

INTERVIEW

Panos Antsaklis



Panos Antsaklis is the Brosey Professor of Electrical Engineering and the Director of the Center for Applied Mathematics at the University of Notre Dame. His research addresses problems of control and automation and examines ways to design engineering systems of high autonomy, focusing on the behavior of networked embedded systems and on hybrid and discrete event dynamical systems. He is a recipient of the Kaneb Award for Excellence in Teaching at the University of Notre Dame, and he has served as President of the IEEE Control Systems Society as an IEEE Fellow. He also enjoys history and learning from its lessons.

How did you decide to study electrical engineering?

I have been interested in how things work since an early age! I disassembled and assembled everything I was allowed to get my hands on—bicycles, clocks, electric appliances—to the amusement of my father and to the worry of my mother, who was afraid that I may not be able to put them back together on time or at all. I guess the reason behind all this was not only to learn how and why things worked, but also to try to make them work better or even use ideas to design new devices!

What was your first job in the industry?

My first job was as an undergraduate spending a summer in Bern, Switzerland working at a small company that made small electric appliances. The next summer I worked at a research center in Greece programming control algorithms. I found the research work in controls much more exciting and challenging. In fact I did my graduate work in the systems and control area.

Which person in the field has inspired you most? In what ways?

I certainly admire the contributions, the dedication, and the insight of several engineers and scientists. Here I will mention just two names from long ago. The first one is Ktesibios of Alexandria (the third century BC), an engineer and the inventor of the ancient water clock, the first feedback control mechanism on record. The second one is James C. Maxwell. In the 1860s he captured the basic laws of electricity in mathematical form in his famous Maxwell equations, and also predicted the existence of radio waves. His contributions signaled the beginning of a new era where mathematics and experimental sciences work side by side and depend on one another for truly remarkable advances.

Do you have any advice for students studying electrical and computer engineering?

As an engineer you have to have your feet firmly on the ground, but at the same time your eyes should be on the horizon. Use your scientific and mathematical expertise to make sure that you are correct, but let your imagination ride on your intuition to make the next great leap forward. Great innovations do not come along very often, so make sure you are well versed in the fundamentals so that you are prepared to recognize them.

What is your vision for the future of electrical and computer engineering?

The area of electrical and computer engineering has been the driving force of a great part of our technological civilization today, and I expect this to continue for many years. Methodologies that have emerged in our discipline have played a leading role in many of the advances in a great variety of areas—from the medical field and instrumentation, to finance and analysis tools, to lasers, to MEMS and nanotechnology, from communication networks to car electronics, to aircraft avionics, and to automatic controls. It is truly remarkable how successful our discipline has been. I can only see more amazing contributions in the future. It cannot be any other way!

Are there any special projects you are currently working on that you'd like to tell students about?

Imagine a cluster of mini-satellites that communicate with each other to coordinate their actions; or a cluster of MEMS; or a million individual segments in the lens of a space telescope that periodically need to be adjusted individually to compensate for temperature changes, aging, or failures.

These are examples of systems that consist of many subsystems distributed over space, which interact with each other via communication channels that may be wireless. Such a system of systems can change dynamically with time as units come in and out of the network and typically interact with the real world and so they must meet hard and soft time constraints, as they are real time systems. Each individual unit is an information processor, a computer, and a node in a network. We have been interested in designing such systems using concepts and methodologies from the areas of hybrid systems and controls, communication networks, and computer science.