

## Who are we?

Robots like those used in the RoboCup differ little technologically from those deployed in military contexts. This proximity raises important questions: technology is not inherently good or bad-it can be used for entertainment, in healthcare or medicine, but also in problematic areas such as automated killing or targeting.

That is precisely why we engage with the ethical, technical, social and legal dimensions of such systems: autonomy, human-machine interaction, rule-based behavior, and the role of humans-including the concept of "Meaningful Human Control."

We are part of the RoboCup, but also of an interdisciplinary research project that, from a peace and conflict studies perspective, examines autonomous weapon systems (AWS). Ostfalia University specifically uses RoboCup as an analytical tool to apply key questions about autonomy and control to the military context.

This flyer provides insight into the work and core themes of our research network.

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<https://meaningfulhumancontrol.de/en/home/>



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## Robots for good

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## Robots for evil



## Autonomy

### Did you know that *autonomy* is not equal to autonomy?

From a technical perspective, autonomy refers to a self-determined system that functions independently of human input and decides for itself how to solve a particular task. From a social science perspective, however, autonomy must be understood in a human context: autonomous technologies are created by humans and are therefore part of a complex network of interactions. This ensures human decision-making and agency, legally and otherwise.

Autonomous systems are used to play soccer, assist in search and rescue missions, entertain, or tackle logistical challenges. Yet, the underlying technology is not fundamentally different from that used in military applications—where systems navigate complex environments, make tactical decisions, perform surveillance tasks or engage targets.

This doesn't mean that RoboCup is dangerous. Rather, our goal is to raise awareness that technological issues are rarely black or white. Most challenges defy simple categorization and fall into areas marked by blurred boundaries

## (Human) Control

The robots presented here are fully autonomous systems that determine their actions based on predefined tasks. Two *control* mechanisms are designed to ensure *human* supervision:

**Human-on-the-loop:** The robot works autonomously but can be interrupted or redirected by an operator if necessary.

**Human-in-the-loop:** The system operates autonomously but delegates critical decisions to a *human* operator who provides input before important actions are executed.

These *control* principles are similar to those used in autonomous weapon systems in the military.

This raises social questions:

- Who is responsible for unexpected decisions?
- Where do we accept the autonomy of machines?

**But is that enough?**

## Meaningful

### What does “Meaningful Human Control” actually mean?

The answer is more complex than it seems.

Technology is making more and more decisions — *but when does responsibility truly remain with the human? When can legal responsibility be attributed? Under which circumstances can individuals be held culpable?*

“Meaningful Human Control” means that people don’t just monitor technology, but can intervene in critical moments in a way that is effective. This control must be appropriate to the context and requires judgment, awareness, and clear interfaces.

But what exactly makes control *meaningful* isn’t set in stone — it’s a complex research question. And that’s exactly what we’re exploring.

In our project, we examine if and how human control of so-called autonomous weapon systems can be *meaningful* — from an interdisciplinary perspective and with real-world applications in mind.