Doing Research

What is research?

To understand research, we need to understand development.

- In development, we implement a solution to a known problem.
- In research, we find a solution to a problem that we need to solve.
- In other words, development is about "Known unknown", and research is about "Unknown unknown".

LLMs and AI are changing the landscape

- AIs are amazingly good at solving the known unknowns.
- They know everything, they can make the best code, they can make any kinds of tests, and they can make documents.
- But, they can't solve the unknown unknowns, because they are basically "answering machines" to the questions that we ask.

We don't know the solution to the problem, but we know that it is worth solving.

- In development, we try to implement the known solution as efficiently as possible.
- In research, we try to find the solution as efficiently as possible.

Research & Development

- Development is about **making money**, and research is about **knowledge**.
- They are all **problem-solving** activities, but they are different in their goals and rewards.
- No developer can earn the Nobel Prize, Turing Award, or Fields Medal; they are all for research.
- Even though researchers can make something as a result, in most cases, the developer who makes it cheaper will be rewarded financially.

The Cost of Development

- Before, development was hard, and the cost of development was high, so the reward was high.
- Now, development is easy, and the cost of development is low, so the reward becomes lower than before.
- We all know why.
- The price of 'Know How' is dropping, and the price of 'Know Why' is rising.

Software Engineers are in a unique position

- So far, the focus of software engineering has been towards development: building software products and services.
- However, LLMs and AI are changing the landscape, and software engineers are now in a unique position to do research to survive and thrive in this new era.
- Even though software engineers are not doing the research per se, they have no chance when they are only doing the development.

Research Ability as a New Skill

- So, research ability is becoming a new skill that software engineers need to learn and master.
- It is not only about learning how to do research, but also about learning how to use the tools that can help us to do research, such as LLMs and AI.

What's the point of doing research?

- We define the problem that we want to solve, and we try to find a solution to it.
- We transform from "Unknown unknown" to "Known unknown", and then to "Known known".
- In other words, research is the skill of finding solutions.

- Then, we can use LLM and AI to build the system to prove our points effectively.
- This is one of the possible ways for software engineers, problem solvers, to survive and thrive in the new era of AI.
- We already have the skills and the tools for managing complexity, and we need to learn how to do research based on the software engineering skills.

The Problems You Will Solve

- The old type of problems is practically gone, as LLMs/AI can solve them too easily.
  - Making a website, building a mobile app, writing code, making a test, writing a document, etc.
  - We cannot compete with machines; we must learn how to use them to solve the problems that we want to solve.

- The new problems will be different, and they will require your problem-solving skills through research.
    - No matter what, you will be responsible for the code that you write (with or without AI), and you will be responsible for the system that you build (with or without AI).
    - How can we be responsible for the mobile app when we cannot even understand how it works? We need to learn to understand the system we build even better than before to be called "professional" software engineers.

Discussion

- If you are the CEO of a company, what skills would you want from your software engineers?
- As a software engineer, what skills do you want to learn to survive and thrive in the new era of AI?
- When the vive coding (AI-assisted coding) becomes the norm, how are you going to maintain your coding skills? Or, how would you define coding skills in the future?
- As a user of a software product, would you buy the product that is built by AI without human involvement? Why or why not?

Nobody seems to know the correct answer to these questions, mainly because the revolution just started.

However, we should be ready to adapt to the new era and learn the skills necessary to survive and thrive.

Research is one of the most important skills we need to learn. As you already know, developing research skills may open your eyes to "How to solve problems."**