Holistic Interdisciplinary Software Systems Engineering

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This presentation colorfully narrates from end to end the development of an unmanned-aerial-vehicle simulator for both classroom and research use. It demonstrates innovative modeling, simulation, visualization, and analysis and emphasizes interdisciplinary software engineering, virtual worlds and gaming, and mechatronics (the fusion of software and hardware) within a successful pedagogical framework for teaching and learning.

The narrative begins with a data-acquisition system for collecting real-world data from actual aircraft to build a software flight-dynamics model. It then details the development of a student-friendly game engine, and in particular, the instrumentation and navigation systems. Finally, it highlights visualization virtually through computer graphics and physically through a flight-simulation device fabricated in the form of a three-axis, electromechanical gimbal manipulating a fully articulated aircraft model.

The overarching theme is that so much of the difficulty in producing quality software lies in our failure to understand the subject matter and task properly. The breadth and depth of this rich pedagogical approach promotes holistic understanding by effectively using available resources, especially our own minds, through multidimensional critical thinking, investigative reasoning, scientific method, and seeing the world like an inquisitive child again.

Preview information is available at shelby.wnmu.edu/uav.