



SPECIAL ISSUE

MACHINE ETHICS: THE DESIGN AND GOVERNANCE OF ETHICAL AI AND AUTONOMOUS SYSTEMS

Edited by A. F. Winfield, K. Michael, J. Pitt, and V. Evers

518 Designing a Value-Driven Future for Ethical Autonomous and Intelligent Systems

By G. Adamson, J. C. Havens, and R. Chatila

| INVITED PAPER | This paper provides an overview of IEEE's current activities related to ethics and argues that human values must drive our future autonomous systems in a way that both protects and benefits humanity.

526 A Value-Driven Eldercare Robot: Virtual and Physical Instantiations of a Case-Supported Principle-Based Behavior Paradigm

By M. Anderson, S. L. Anderson, and V. Berenz

| INVITED PAPER | This paper describes both simulated and real-robot implementations of an eldercare robot in which ethical principles are learned, via inductive logical programming, from a set of training examples provided by a project ethicist.

541 On Proactive, Transparent, and Verifiable Ethical Reasoning for Robots

By P. Bremner, L. A. Dennis, M. Fisher, and A. F. Winfield

| INVITED PAPER | In this paper, the authors review and update an approach to the design of ethical robots based on a simulation-based internal model, in which the ethical robot's reasoning is both transparent and verifiable.

562 Motivations and Risks of Machine Ethics

By S. Cave, R. Nyrup, K. Vold, and A. Weller

| INVITED PAPER | In this paper, the authors clarify various philosophical issues surrounding the concept of an ethical machine and the aims of machine ethics, outlining the potential risks that must be considered and managed.

575 Clarifying Privacy, Property, and Power: Case Study on Value Conflict Between Communities

By A. Ema, H. Osawa, R. Saijo, A. Kubo, T. Otani, H. Hattori, N. Akiya, N. Kanzaki, M. Kukita, K. Komatani, and R. Ichise

| INVITED PAPER | Based around a case study on the "flaming" of fan fiction, this paper aims to clarify notions of privacy and draw lessons for the ethical governance of AI in the presence of value conflicts.

582 Engineering-Based Design Methodology for Embedding Ethics in Autonomous Robots

By L. J. Robertson, R. Abbas, G. Alici, A. Munoz, and K. Michael

| INVITED PAPER | This paper explores a method for embedding ethics into the design and use of an endoscopic capsule for diagnosis and drug delivery, using a codesign approach to reduce end-user risk.

600 Inside the Organization: Why Privacy and Security Engineering Is a Challenge for Engineers

By S. Spiekermann, J. Korunovska, and M. Langheinrich

| INVITED PAPER | This paper reports on the findings from a survey of 124 engineers in order to understand the drivers and impediments facing ethical systems development with respect to privacy and security engineering.

DEPARTMENTS

502 POINT OF VIEW

The Trolley, the Bull Bar, and Why Engineers Should Care About the Ethics of Autonomous Cars

By J.-F. Bonnefon, A. Shariff, and I. Rahwan

505 POINT OF VIEW

Toward the Agile and Comprehensive International Governance of AI and Robotics

By W. Wallach and G. Marchant

509 SCANNING THE ISSUE

Machine Ethics: The Design and Governance of Ethical AI and Autonomous Systems

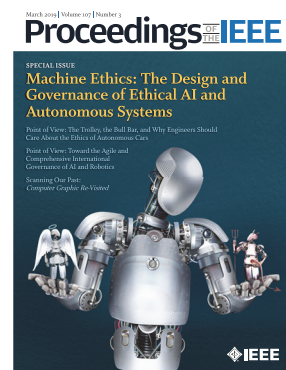
By A. F. Winfield, K. Michael, J. Pitt, and V. Evers

616 SCANNING OUR PAST

Computer Graphic Re-Visited: The Virtual Reconstruction of One of the First Computer Art Exhibitions

By J. Horáková and J. Mucha

630 FUTURE SPECIAL ISSUE/SPECIAL SECTIONS



On the Cover:
Our cover image this month tries to capture the focus of the special issue which deals with the principles and process of imbuing ethical behavior into AI. (Photo credit: Derek Bacon/Alamy Stock Photo.)