

A Gamified Course Visualization, Organization, and Assessment System  
(Technical Report)

The Impact of the Internet on Personal Autonomy  
(STS Research Paper)

An Undergraduate Thesis Portfolio  
Presented to the Faculty of the  
School of Engineering and Applied Science  
In Partial Fulfillment of the Requirements for the Degree  
Bachelor of Science in Computer Science

by

Connor Anderson

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## Preface

How are sociotechnical systems affecting personal autonomy? The internet and new ways to learn influence personal desires, values, and actions in complex ways.

Mark Floryan, a Computer Science professor at the University of Virginia, seeks to improve classes so as to increase efficacy, student engagement, and feedback. Floryan hypothesizes that gamification, topic-based learning, and knowledge estimation models may serve these purposes. The research team further developed a previous team's software project that centralizes the learning methods Floryan is evaluating. Our team improved the security and scalability of the system, aligned it with Floryan's experimental Computer Science curriculum, and developed a gamified quizzing system that estimates students' mastery of a subject as they progress through the quiz. The effectiveness of the system will be determined when Floryan uses it in future classes.

Tech companies seek to profit from internet user data and attention. Internet systems learn to induce user attention, collect data, and generate ad revenue through AI. Such systems can also spread ideas, combat disinformation, and learn who users are. These systems threaten privacy and autonomy through misuse by tech companies, marketers, foreign actors, data brokers, and others advancing financial or political agendas. To avert stricter public regulation, tech companies regulate their own platforms to prevent security threats. In relatively unregulated markets, tech companies are incentivized to collect personal data and to govern their platforms. The consequence may be called the Paradoxical Capitalist Effect, whereby markets in the internet age produce companies that threaten privacy and autonomy in ways that appear statist. These

companies must be careful to build trust through transparency, or governments will force their hand.

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