

SPECIAL ISSUE

SELF-AWARENESS FOR AUTONOMOUS SYSTEMS

Edited by N. Dutt, C. S. Regazzoni, B. Rinner, and X. Yao

976 Neurobiologically Inspired Self-Monitoring Systems

By A. A. Chiba and J. L. Krichmar

| INVITED PAPER | This article outlines the neurobiological principles for living organisms that inspire self-awareness in engineered systems, using adaptive, self-monitoring robots as an exemplar for an engineered self-aware system.

987 Multisensorial Generative and Descriptive Self-Awareness Models for Autonomous Systems

By C. S. Regazzoni, L. Marcenaro, D. Campo, and B. Rinner

| INVITED PAPER | This article provides a Bayesian multisensor signal processing framework allowing an autonomous system to perform self-supervised estimation of self-awareness models by using proprioceptive and exteroceptive dynamic descriptions of its own experiences.

1011 Verifiable Self-Aware Agent-Based Autonomous Systems

By L. A. Dennis and M. Fisher

| INVITED PAPER | This article provides an overview not only of how one can construct self-aware autonomous systems, but also of how one can potentially have verifiable, self-aware behavior.

1027 Embodied Self-Aware Computing Systems

By H. Hoffmann, A. Jantsch, and N. D. Dutt

| INVITED PAPER | This article addresses self-awareness in the context of computing platforms embodied in a physical environment, using illustrative case studies in health-monitoring, systems-on-chip, control systems, and industrial production systems.

1047 Self-Aware Neural Network Systems: A Survey and New Perspective

By Z. Du, Q. Guo, Y. Zhao, T. Zhi, Y. Chen, and Z. Xu

| INVITED PAPER | This article reviews advances in self-aware neural networks and presents a case study of a neural network system that deploys self-awareness to adapt to varying demands in performance and energy.

1068 Time Series Forecasting for Self-Aware Systems

By A. Bauer, M. Züfle, N. Herbst, A. Zehe, A. Hotho, and S. Kounev

| INVITED PAPER | This article overviews methods for time series forecasting as an important pillar for decision making in self-aware systems. It further discusses feature engineering techniques and assesses a data-center resource management case study.

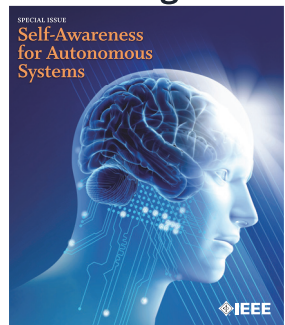
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DEPARTMENTS

971 SCANNING THE ISSUE

Self-Awareness for Autonomous Systems
By N. Dutt, C.S. Regazzoni, B. Rinner, and X. Yao

1208 FUTURE SPECIAL ISSUE/SPECIAL SECTIONS



On the Cover:
Our cover image this month is an artist's rendition of "system intelligence," which is crucial for achieving self-awareness in a system.

SPECIAL ISSUE: Self-Awareness for Autonomous Systems

1094 Synergizing Domain Expertise With Self-Awareness in Software Systems: A Patternized Architecture Guideline

By *T. Chen, R. Bahsoon, and X. Yao*

| INVITED PAPER | This article presents a foundation, a principled methodology, and case studies for synergizing human expertise with architectural design patterns for engineering self-aware and self-adaptive software systems.

1127 Acoustic Self-Awareness of Autonomous Systems in a World of Sounds

By *A. Schmidt, H. W. Löllmann, and W. Kellermann*

| INVITED PAPER | This article provides an overview of acoustic self-awareness signal processing techniques. The role of ego-noise representation and processing in autonomous systems is highlighted, and application case studies are presented.

1150 Self-Aware Networks That Optimize Security, QoS, and Energy

By *E. Gelenbe, J. Domanska, P. Fröhlich, M. P. Nowak, and S. Nowak*

| INVITED PAPER | In this article, self-awareness in networking is discussed. Examples of advantages of self-aware networks with respect to quality of service, energy, and security are presented.

1168 Self-Aware Swarm Navigation in Autonomous Exploration Missions

By *S. Zhang, R. Pöhlmann, T. Wiedemann, A. Dammann, H. Wymeersch, and P. A. Hoehner*

| CONTRIBUTED PAPER | This article presents methods for incorporating self-awareness into a swarm navigation system through a case study.

1196 Achieving Resiliency and Behavior Assurance in Autonomous Navigation: An Industry Perspective

By *S. Baruah, P. Lee, P. Sarathy, and M. Wolf*

| INVITED PAPER | This article provides an industrial perspective on self-aware autonomous navigation systems, with a focus on critical features required to achieve resilience and behavioral assurance for mission-critical applications spanning air, ground, marine, underwater, and space systems.

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