Effects of AI on Tech Jobs:
What is the Future of Software Engineers in the Age of AI?
Identifying Strategies for Mitigating Skill Gaps.

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Research Problem

The modern job marketplace for tech jobs, and in particular Software Engineering field, is undergoing a massive shift due to a rapid adoption of generative Artificial Intelligence (AI) tools. Tools such as GitHub Copilot, large language models (LLMs) and AI-driven testing agents are being integrated into workspaces and utilized in many aspects of software design and development, including code generation, bug fixes and security. This is not only fundamentally transforming the software development lifecycle, but also affecting human employees in ways that society only begins to understand.

The main research problem of this research project is to analyze the structural impact of AI-associated augmentation on the traditional software engineering job market, with a focus on displacement of existing human roles versus the creation of new ones, and identifying the resulting skill gaps that threaten early career viability.

This issue is important because software engineering has long been considered a high-growth meritocratic profession, with a social and economic impact that goes beyond software development. With the advent of Artificial Intelligence, however, the tasks that are being automated are predominantly tasks traditionally performed by junior and mid-level developers, including code debugging and UI implementation. This creates a "hollowing out" effect in the entry-level pipeline of Software Developers, potentially eliminating the crucial apprenticeship phase where new engineers gain foundational experience and have an ability to enter the marketplace.

The proposed research project will investigate the following parameters. Job displacement due to AI automation (layoffs, team movement, etc.) and hiring decline in the entry-level roles. The research will also explore skill gap mitigation strategies.

Literature Review

The article “Canaries in the Coal Mine? Six Facts about the Recent Employment Effects of Artificial Intelligence” by Erik Brynjolfsson, Bharat Chandar, and Ruyu Chen (2025) examines how AI is beginning to affect employment in the United States across the broader market, including software development, marketing, customer service, and health care. The authors used real data from ADP payroll records to study how jobs have changed since generative AI tools such as ChatGPT and Claude became popular. Their research found that the impact of AI is showing up most strongly among young, entry-level employees between the ages of 22 and 25, suggesting that these workers are the first to feel the real effects of automation.

The paper presents six main facts based on their findings. First, there has been a major decline in employment for younger workers in AI-exposed jobs such as software developers and customer service representatives, while employment for older workers in the same fields has stayed steady or slightly increased. Second, although overall employment in the economy continues to grow, job growth for younger workers has stalled, showing that the slowdown is concentrated among those just starting their careers. Third, AI-driven automation is responsible for most of the decline, while occupations that use AI for augmentation where technology helps workers rather than replace them show higher productivity and job stability. Fourth, these results remain even after accounting for company or industry-level factors, which means the decline is not caused by firm-wide shocks but by AI exposure itself. Fifth, the adjustment is happening mainly through employment rather than wages, as companies are hiring fewer people instead of cutting pay. Sixth, the results are consistent across different job

types, education levels, and industries, proving that AI's early impact is widespread and not limited to the tech sector (Brynjolfsson et al., 2025).

This article is both interesting and concerning because it provides strong evidence that AI has already replaced certain types of jobs, especially among younger software engineers who are just beginning their careers. Even though AI is still in its early stages, it is already creating uncertainty across the technology industry. Many new graduates in computer science are facing hiring freezes or fewer job openings, which can be discouraging, especially for those who have invested years of study and carry student loans. This situation could lead to higher stress and pressure among young professionals. Educational institutions need to move faster to prepare students for this shift by offering courses that teach how AI actually works, how it processes data, learns patterns, and generates results so students can work with AI instead of being replaced by it. Understanding how to design, apply, and manage AI systems, while developing strong critical-thinking and problem-solving skills, will help future workers stay employable and turn AI into an advantage rather than a threat.

In their 2025 article titled "*Impact of AI on Software Engineering Jobs,*" researchers Abhik Roychoudhury and Andreas Zeller start by addressing two misconceptions about software engineering:

> First, software engineering is much more than producing program code. At least half of the effort in software engineering is about maintaining and understanding existing software. Second, code is more than just text—it has a formal syntax, it has semantics, and it can be executed, tested, and analyzed. (Roychoudhury & Zeller, 2025)

While people fear that Artificial Intelligence (AI) will take the jobs of software engineers away due to their ability to generate code, they lack the ability and insight to truly manage software. Roychoudhury and Zeller share that Large Language Models (LLMs) do not inherently worry about security risks nor safety properties or compromising functionality (Roychoudhury & Zeller, 2025). While not perfect, the LLMs are good at helping humans identify bugs. It is advised for software engineers to monitor the suggestions from the LLM. However, Roychoudhury and Zeller expect that non-critical software will be automated in the future (Roychoudhury & Zeller, 2025).

The researchers investigate the problem that LLMs tend to face as they replicate code based on already solved problems from training data. “The fundamental challenge is that with each new line of code, the possibilities in execution multiply, and it takes humans (and automated tools) lots of effort to abstract over all these possibilities” (Roychoudhury & Zeller, 2025). They suggest an alternative way for LLMs to be trained to help reduce the complexity steps that are wasted on traditional LLM model data by code executions rather than by code sequences (Roychoudhury & Zeller, 2025).

Ultimately, the authors find that AI does not have the capability to fully replace software engineers. The one problem the researchers did not elaborate on was with the power of automating monotonous tasks with AI, how this will impact entry-level developers as monotonous tasks like testing and debugging code responsibilities are being demoted to AI.

In the article “The Impact of Generative AI on Job Opportunities for Junior Software Developers” written by Samuel Westby and Alicia Sasser Modestino, the

authors investigate the effects that a rise in Generative Artificial Intelligence (AI) usage has on employment and career opportunities of junior software developers.

The study evaluated shifts in hiring trends in the aftermath of the release of ChatGPT 3.5 by analyzing online job vacancies data for software engineer roles and identifying changes in demand for junior software developers.

The main finding of this research is that “nearly all computer-related roles had some reduction in junior hiring” (Modestino & Westby, 2025). Furthermore, when analyzing the trends in hiring, the skills increasingly in demand for software engineer roles were Artificial Intelligence or Machine Learning. These job ads, however, were not only asking for such skills but also experience. “Between October 2022 and October 2024, the monthly share of software developer vacancies asking for AI/ML skills rose from 10.5% to 13.1%. During this same period, the number of junior-level vacancies requiring at least one AI/ML skill dropped by 86.1%” (Modestino & Westby, 2025).

The above findings are pointing at an increasing skills gap where in order to enter the tech job market, junior software developers must have extensive knowledge and experience of AI-related tools, Machine Learning or other in-demand related skills. These findings have important policy implications because it can further help to identify how educational programs can be adjusted to provide newly minted software engineers with hands-on skills and experience that are increasingly in demand in the modern job marketplace.

The common theme among three articles that were analyzed is a profound effect that AI is having on the software development roles, particularly the “hollowing out” effect for junior software engineers. Brynjolfsson et al. provide empirical evidence from

payroll records, showing a major decline in employment for younger workers in AI-exposed jobs. This is further supported by Westby and Modestino's job vacancy analysis, which found that "nearly all computer-related roles had some reduction in junior hiring" (Modestino & Westby, 2025) following the release of ChatGPT. As noted by Roychoudhury and Zeller, AI tends to automate certain monotonous tasks, testing and debugging, which are commonly the very tasks traditionally assigned to entry-level developers to build foundational experience. All of these findings are pointing towards increasing skill gaps that affect junior software developers ability to enter the workforce at a time when Generative AI tools are transforming the tech job market as we know it.

The important implications of these findings indicate that the demand for knowledge, skills and experience with Generative AI tools, Machine Learning, and other related technologies continues to rise. It is imperative that the strategies for mitigating these skill gaps are investigated and identified in order to provide recent graduates with means to effectively address the rising disparity in employment opportunities. While the demand for AI expertise is shifting overwhelmingly to experienced candidates, in order to remain employable, future software engineers must possess extensive, hands-on knowledge of how AI works, how to employ it, and how to manage its systems. This necessitates a rapid adjustment in educational programs in order to equip students with critical-thinking and problem-solving skills to navigate a rapidly evolving job landscape.

Research Question:

What are the strategies for mitigating skill gaps caused by implementation of Generative AI technology in the modern tech workplace for the Junior Software Engineers?

Research Design

Interview Questions

- In what ways do you find AI handling of low-level tasks affects entry-level software engineers?

- Considering the impact of AI in the tech landscape today, in what ways, if any, has AI influenced your work or career decisions?

- Describe a time when you or someone you know had been laid off, moved to another team or demoted as a result of generative AI technology integration at your workplace?

- Tell us your concerns about potentially being laid off in the future due to generative AI technology integration at your workplace?

- Describe some strategies you think software engineers might use to stay competitive as AI tools evolve?

- Is there a kind of a safety net that society might need to consider in order to address the rise of AI taking over software engineering in the job market?

Target Audience

The target audience include Software Engineers who currently have a job or who recently were laid off and are looking for a job, as well as junior recent graduates who are looking for a job. The target audience is not restricted by age, gender, race or income level. The primary characteristic is that the person is either currently in a Software Engineering job, has recently been laid off from a Software Engineering job or is a recent graduate looking for a job.

Interview Participants Recruitment

Participants will be recruited live in person at tech events where people from tech industry, as well as job seekers, gather to discuss their current tech jobs, job opportunities and other Software Engineer job market related topics. The questions will be shared to the participants verbally during in person interviews and the interviews will be audio-recorded.

Team Interview Response Deadline

In order to provide enough time for data processing, our team aims to conclude interviews by November 30th, 2025.

Description of Conducted Research

The research conducted by the research team includes interviews with members of the target audience. The below data includes the details about interviews conducted,

such as summary and collection methods. The interview transcripts are provided in the Appendix. It also includes information about the interviewees and their background, describing their belonging to the target audience.

Interviewee # 1: Hugh

Interviewed by: Vivian Le

Interviewee background: Senior Software Engineer currently working at a large established tech company. Software Engineers are the target audience for our study, and as an experienced engineer, he can provide a valuable insight into how AI affects his role and the software engineering field overall.

Summary: The interviewee mentions that in order to stay employable Software Engineers must learn and know how to use AI extensively. He also states that he expects most companies to start requiring AI expertise from the incoming job applicants.

Interview method: Questions were provided to the interviewee by email and received from the interviewee in written form via email.

Interviewee #2 : Shawn

Interviewed by: Dakota Hyman

Interviewee background: Software Engineer & Electrical engineer. The interviewee is a part of the research target audience as he is working in the tech field and has the opportunity to observe the effects of AI implementation in the workplace.

Summary: The interviewee has noticed a lot of changes in the job market due to AI, but does not see it as a problem. They see AI as something worth getting into, not to be denounced as a replacement, but as an opportunity.

Interview method: Questions were provided to the interviewee through Discord digital communication web-based application and he responded through the same medium.

Interviewee # 3: John

Interviewed by: Alexandra Miller

Interviewee background: Software Engineer who is currently looking for a new job.

The interviewee is a part of the target audience because he is a Software Engineer who is currently looking for a new job and has extensive professional experience using AI in the workplace, as well as observing the effects of AI implementation in the workplace.

Summary: The interviewee raises concerns about AI effects on the future of employment, in his view fewer jobs will be there. He also states that in order to stay competitive, Software Engineers have to learn AI tools, particularly LLM engineering.

Interview method: Questions were provided to the interviewee digitally via notepad.link and received from the interviewee in written form via notepad.link shared notes web app.

Findings

Based on the three interviews conducted, several patterns appeared in how participants view the impact of generative AI on junior software engineers. Two of the three interviewees said that AI can replace low-level or entry-level tasks that junior engineers typically rely on for early skill development. One interviewee disagreed, saying that even when AI produces code, someone still needs to review it and make sure it functions correctly, so some hands-on learning remains (Shawn, personal communication, December 1, 2025).

When asked about the broader career impact, two of the three interviewees felt that AI will affect software engineering roles negatively. They believed recent job cuts in tech are linked to AI adoption, and expressed concerns about fewer available opportunities for their current roles. The third interviewee viewed the changes as part of a normal industry shift and still considers software engineering a strong long-term profession, albeit he also stated that while “there are many opportunities brought upon by AI, if you don’t use it, you will be left behind as many companies are adopting technology” (Shawn, personal communication, December 1, 2025).

All three interviewees said that software engineers must learn to use AI tools or consider moving toward AI-related roles in order to stay competitive. When asked about a safety net for software engineers as AI adoption increases, all interviewees alluded that in their view currently there is no such safety net, it is yet to be developed. “I don't think we're quite there yet” (Hugh, personal communication, December 1, 2025). Furthermore, interviewee number three expressed his belief that in order for such a safety net to be considered by the government, it is likely that the broader impact of AI

on human jobs as a whole and its impact on society might serve as a catalyst for developing such a program.

Synthesis and Research Question

The interview responses help address the research question about strategies for mitigating skill gaps caused by generative AI. Since low-level tasks are becoming less available, junior engineers may need to update their skillsets for the evolving landscape.

The interviews suggest that staying competitive requires intentional upskilling. All participants pointed to AI literacy - being able to use AI tools effectively or understanding AI-related technologies - as an important employment strategy. Since all interviewees acknowledged the current lack of a formal safety net and primary strategies remain focused on individual skill-building, a future safety net program consideration may suggest training that combines skill development and AI expertise.

Overall, the responses show that junior engineers may need to adjust how they learn and grow in an AI-augmented environment, and organizations may need to consider new training approaches in order to support early-career talent effectively.

Conclusions

Based on the conducted research, the main conclusion is that due to the rapid integration of AI into the software development infrastructure pipeline, junior engineers need to know how to use AI tools effectively in order to be able to meet the demands of modern work environments. Subsequently, as AI is becoming a part of everyday development work, understanding how to work with these tools is no longer optional. Furthermore, due to the current lack of safety nets for software engineers displaced by AI, there is a potential need for training programs and educational reforms that may help with closing the skill gap caused by the fastly evolving tech landscape.

In order to address the research question in a substantive way, the questions administered to the participants were purposefully designed in an open-ended manner, allowing interview respondents to truly share their experiences and expand on matters surrounding this issue. This strategy allowed the research team to gather enough data to analyze, process and compile valuable results, culminating in some distinct emerging patterns of thought and spurring fresh ideas to the surface. The interviewees provided a range of astute answers, which in turn gave the research team a wide array of data points for analysis, proving highly useful in addressing the research question. The research question was focused on determining the strategies for closing the skills gap in junior engineers caused by rapid integration of AI. The respondents provided clear and definitive answers regarding such strategies, pointing to the need for AI-focused training and education for software engineers in order to remain competitive in the marketplace.

The conclusion that AI skills training is necessary for junior software engineers is supported by research findings in the following manner. A strong pattern that emerged

after analyzing every response from the interview participants showed that every single interview respondent expressed that AI literacy is fundamental to remaining competitive in the tech field. One respondent was even more blunt, “if you don’t use it, you will be left behind” (Shawn, personal communication, December 1, 2025).

With all respondents acknowledging a lack of current safety net for displaced engineers and some expressing their fears of losing jobs or having less opportunities if they don’t bring their AI skills up to date, it’s becoming increasingly clear how important this issue is. One interviewee stated that he sees “learning how to use those AI tools, going into LLM engineering” as a primary strategy for mitigating the effects of AI implementation in the workplace (John, personal communication, December 1, 2025). Overall, the findings provide support for the idea that AI knowledge is on track to quickly becoming a baseline skill, rather than a specialized one.

Recommendations

Based on the current research results, the following recommendations are suggested by the research team in order to address skill gap issues arising from increased adoption of AI in tech workspaces. These recommendations are two-fold and involve educational institutions curriculum reforms and government-coordinated programs establishing retraining opportunities for software engineers displaced as a result of AI disruption.

While the Computer Science curriculum taught in educational institutions across the nation has always been fastly evolving, the dramatic rise of AI and the rate of its adoption in society as a whole might prove to be a kryptonite. In just a few short years,

OpenAI's ChatGPT went from a shiny new object to a conglomerate with a multi-billion dollar valuation, running amok across multiple industries while hitting the software development field particularly hard. The IDEs (Integrated Development Environment) that software engineers use for programming, the operating systems, the remote code version control repositories (i.e. GitHub), and other core essential tools that software developers use on a daily basis - nearly all of them now have an AI component. Even without touching on advanced topics like Machine Learning and Natural Language Processing, there is no way around the fact that AI at this point has fully integrated itself in the process of Software Development Lifecycle (SDLC).

In order to be able to equip college graduates with relevant skills, educational institutions are recommended to commission reforms to the existing Computer Science curriculums in order to include tools and topics that help students achieve AI proficiency. Such subjects can include "Generative AI Fundamentals", "AI Prompt Engineering", "Machine Learning", "Large Language Models" and "Building AI Agents". These changes would allow students to maintain a competitive edge while entering the job marketplace and meet the demand for the sought-after AI skills.

Another recommendation is for the state government to establish retraining programs for workers displaced as a result of AI-fueled disruption. Such programs can be implemented via grants provided by the state leadership to non-profit organizations, which in turn would administer the training to the community. While large companies such as Google and Meta might be able to afford retraining programs for their workers within their own business environments, displaced engineers from smaller companies may find it difficult to situate themselves. As AI continues to take the world by storm, it is

incumbent upon the state governments to think ahead and identify potential social disruptions. Having mitigating measures in place that may soften the blow of mass lay-offs, while providing opportunities for retraining and skill development to those affected can allow for a smoother transition to the future workforce.

In the light of the above, recommendations for future research include exploration of the changes in hiring practices as it relates to the adaptation of AI Agents. For instance, are there particular fields where the hiring slowed down, while the rate of AI implementation has increased? Identifying and predicting the shifts in trends of hiring practices can allow for a more efficient planning and development of skill retraining programs by the government. This effort can be a joint undertaking between the tech industry AI specialists from such companies as OpenAI, and University-based researchers from educational institutions across the country. Such exploration may provide a crucial insight into the future of the workforce, reshaped by AI as we know it.

References

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Appendix

Interview Transcripts

Interviewee # 1: Hugh

Interviewed by: Vivian Le

Question: In what ways do you find AI handling of low-level tasks affects entry-level software engineers?

Hugh: When I work with entry-level and junior engineers, I will assign them easier tasks to work on. As they gain more and more experience, their tasks and expectations on their performance also increase. This is how we differentiate stronger engineers - they are the ones that will grow in experience, and expand their capabilities readily. But they all generally start at the same level. If AI takes away these low-level tasks, it will change how we need to train and develop new engineers into seasoned, senior engineers.

Question: Considering the impact of AI in the tech landscape today, in what ways, if any, has AI influenced your work or career decisions?

Hugh: I've considered shifting into AI development but found that it is an entirely different class of software development. A lot of my knowledge around building good software products and experiences, would not be useful. However, adoption and usage of AI tools is a must. I've gradually incorporated AI tools into my everyday development and am looking to expand my usage of it to increase my software quality and development velocity. I expect that all employers will require engineers to be proficient

in AI tools and expect that development time will be significantly reduced across the board.

Question: Describe a time when you or someone you know had been laid off, moved to another team or demoted as a result of generative AI technology integration at your workplace?

Hugh: I've had co-workers laid off, but do not believe it was related to AI. However, a co-worker that quit has not yet been replaced and I believe this is directly related to the expectation that AI tools can increase the productivity of current engineers without the need to add more engineers.

Question: Tell us your concerns about potentially being laid off in the future due to generative AI technology integration at your workplace?

Hugh: To answer the question, you'll have to make note that there are different types of software engineers and it's not just about experience level. Everyone agrees that AI focused engineers will be growing a lot. However, I see a decline in other types of software engineers (backend, front-end, database, UI, iOS, etc) . I'm in that boat and so there is a potential of being laid off simply because they need fewer full-stack engineers because of the productivity gains that AI provides. For example, instead of needing 10 such engineers, you'll maybe need only 5.

Question: Describe some strategies you think software engineers might use to stay competitive as AI tools evolve?

Hugh: As I mentioned earlier, engineers today must know and use AI tools extensively. Use it to increase your productivity. I expect all companies will start to require some level of expertise in some AI tools. This includes how to prompt, verify, build agents, etc. For new software engineers that are interested in the AI domain, I strongly suggest they embrace it fully.

Question: Is there a kind of a safety net that society might need to consider in order to address the rise of AI taking over software engineering in the job market?

Hugh: I don't think we're quite there yet. This reminds me of the time when uber started and taxi drivers were complaining that they spent so much money on getting their medallions but are now being displaced by just normal people. Just like uber, or even more so, AI is here to stay and we expect it to grow quite a lot in the coming years. I believe one possibility is to make it easier for software engineers to retrain for AI.

Interviewee #2 : Shawn

Interviewed by: Dakota Hyman

Question: In what ways do you find AI handling of low-level tasks affects entry-level software engineers?

Shawn: Entry-level jobs are a misnomer, as even AI will need someone to watch over them as they do some low-level tasks.

Question: Considering the impact of AI in the tech landscape today, in what ways, if any, has AI influenced your work or career decisions?

Shawn: It hasn't affected me at all. Sure, some jobs will disappear, but others will be created, and if it's not a problem, make your own job.

Question: Describe a time when you or someone you know had been laid off, moved to another team or demoted as a result of generative AI technology integration in the workplace?

Shawn: I've worked for many companies under contracts, so I never noticed it in many of my colleagues being laid off.

Question: Tell us your concerns about potentially being laid off in the future due to generative AI integration in your workplace.

Shawn: Similar as above, it's not a problem. There are many opportunities brought upon by AI, if you don't use it, you will be left behind as many companies are adopting technology. It may seem like an impending doom for many, but technology advancements have shifted the way things are in the job space multiple times in history.

Question: Describe some strategies you think software engineers might use to stay competitive as AI tools evolve?

Shawn: Learn to use AI, even if it is just a little bit of experience. Software engineers need to be evolving with technology. While AI is impressive to many, it has many faults

where software engineers will have to fix these faults. It can make production faster, but it can also be deceptive and cause more problems if not noticed earlier.

Question: Is there a kind of safety net that society might need to consider in order to address the rise of AI taking over software engineering in the job market?

Shawn: Not really, AI is like a trend that many companies' mass-adopt without testing. There will always be work, it's just a matter of where you are, and if you are willing to move. Society will see a fluctuation in unemployment, but nothing too major, especially for software engineers.

Interviewee # 3: John

Interviewed by: Alexandra Miller

Question: In what ways do you find AI handling of low-level tasks affects entry-level software engineers?

John: It makes entry-level SWE less necessary since the low level tasks that the entry-level engineers typically do are now automated.

Question: Considering the impact of AI in the tech landscape today, in what ways, if any, has AI influenced your work or career decisions?

John: If I were to go back in time I would probably pick a different career (like lawyer or something in finance) since AI is making less gains there (for now).

Question: Describe a time when you or someone you know had been laid off, moved to another team or demoted as a result of generative AI technology integration in the workplace?

John: I can't list any specific instances that I know of, but it seems a lot of CEOs are using gen AI as a justification for cuts (regardless of whether it's justified or not).

Question: Tell us your concerns about potentially being laid off in the future due to generative AI technology integration at your workplace.

John: The more Gen AI advances, the less necessary mid-level roles would be (my current level), and the fewer mid-level job there would be out there.

Question: Describe some strategies you think software engineers might use to stay competitive as AI tools evolve?

John: Learning how to use those AI tools, going into LLM engineering.

Question: Is there a kind of a safety net that society might need to consider in order to address the rise of AI taking over software engineering in the job market?

John: It would probably only be considered if a wide variety of careers were threatened by AI, not just SWE.