Keynote

The ABCs of Software Engineering: Affect, Biometrics, and Cognition

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Abstract:
Researchers have long investigated how people read, write, and speak about software on their computers to identify the skills, education, and practices needed to acquire expertise and perform development duties effectively and efficiently. However, until now the methods used to study developer comprehension, expression, and communication has been limited and coarse-grained because there was no way to identify what a developer thought or felt unless it was expressed out loud.

The world has changed. With the introduction of low-cost, widely available, high-fidelity biometric sensors, we can now more directly observe a software developer's cognitive and affective (emotional) processes. The ABCs of Software Engineering is a set of techniques that modernize classic approaches to program comprehension and human interaction by combining (A) principles governing the influence of human *affect* on behavior, (B) *biometric* sensors, and (C) models of *cognition* informed by advances in cognitive neuroscience. Technologies like electroencephalography (EEG), electro-dermal activity sensors (EDA), capacitive sensors, and eye trackers can reveal a software developer's internal emotional states, for example identifying when the developer is confused, frustrated, surprised, stressed, fatigued, or in a highly productive flow state. These affective states can be correlated with code quality, software complexity, development productivity, and effective communication --- the same software outcomes already correlated with developer activities in other research areas such as mining software repositories (MSR) and cooperative and human aspects of software engineering (CHASE). By developing a better understanding of what programmers think and feel when they create and maintain software, we can design tools and interventions to improve their productivity and reduce the impact of their errors.

Bio:
Andrew Begel is a Senior Researcher in the VIBE group at Microsoft Research. Andrew studies software engineers to understand how communication, collaboration and coordination behaviors impact their effectiveness in collocated and distributed development. He then builds software tools that incentivize problem-mitigating behaviors. Andrew's recent work focuses on the intersection of social computing and software engineering, and on the use of biometrics to better understand how software developers do their work, and the study and support of autistic professional software engineers.