Πανεπιστήμιο Κύπρου
University of Cyprus

**School of Engineering
Department of Electrical and
Computer Engineering**

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Department of Electrical and Computer Engineering

Title: *«Semantically-enhanced Feedback Control Systems»*

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Room KENTP. E116, Old Campus – University of Cyprus

Abstract:
A usual practice of control engineers when designing control systems for specific plants, is to first come up with a model of the plant, using first principles of physics and/or approximation-based techniques. Designing a model of the plant and subsequently a controller based on that model, implies a number of logical assumptions made by the engineer. For instance, the fact that a state represented by the model is actually the temperature of a specific room in a building, is a piece of knowledge utilized by the engineer in designing a controller, but it cannot be utilized by machines to provide further automation of the control process.

With today's technology, it is possible to use widely adopted knowledge representation techniques to represent the knowledge "hidden" in a plant and semantic descriptions of all components comprising a control system. The aim is to enable a machine to make use of this knowledge representation and achieve automation of the control process in cases where the control system synthesis changes upon the occurrence of events. The presentation will start with a discussion about the key components participating in a basic feedback loop, i.e. the Plant, the Sensors, the Actuators, the Controller, as well as Functions that may be used for the processing of sensing and control signals. The semantic annotations of these components will be introduced, leading to the presentation of the way these annotations are explored to test and achieve compose-ability of the feedback loop given specific plant and components' configuration. Bipartite graphs and related concepts are used as the main tool for the semantic relations' management.

During the presentation, the application of semantic composition of services in several domains (e.g., Health, Travel, Employment Market) will be discussed in order to complete the understanding of the concepts. Then, recent work in applying the semantic compose-ability of closed loops in the Buildings domain, Electric Power System, as well as in the Water Distribution System, will be shown.

Biography:
George Milis has a Diploma in Electrical and Computing Engineering from the Aristotle University of Thessaloniki (Greece) and an MSc in Advanced Computing with specialization in Artificial Intelligence from Imperial College London (UK). Currently he is pursuing his PhD in Electrical Engineering from the Department of Electrical and Computer Engineering of the University of Cyprus (UCY), while he is working in parallel as a Researcher at the KIOS Research Center for Intelligent Systems and Networks. His current research interests are in the fields of intelligent monitoring and control of large-scale systems, exploiting the concepts and technologies of semantic interoperability and compose-ability of cyber-physical components and services.

Mr. Milis has also served as a senior ICT consultant and project manager at European Dynamics S.A (Greece) (2004-2008), and Dampier Enterprises Ltd (Cyprus) (2008–2010) participating with a key role in more than 15 EU funded projects and public tenders. Mr. Milis is a member of IEEE, of the Control Systems, Computational Intelligence, and Power and Energy technical Societies of IEEE, as well as the Technical Chamber of Greece and the Scientific and Technical Chamber of Cyprus.