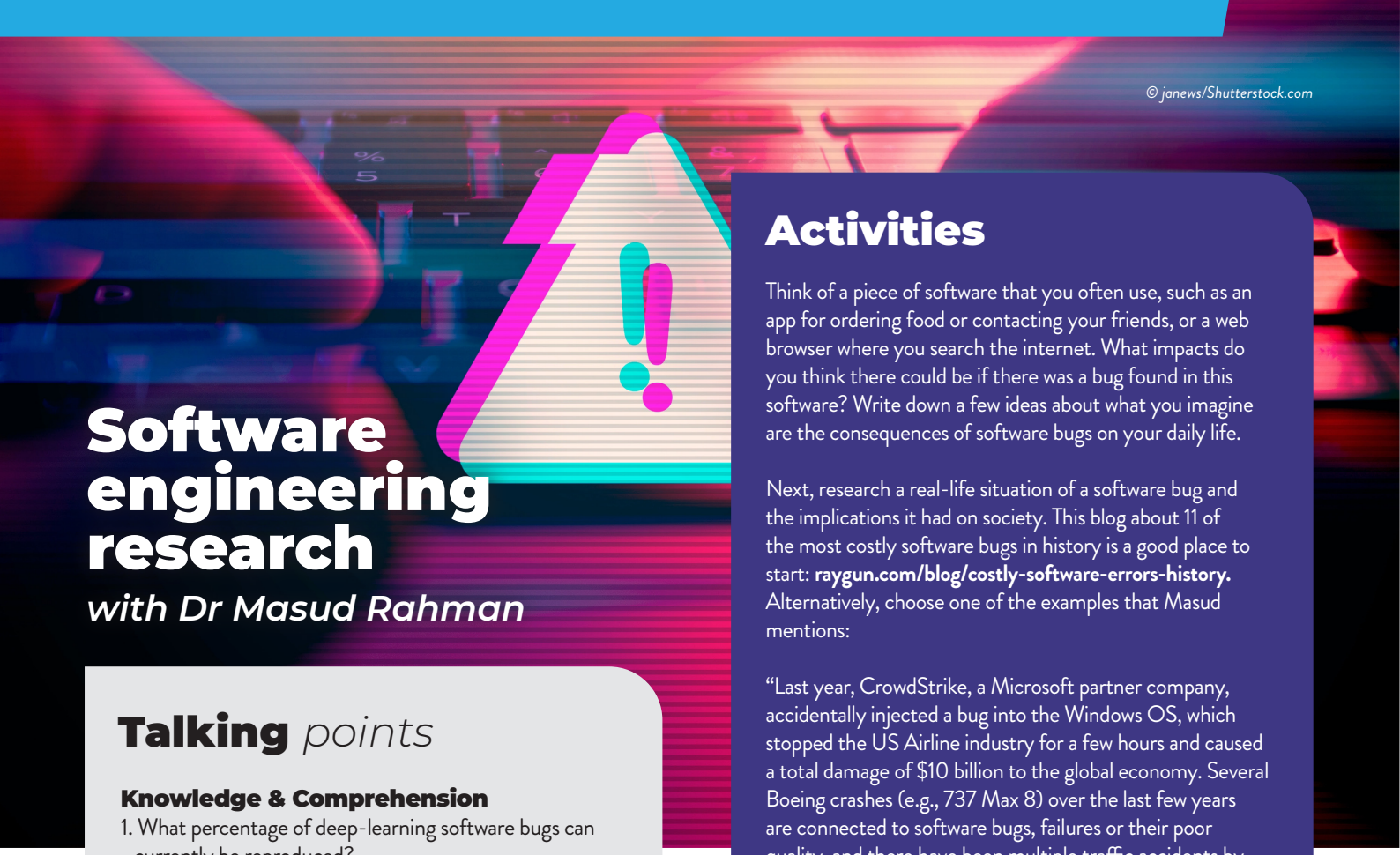

Software engineering research

with Dr Masud Rahman

Talking *points*

Knowledge & Comprehension

1. What percentage of deep-learning software bugs can currently be reproduced?
2. What is Stack Overflow?
3. Who reports software bugs?
4. What are two reasons that bug reports might not give enough information?
5. What techniques do Masud and his team use to reproduce software bugs?

Application

6. Which types of software do you use on a regular basis? Has your use of this software ever been affected by a bug and, if so, what was the impact, and how did you deal with it?

Analysis

7. Why are software bugs important, and what impact can they have?
8. Why was it easier in the past for developers to find and fix software bugs?
9. How is artificial intelligence (AI) changing the field of software engineering?

Evaluation

10. In his personal interview, Masud references a quote by Andrew Ng, that "AI is the new electricity." What do you think Andrew Ng means by this? To what extent do you agree with this quote, and why?

Creativity

11. Think about potential software that could be developed to do something that has not been done before. For example, there are now self-driving cars because of new advances in software and AI – technology that was unimaginable a few decades ago. What software do you think we might have in the future?

Activities

Think of a piece of software that you often use, such as an app for ordering food or contacting your friends, or a web browser where you search the internet. What impacts do you think there could be if there was a bug found in this software? Write down a few ideas about what you imagine are the consequences of software bugs on your daily life.

Next, research a real-life situation of a software bug and the implications it had on society. This blog about 11 of the most costly software bugs in history is a good place to start: **raygun.com/blog/costly-software-errors-history.** Alternatively, choose one of the examples that Masud mentions:

"Last year, CrowdStrike, a Microsoft partner company, accidentally injected a bug into the Windows OS, which stopped the US Airline industry for a few hours and caused a total damage of $10 billion to the global economy. Several Boeing crashes (e.g., 737 Max 8) over the last few years are connected to software bugs, failures or their poor quality, and there have been multiple traffic accidents by autonomous vehicles."

Prepare a presentation about your chosen software issue. Make sure to research and include answers to the following questions:

- What was the software, and how was it involved in the incident?
- What was the problem with the software?
- Was AI involved in the software? If so, in what way?
- What were the consequences of the bug?
- Why did the incident happen?
- How could a similar incident be prevented in the future?

Deliver your presentation to your classmates to help explain the importance of software bugs and the jobs of software engineers and software engineering researchers.

Finally, reflect on your original ideas of what you imagined the impacts of a software bug to be. How do your initial thoughts compare with what you have learnt?

More *resources*

- Visit Masud's lab website to see what the team is up to: **raise.cs.dal.ca**
- Keep up-to-date with social media software updates: **heyorca.com/blog/tiktok-social-news**
- Read this interesting article about some of the biggest software failures of all time: **rankred.com/biggest-software-failures**