A Full-stack Platform for Teaching Web Application Security

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Abstract

Web application security is a core issue that must be addressed in cybersecurity degree programs to adequately prepare students for leadership in industry. To teach a "Web Application Security" course, a good exercise platform that can cover the context of Web application is crucial to the learning outcomes. Unfortunately, existing platforms cannot satisfy both cost and efficiency requirements. In this paper, a cost-effective and easy-to-use full-stack Web application platform, ESP32-CAM, is introduced to the course, which is an Internet of Things device with a built-in face recognition Web App. Our major contribution in this paper includes the thoughtful design of an exercise series around the platform, which can provide more hands-on practice in the class, strengthen students' practical skills, and further inspire the students' learning interests on a matured technique such as Web applications. Furthermore, through this platform students can explore the cutting-edge technologies in their class projects or capstone project, e.g., "transfer learning" to extend the face recognition to emotion recognition or generative adversarial network to fool the Artificial Intelligence model, which will greatly involve students in academic research.

Keywords: Web Application Security, Internet of Things, Artificial Intelligence, Reverse Engineering, Penetration Testing, Secure Software Development.

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