul, Ueno, & Dennis, 2023; Shahsavar & Choudhury, 2023). LLMs are also widely used in many areas of the workforce. A consequence of the widespread use of LLMs is potential for job loss (Kuhail, Mathew, Khalil, Berengueres, & Shah, 2024). A disadvantage is the LLMs attention span can be limited, particularly when providing comprehensive descriptions (Tian, et al., 2023).

However, despite the consequences and limitations, LLMs can be a valuable part of a comprehensive debugging toolkit, complementing other debugging tools and techniques (Surameery & Shakor, 2023). In

addition, the use of generative AI for software development has been found to help software developers complete coding tasks up to twice as fast (Deniz, Gnanasambandam, Harrysson, Hussin, & Srivastava, 2023). Additional advantages of the use of LLMs are they can provide explanations, examples, and guidance, improving overall satisfaction with support services (Biswas, 2023). These models are also capable of generating codes for numerical algorithms, debugging and improving written codes, and completing missed parts of numerical codes (Kashefi & Mukerji, 2023).

For these reasons, software developers across various specializations are leveraging the capabilities of ChatGPT to help in the unique demands of their fields. Understanding what may affect the utilization of LLMs among software developers can help organizations to better address those who may be hesitant and speak to their reasons of not adopting or increasing their use. Though limited studies have been performed on age and gender affecting LLM usage by developers, all have had a limited sample size. Also, studies of other demographic variables are sparse or non-existent. Our study addresses this research gap. The next section of this paper will discuss studies found in literature related to this study. Following will be a section on the methodology used in this paper, followed by a discussion of the results. Limitations and future research areas are also included, followed by the conclusion.

Literature Review

Web developers can enhance the web accessibility of their sites by using ChatGPT to bring them quickly up to the latest accessibility guidelines (He, et al., 2025). Data scientists, on the other hand, are using ChatGPT "to suggest data-driven approaches and interpret models" allowing them to see different paths that can be explored in their analysis (Valli, Sujatha, Mech, & Lokesh, 2024). Game developers of simulated story worlds, such as The Sims and RimWorld, use ChatGPT for theme-relevant content generation (Johnson-Bey, Mateas, & Wardrip-Fruin, 2023). Meanwhile, embedded systems developers can use LLM to generate suggestions to optimize a system that will contain hardware and communication protocols (Englhardt, et al., 2023). ChatGPT serves as a multifaceted tool that caters to the nuanced needs of different types of developers, enhancing their efficiency and creative potential across the spectrum of software development tasks.

A range of studies have explored the use of ChatGPT and other LLMs by different types of software developers. Ge and Wu (2023) found that factors such as performance and effort expectancy, social influence, facilitating conditions, data security, and trust influence the adoption of ChatGPT for bug fixing. They determined that trust and perceived usefulness were fundamental drivers for adopting LLM systems. Liang, Yang, and Myers (2024) found that developers are primarily driven to use AI programming assistants due to enhanced productivity through reduced typing requirements, faster task completion, and assistance with syntax recall. Nevertheless, they also noted several constraints, including these tools' inability to handle specific functional or non-functional requirements and challenges in directing the tool to produce desired results.

Zhan, Molina, Rheu, and Peng (2024) conducted a survey with 717 participants from various backgrounds, not exclusively programmers, to examine concerns about job displacement and existential risks posed by AI tools. Their findings indicated that experience with AI technology can diminish fears related to bias and job replacement.

A study by Suryavanshi, Kapse, and Sharma (2025) found that the hedonistic motivation, the enjoyment and satisfaction of working with ChatGPT as a significant factor on the behavioral intervention to use the AI system. "Developers prefer exciting and innovative tools and ChatGPT's conversational, user-friendly

design appeals to their preferences. This is an essential aspect in the field where learning new things constantly and adapting to technology are needed. In a nutshell, developers understand when it is a complex problem; they also need to give proper prompts so that ChatGPT can generate valid output. It may take multiple iterations to get the valid output, just like debugging an error. This similar pattern in both processes may encourage developers to use ChatGPT more. (pg. 116)"

Monteiro, Branco, Silvestre, Avelino and Valente (2023) reported on the use of ChatGPT for end-to-end software construction, identifying four categories of prompts and discussing the advantages and disadvantages of different prompt construction approaches. Haque and Li (2023) highlighted the potential of ChatGPT as a debugging tool, emphasizing its ability to streamline the process and make it more accessible to developers. Xiao, Treude, Hata, and Matsumoto (2024) introduced DevGPT, a dataset that provides insights into the questions developers present to ChatGPT, the dynamics of their interactions, and the implications of these conversations. These studies collectively underscore the diverse ways in which software developers can use ChatGPT in their work.

A survey commissioned by Forbes Advisor and conducted by OnePoll involving 600 businesses, nearly all (97%) business proprietors are confident that ChatGPT will be beneficial for their business. One-third of these businesses intend to utilize ChatGPT for composing website content, while 44% plan to employ it for generating content in languages other than their own (Haan & Watts, 2024).

Kuhail et al. (2024). found that programmers and analysts did not view AI tools as an immediate threat to their employment security, though they were concerned about long-term job stability. Additionally, their research found that participants who achieved greater productivity gains through AI tools demonstrated increased confidence in these technologies while simultaneously experiencing heightened concerns about potential job security risks. Generational differences may account for the varying perceptions of confidence and concerns.

Age and ChatGPT

The integration of AI tools like ChatGPT into the workflow of software developers has shown a notable generational trend, with younger developers demonstrating a higher propensity to adopt such technologies. According to Dice's Tech Sentiment Report (2024), 38 percent of young tech professionals aged 18 to 34 say they are using generative AI on the job at least once a week. Whereas, nearly half of AI tech professionals aged 55 or older say they don't use the technology at all.

This trend can be attributed to several factors. First, younger developers are generally more exposed to the latest technological innovations during their education and early careers, making them more receptive to AI-driven solutions. In a large-scale study with 4,800 respondents, it was found that younger students, especially those in technical fields, were not only more familiar with AI tools like ChatGPT but also expressed strong desires for their integration into academic and professional workflows (Balabdaoui, Dittmann-Domenichini, Grosse, Schlienger, & Kortemeyer, 2024) Educational institutions have been increasingly incorporating AI and machine learning courses into their curricula, in order to equip new graduates with the skills and familiarity needed to leverage these tools effectively.

A study by GitHub's Octoverse report (2024) highlights that newer programmers are more likely to utilize AI coding assistants, attributing this to their up-to-date training and inherent flexibility in adopting new workflows. Research on the use of ChatGPT by developers reveals a complex interplay of factors. Kacperski, Ulloa, Bonnay, Kulshrestha, Selb, and Spitz (2025) found that lower age and more education are associated with higher usage, while full-time employment and more children act as barriers. Ge and Wu (2023) identified performance and effort expectancy, social influence, facilitating conditions, data security,

and trust as key factors influencing adoption for bug fixing. Hernandez, Abisado, Rodriguez, and Imperial (2023) highlighted the role of facilitating conditions, habit, performance expectancy, and personal innovativeness in predicting use behavior among higher education students. Hanifi, Cetin, and Yilmaz (2023) reported widespread acceptance of ChatGPT among software engineering students, with a majority intending to continue using it. However, concerns were raised about the potential for hallucinations during interactions with the tool. These concerns may lead to a lack of trust in AI/ChatGPT.

Trust in AI/ChatGPT

Several surveys and research have shown that younger generations are generally more open to embracing AI technologies and are more trusting of their capabilities compared to older generations. A global study conducted by The University of Melbourne and KPMG found that 51% of participants aged 18-34 years old trust AI systems compared to 48% of those 35-54 years old and only 38% of participants 55 and older (Gillespie, Lockey, Ward, Macdade, & Hassed, 2025). They also tend to be more comfortable with AI-driven interactions and personalized recommendations. According to a survey by Hootsuite (2024) 62% of consumers say they are less likely to engage with and trust content if they know it was created by an AI application. They found that the younger Gen Z generation are more likely to claim they know what's real and what's created by AI better than other generations. They're also more likely to trust and engage with AI content. On the other hand, baby boomers are the opposite on all accounts.

Methodology

To investigate the use of ChatGPT by software developers, data from the 2023 Stack Overflow survey was utilized. The Stack Overflow Developer Survey is recognized as the most extensive and comprehensive examination of individuals who code globally. Each year, the survey encompasses a broad array of topics, including developers' preferred technologies and job preferences. As stated on their website:

> "For 13 years, we've delivered industry-leading insights regarding the developer community. This is the voice of the developer. Analysts, IT leaders, reporters, and other developers turn to this report to stay up to date with the evolving developer experience, technologies that are rising or falling in favor, and to understand where tech might be going next." (Stack Overflow, 2023)

The use of Stack Overflow data is supported by peer-reviewed publications, including studies by Barua, Thomas, and Hassan (2014), Asaduzzaman, Mashiyat, Roy, and Schneider (2013), and Treude and Robillard (2016). The dataset comprises a rich mix of demographic data, descriptive statistics, and responses to opinion-based questions about the programming industry. IBM SPSS 29 was utilized for data analysis. The survey contained responses from 89,185 people worldwide. We filtered the data for those who identified as developers by profession. StackOverflow survey is public and anonymized, is available to the public and exempt from IRB review or ethical clearance procedures.

Results

Table 1 shows the use of specific AI LLMs and includes the count and percentage of developers that participated in the Stack Overflow survey that either use the tool (T) or do not use the tool (F). It is clear that ChatGPT is by far the most used LLM with 58% of developers having used the tool out of 67,237 developers or 58.43%. The closest other tool used was Google Bard AI, but that is only used by 6.41% of

developers. Since the overwhelming majority of developers who use LLMs use ChatGPT, we will primarily focus on ChatGPT in this study.

Table 1. AI Powered Search Usage by Software Developers

AI Search Tool	Percentage Use
Chatgpt	58.43%
WolframAlpha	7.82%
Google Bard AI	6.41%
Phind	2.19%
Perplexity AI	0.68%
Quora Poe	0.54%
Neeva AI	0.25%
Andi	0.14%
Metaphor	0.09%
Bing AI	0.00%

Table 2 examines the types of users that are utilizing ChatGPT. There are significant and wide variabilities among the types of respondents. The highest-level users are students Looking at industry jobs, Marketing and sales professionals as well as Chief Executives lead the field with 71% and 70% usage. This seems appropriate given the capabilities of ChatGPT to generate creative alternatives as well as to provide assistance to less tech-savvy individuals. But a bit surprising in second place are Data Scientists at 70%. This does highlight potential dangers since LLMs are subject to fabrications, hallucinations, and even totally incorrect output. Developers below 50% include hardware, database, and enterprise and embedded systems coders.

Table 2. Software Developer's Main Job and ChatGPT Use

Main Job	Use ChatGPT	Total Count	Percentage Use ChatGPT
Student	457	619	74.00%
Marketing or sales professional	10	14	71.00%
Senior Executive (C-Suite, VP, etc.)	647	920	70.00%
Data scientist or machine learning specialist	896	1,282	70.00%
Blockchain	189	281	67.00%
NA	1,502	2,266	66.00%
Developer Advocate	91	138	66.00%
Developer, front-end	3,041	4,698	65.00%
Engineering manager	945	1,511	63.00%
DevOps specialist	655	1,061	62.00%
Developer, full-stack	15,188	24,720	61.00%
Educator	68	111	61.00%
Engineer, data	655	1075	61.00%
Developer, mobile	1,510	2,493	61.00%

Main Job	Use ChatGPT	Total Count	Percentage Use ChatGPT
Product manager	103	171	60.00%
Cloud infrastructure engineer	474	790	60.00%
Data or business analyst	188	320	59.00%
Project manager	154	264	58.00%
Security professional	109	194	56.00%
Developer, QA or test	217	392	55.00%
Other (please specify):	812	1471	55.00%
Developer Experience	162	298	54.00%
Developer, back-end	7255	13420	54.00%
System administrator	81	152	53.00%
Academic researcher	286	537	53.00%
Engineer, site reliability	160	314	51.00%
Research & Development role	533	1050	51.00%
Developer, game or graphics	371	738	50.00%
Scientist	70	144	49.00%
Database administrator	47	99	47.00%
Hardware Engineer	64	144	44.00%
Developer, desktop, or enterprise applications	1576	3687	43.00%
Developer, embedded applications, or devices	733	1766	42.00%
Designer	39	97	40.00%

Trust in AI tools

Attitudes towards AI have a very strong impact on usage. Those who have a very favorable stance on the use of AI in the development workflow have an 86% ChatGPT usage (Table 3). For those who have a highly unfavorable stance the usage is still 55% but this is on a very low response count. Over 76% of the developers had a favorable view of AI LLMs in the development workflow and only 2% had an unfavorable view.

Table 3. Attitude towards AI and ChatGPT Usage by Software Developers

Attitude	Use ChatGPT	Total Count	Percentage Use ChatGPT
Very Unfavorable	110	199	55.00%
Unfavorable	733	1,305	56.00%
Indifferent	4,708	7,884	60.00%
Favorable	17,237	22,717	76.00%
Very favorable	11,142	13,002	86.00%
Unsure	938	1,821	52.00%

Table 4 shows some significant impact on trust in AI and Usage of ChatGPT. Those who highly trust use ChatGPT at a 76% rate while those who highly distrust have a usage rate of 68% rate. This difference is statistically significant at p<.001 via linear regression. The data may be somewhat skewed since many developers appear to have skipped this question.

Table 4. Trust in AI and ChatGPT Usage by Software Developers

Attitude	Use ChatGPT	Total Count	Percentage Use ChatGPT
Highly Trust	865	1,139	76.00%
Somewhat Trust	14,302	17,696	81.00%
Neutral	10,475	14,789	71.00%
Somewhat Distrust	7,359	10,514	70.00%
Highly Distrust	1846	2721	68.00%

Next, we performed a correlation analysis between the trust of accuracy of AI and how favorable you view AI tools as part of the development workflow. We found a significant correlation at $p < .001$ via correlation analysis but this correlation was limited, accounting for only about 15% (r squared) of the variance.

Table 5. Correlation Trust and Attitude

		Trust	Attitude
Trust	**Pearson Correlation**		**.375****
	Sig. (2 tailed)		<.001
	N	8,597	8,591
Attitude	**Pearson Correlation**	**.375****	
	Sig. (2 tailed)	<.001	
	N	8591	8607

The findings presented in Table 6 corroborate existing literature by indicating a negative correlation between age and the likelihood of utilizing ChatGPT among developers. The correlation was significant at $p < .001$ with a coefficient of -.078. As outlined in the literature review, younger cohorts typically exhibit a higher level of technological fluency and comfort, encompassing conversational AI such as ChatGPT. Consequently, they may employ it as a convenient means to swiftly access information, receive coding assistance, or engage in casual conversation.

Table 6. Age and ChatGPT Usage by Developers

Age	Use ChatGPT	Total Count	Percentage Use ChatGPT
18-24 years old	7,945	11,002	72.00%
25-34 years old	17,496	28,848	61.00%
35-44 years old	9,271	17,304	54.00%
45-54 years old	3,105	6,487	48.00%
55-64 years old	941	2,449	38.00%
65 years or older	151	594	25.00%
Prefer not to say	55	131	42.00%
Under 18 years old	324	422	77.00%

Education and ChatGPT

The adoption of ChatGPT among developers is not limited to any specific education level (Table 7).

Table 7. Education and ChatGPT Usage by Developers

Education	Use ChatGPT	Total Count	Percentage Use ChatGPT
Associate degree (A.A., A.S., etc.)	1,339	2,201	61.00%
Bachelor's degree (B.A., B.S., B.Eng., etc.)	18,687	31,498	59.00%
Master's degree (M.A., M.S., M.Eng., MBA, etc.)	9,311	17,223	54.00%
Primary/elementary school	323	478	68.00%
Professional degree (JD, MD, Ph.D, Ed.D, etc.)	1,279	2,590	49.00%
Secondary school	2,588	3,949	66.00%
Some college/university study without earning a degree	5,280	8,437	63.00%
Something else	481	861	56.00%

Trust in AI tools

It is not surprising that the adoption of AI tools is influenced by the level of trust users place in them (Table 8). Interestingly, even when users harbor distrust towards the technology, they continue to utilize the tool. This trend is evident in the table, where nearly 68% of respondents who expressed high levels of distrust in technology still reported using it. There was a significant relationship between Trust and Use at $p < .001$. The correlation coefficient was -.042. This was calculated via linear regression. Lower trust results in lower usage.

Table 8. Trust in AI and Use

	Use ChatGPT	Count	Percentage Use ChatGPT
Highly trust	865	1,139	75.90%
Somewhat trust	14,302	17,696	80.80%
Neither trust nor distrust	7,359	14,789	70.80%
Somewhat distrust	10,475	10,514	70.00%
Highly distrust	1,846	2,721	67.80%
Total	34,847	46,859	74.50%

Younger developers trust AI tools slightly more than older people (Table 9). Younger developers may find ChatGPT more trustworthy, especially if they're accustomed to interacting with AI-driven tools and platforms in their daily lives. Additionally, as AI technology continues to improve and becomes more integrated into various aspects of development workflows, younger developers may be more likely to trust AI assistants like ChatGPT for assistance and support in their work. However, individual trust may vary based on personal experiences, work atmosphere and perceptions of AI technology.

Table 9. Age and Trust in ChatGPT by Developers

Age	Highly distrust	Somewhat distrust	Neither trust nor distrust	Somewhat trust	Highly trust
18-24 years old	4.00%	16.00%	23.00%	32.00%	2.00%
25-34 years old	4.00%	16.00%	23.00%	27.00%	2.00%
35-44 years old	4.00%	16.00%	22.00%	24.00%	1.00%
45-54 years old	4.00%	14.00%	21.00%	21.00%	1.00%
55-64 years old	4.00%	11.00%	19.00%	19.00%	2.00%
65 years or older	3.00%	9.00%	16.00%	15.00%	2.00%
Prefer not to say	9.00%	11.00%	14.00%	11.00%	2.00%
<18 years old	4.00%	12.00%	18.00%	41.00%	4.00%

Table 10 shows the education level along with the level of trust in ChatGPT. Table 11 shows that trust in ChatGPT is not necessarily based on education level but rather about familiarity and experience with AI technology. Table 11 indicates that those with less experience coding tend to have more trust in ChatGPT. This may be due to the age of the coder and their exposure to AI technology. Conversely, some developers might remain skeptical or cautious regardless of their education level, especially if they haven't had much exposure to AI technology or if they harbor concerns about privacy, security, or reliability.

Table 10: Education and Trust in ChatGPT

	Highly distrust	Somewhat distrust	Neither trust nor distrust	Somewhat trust	Highly trust
Associate's degree	4.00%	15.00%	23.00%	28.00%	2.00%
Bachelor's degree	4.00%	16.00%	22.00%	28.00%	2.00%
Master's degree	4.00%	15.00%	22.00%	24.00%	2.00%
Primary/elementary school	5.00%	13.00%	21.00%	30.00%	6.00%
Professional degree	5.00%	15.00%	18.00%	23.00%	2.00%
Secondary school	4.00%	16.00%	22.00%	27.00%	1.00%
Some college/university	5.00%	16.00%	22.00%	27.00%	1.00%
Something else	5.00%	15.00%	22.00%	21.00%	2.00%

Table 11: Years Coding and Trust in ChatGPT

Years Coding	Highly trust	Somewhat trust	Neither trust nor distrust	Somewhat distrust	Highly distrust
1 to 10	2.00%	32.00%	24.00%	16.00%	4.00%
11 to 20	1.00%	24.00%	22.00%	16.00%	4.00%
21 t0 30	1.00%	21.00%	20.00%	16.00%	4.00%
+30	1.00%	16.00%	19.00%	13.00%	5.00%

Limitations and Future Research

While this study provides valuable insights into the differences in age groups in the adoption of ChatGPT among software developers, there are a few limitations that should be acknowledged. The first limitation is the lack of assessment of leadership capabilities. Familiarity of technology does not necessarily equate to leadership potential. This aspect warrants further investigation.

The next limitation is the lack of assessment of respondents' actual level of expertise with ChatGPT or any AI tools. This study focused only on the respondents' acceptance, attitudes, and trust of ChatGPT. This, along with the leadership component, limits our ability to draw conclusions regarding the readiness of respondents to lead the adoption of AI technologies.

This study used a secondary dataset composed of self-reported responses. The data may have various biases present, including social desirability and recall bias. In addition, there could be potential bias in the administration of the survey. Both of which could affect the accuracy of the reported attitudes and behaviors. These factors should be considered when interpreting the results. The study used 2023 data and reflects usage in that time period. The use of AI among developers is in a constant state of flux and may differ at this time, but this represents the initial advent of AI into code and this represents a useful benchmark for future study. Future work can be undertaken to determine longitudinal changes. Finally, the generalizability of our findings is restricted by the dataset used. The way the data was collected, the demographic and geographic distribution of the respondents may not reflect the broader population of software developers globally.

Future researchers should try to address these limitations by looking at the following areas. First, a study that assesses leadership competencies among the different age groups as well as measuring their ChatGPT skills, would help in determining whether younger developers are indeed equipped to lead AI initiatives. Second, future researchers should look to conduct primary data collection to ensure there is a diverse and representative sample that would help with the generalization of the findings. In addition, they may consider conducting a longitudinal study to track any changes in attitudes and skill level over time as AI tools and technologies evolve. Lastly, future researchers may wish to review the organizational and cultural factors which might play a factor in the adoption of AI by the software developers. By addressing these factors, future studies will help deepen our understanding of how the dynamics between age groups contribute to the adoption of emerging technologies in software development.

Conclusions

Younger developers tend to use ChatGPT more often than their older counterparts, likely due to their familiarity and comfort with various AI tools. These younger developers are more likely to be on board with the adoption of disruptive technologies like ChatGPT. The level of education does not appear to influence the use of ChatGPT among developers, although having a deeper understanding of AI topics might enhance usage. Trust in AI is generally higher among younger developers, possibly because they use AI tools both personally and professionally. Developers who view AI positively in their workflows are more inclined to use ChatGPT. These findings can guide organizations in leveraging younger developers' familiarity with AI tools to facilitate the broader adoption of ChatGPT and similar LLMs in software development. Assisting developers in gaining a deeper understanding of AI concepts related to the use of LLMs in their development, as well as teaching them to use these tools reliably, could lead to a more favorable overall perception of AI among developers as well as higher productivity among professionals.

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