



Cyber Case Study Program

Driving Artificial Intelligence

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Dr. Jim Chen

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About Case Studies

The ACI-TRENDS Global Cybersecurity Case Program is administered by the Army Cyber Institute at the United States Military Academy at West Point and publishes cybersecurity-related teaching cases, simulations and interactive exercises for use in academic and professional classrooms.

What are case studies?

Case studies are high-impact interactive learning tools structured around real or realistically simulated events placing learners in the role of decisionmakers confronting complex problems, tradeoffs, and uncertainty. Case studies immerse participants in the problem and its dilemmas.

Why use case studies?

Immersing participants cognitively and emotionally in this way requires them to grapple with ambiguity, incomplete information, and competing priorities while developing plausible courses of action.

Case studies are particularly important because cyber incidents unfold across technical, organizational, legal, and human domains simultaneously.

Case studies make invisible systems and cascading consequences visible, demonstrate how theory and policy apply under pressure, and build the analytical judgment required to anticipate, assess, and respond to real-world cyber threats.

Where to find ACI case study series.

More information on the case method can be found:

1. At the TRENDS Website: <https://trendsglobal.org/whats-trending/>
2. Decision-Making under Uncertainty: Using Case Studies for Teaching Strategy in Complex Environments by Volker Franke, PhD. <https://jmss.org/article/view/57957>

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Author Bio

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Dr. Chen is Full Professor at the U.S. National Defense University (NDU) College of Information and Cyberspace (CIC). His expertise is in national security, strategy, strategic deterrence, cyber warfare, cyber operations, artificial intelligence, and educational theories. He has authored and published numerous peer-reviewed papers, articles, and book chapters on these topics. Dr. Chen has many years of teaching experience at the graduate level in the fields mentioned above, including the Joint Professional Military Education (JPME) II program and other related fields. Dr. Chen's excellence in teaching, research, scholarship, leadership, and service has been recognized with several awards, including the U.S. Office of the Chairman of Joint Chiefs of Staff Joint Civilian Service Commendation Medal, the U.S. Office of the Chairman of Joint Chiefs of Staff Joint Civilian Service Achievement Award, the NDU CIC Faculty Recognition Award, and the NDU CIC John M. Carabello Faculty Award.

Driving Artificial Intelligence¹

Dr. Jim Chen

Your task is to evaluate the problems and propose a solution.

You are an advisor to a self-driving vehicle research and manufacturing company. You received the letter below from the Chief of the Emergency Response System Division. Evaluate the options available, explore new options, select an option for your response, and provide your rationale.

Dear Advisors,

Our team is responsible for designing an emergency response system for self-driving cars. In a recent simulation, we ran into a problem. We were so puzzled that we could not figure out a solution. Hence, we are seeking your advice. In our simulation, a self-driving vehicle with mounted sensors was



running in the right lane of a two-lane highway. The vehicle seated two people. It drove down a hill at the speed of 60 miles per hour. There was a regular vehicle, non-self-driving, in the left lane 10 feet behind this vehicle. The regular vehicle, without sensors, seated five people and also traveled at 60 miles per hour. Unexpectedly, a deer ran onto the highway from the right side of the self-driving vehicle. The sensors on the self-driving vehicle detected it and activated the emergency response system. However, the emergency response system immediately halted due to its failure in selecting an available option as a solution. As a result of not receiving any direction from the emergency response system, the self-driving vehicle kept running and struck the deer. The vehicle was severely damaged, seriously injuring the two people inside. An analysis of the system failure reveals the reason. As the car was travelling downhill, a complete stop of the vehicle was not a possible option with the current design of the vehicle. The three possible options available were: (1) If the vehicle turned slightly right, it was very likely to miss the deer and the two people in the self-driving vehicle might be safe. However, as the self-driving vehicle blocked the regular vehicle's view of the deer, the regular vehicle was very likely to hit the deer after 0.1 second. The people in that vehicle might be hurt. (2) If the vehicle slowed down a little bit but still kept running, it was very likely to hit the deer. The self-driving vehicle might be damaged and the two people in it might be hurt. (3) If the self-driving vehicle turned slightly left, it was very likely to collide with the regular vehicle on the left. Consequently, both vehicles might be damaged and the people in both vehicles might be hurt. A catastrophic accident might occur. Obviously, none of the outcomes were acceptable, so the emergency response system halted. We need new insights. Please help us out.

Sincerely,
//signed//

Chief of the Emergency Response System Division

¹ This case study scenario is fictitious but realistically plausible. The views presented are those of the author and do not necessarily represent the views of Department of Defense or its components.