

# RoboSoft 2024 Plenary Lecture Notes

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## THE FUTURE OF ROBOTICS DOES NOT BELONG TO ROBOTICISTS

**Abstract:** This opening plenary talk at RoboSoft 2024 will provide an insight into the progression, potential, and intricacies of soft-robotics. In keeping with the central theme of this year's conference it will place particular emphasis on the use of bioinspired and fluidic technologies in the context of **exploration**.

Professor Adam A. Stokes — from The University of Edinburgh, where he holds the Chair of Bioinspired Engineering — will give his perspective of the field of soft robotics, and will elucidate the principles and applications rooted in nature that inspire advancements in engineering.

Prof. Stokes will draw attention to the challenges posed by Robotics for Extreme Environments, and the opportunities presented by the emerging technologies arising from this new field of Soft Robotics. He will highlight the potential and real-world applicability of technologies that draw on nature for inspiration in solving tough problems, and he also offers a candid perspective on the intersections and collaborations between academia and industry, and the subsequent challenges and opportunities that they present.

## Propositions

1. **The future of robotics does not belong to roboticists**
2. The **future of robotics is soft** (and hard, and both... ). Soft adds value to hard... it's a different quest not a competition.
3. Biomimicry and **bioinspired engineering** are fundamentally different quests.
4. **Materials are the foundation:** We need to learn from what we see and build from what we have
5. Extreme environments are an interesting initial application space. We should focus on robust and safe operation of simple and low-cost sub-systems that are designed for circularity.
6. Modelling the **Flow of Energy** in soft systems enables a focus on dynamics rather than kinematics.
7. **Flow** represents a new and very beneficial mode of actuating and controlling soft systems.
8. **Flow control** requires both digital and analog FLUIDIC LOGIC.
9. To reach adolescence, we — the soft robotics community — need to **play** AND we need to mature our best ideas into the application space: moving from interesting to useful.

## TALK OVERVIEW:

- 1 Introductory remarks
- 2 Engineering Soft Systems
- 3 Energy Based Modelling
- 4 Fluidic Logic
- 5 Flow
- 6 The Application Space
- 7 Conclusions



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"I DON'T KNOW WHAT THAT IS, BUT IT'S NOT ROBOTICS" - ANON ICRA REVIEW 2011

"SOFT ROBOTICS IS NOT A RELIGION." - CECILIA LASCHI

e.g. High radiation, high magnetic field, high explosion risk, low availability of materials.

Digital is relatively easy, but bulky. Analog is harder, elegant and lightweight.

We need to be more Dionysian and less Apollonian (c.f. Albert Szent-Gyorgi)