QUICKSCAN - CANVAS Motion Simulation of an SSL Robot for RoboCup

NAME: Motion Simulation of an SSL Robot for RoboCup
DATE: December 16, 2025 7:14 AM

DESCRIPTION OF TECHNOLOGY
In the SSL, robots are compact platforms that rely on an overhead vision system (SSL-Vision) for global localization and must demonstrate precise motion control, fast decision-making, and reliable path-following under dynamic game conditions. These requirements place high demands on low-level kinematics, control software, and hardware integration. RoboHub current prototype demonstrates the correct…

HUMAN VALUES

The technology empowers students and researchers by giving them the tools to simulate, test, and innovate. It enhances their professional identity as engineers by fostering skills in robotics, control, and sustainability. It does not stigmatize or impose beliefs, but instead encourages curiosity, teamwork, and competence.

TRANSPARENCY

Yes. The technology is explained through the Plan of Approach, final report, and documentation. There is no commercial business model it is an educational project. Goals (building a validated digital twin and motion control system) are clearly stated, and users can see how the simulation behaves.

IMPACT ON SOCIETY

RoboHub currently lacks a digital twin, control software, and an inverse kinematics model. This limits testing, optimization, and preparation for RoboCup. The pain is that hardware-only testing is inefficient, costly, and unsustainable. By providing a digital twin, the project eases this pain for students and RoboHub, enabling faster, safer, and more sustainable development.

STAKEHOLDERS

- Students (current project team)
- RoboHub (client)
- University (Fontys)
- Future student teams
- RoboCup organization
- Mentors & supervisors

SUSTAINABILITY

Direct energy use comes mainly from running simulations on computers. This is less than the energy/material waste of building and testing multiple physical prototypes. Indirectly, by reducing trial-and-error on hardware, the project saves energy and resources in production and assembly. Improvements could include optimizing code for efficiency and using energy-efficient computing hardware.

HATEFUL AND CRIMINAL ACTORS

Unlikely. The digital twin only simulates robot movement and control. It does not interact with sensitive data or critical systems. At most, someone could use the code without permission (plagiarism or copyright violation).

DATA

Yes. We are aware that simulation data is always an approximation of reality. Models may oversimplify or miss real-world conditions. Correlation causation, and bias can be introduced if models are not validated with real robot experiments. The project takes this into account by planning both simulation and hardware validation.

FUTURE

In the near future, the digital twin could become a standard tool at RoboHub for teaching and testing robot control. If widely shared, it might become a reference framework for other RoboCup teams, spreading sustainable simulation practices. On a larger scale, it could inspire similar digital-twin approaches in other fields of robotics and engineering education.

PRIVACY

No. The digital twin only processes robot parameters (wheel geometry, trajectories, motor commands). It does not collect or store any personal data.

INCLUSIVITY

No inherent bias. The simulation models robots and physics, not people. The only bias risk is technical oversimplifications in the model might favor certain testing conditions but not others. This is addressed by validating against real robot data.

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HUMAN VALUES

How is the identity of the (intended) users affected by the technology?

To help you answer this question think about sub questions like:

- If two friends use your product, how could it enhance or detract from their relationship?
- Does your product create new ways for people to interact?…

TRANSPARENCY

Is it explained to the users/stakeholders how the technology works and how the business model works?

- Is it easy for users to find out how the technology works?
- Can a user understand or find out why your technology behaves in a certain way?
- Are the goals explained?
- Is the idea of the technology explained?
- Is the technology company transparent about the way their…

IMPACT ON SOCIETY

What is exactly the problem? Is it really a problem? Are you sure?

Can you exactly define what the challenge is? What problem (what 'pain') does this technology want to solve? Can you make a clear definition of the problem? What 'pain' does this technology want to ease? Whose pain? Is it really a problem? For who? Will solving the problem make the world better? Are you sure? The problem definition will help you to determine…

STAKEHOLDERS

Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by…

When thinking about the stakeholders, the most obvious one are of course the intended users, so start there. Next, list the stakeholders that are directly affected. Listing the users and directly affected stakeholders also gives an impression of the intended context of the technology.
…

SUSTAINABILITY

In what way is the direct and indirect energy use of this technology taken into account?

One of the most prominent impacts on sustainability is energy efficiency. Consider what service you want this technology to provide and how this could be achieved with a minimal use of energy. Are improvements possible?

HATEFUL AND CRIMINAL ACTORS

In which way can the technology be used to break the law or avoid the consequences of breaking the law?

Can you imagine ways that the technology can or will be used to break the law? Think about invading someone's privacy. Spying. Hurting people. Harassment. Steal things. Fraud/ identity theft and so on. Or will people use the technology to avoid facing the consequences of breaking the law (using trackers to evade speed radars or using bitcoins to launder…

DATA

Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into…

There are fundamental issues with data. For example:

- Data is always subjective;
- Data collections are never complete;
- Correlation and causation are tricky concepts;
- Data collections are often biased;…

FUTURE

What could possibly happen with this technology in the future?

Discuss this quickly and note your first thoughts here. Think about what happens when 100 million people use your product. How could communities, habits and norms change?

PRIVACY

Does the technology register personal data? If yes, what personal data?

If this technology registers personal data you have to be aware of privacy legislation and the concept of privacy. Think hard about this question. Remember: personal data can be interpreted in a broad way. Maybe this technology does not collect personal data, but can be used to assemble personal data. If the technology collects special personal data (like…

INCLUSIVITY

Does this technology have a built-in bias?

Do a brainstorm. Can you find a built-in bias in this technology? Maybe because of the way the data was collected, either by personal bias, historical bias, political bias or a lack of diversity in the people responsible for the design of the technology? How do you know this is not the case? Be critical. Be aware of your own biases.…

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