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Enhancing Safety and Efficiency in Welding Environment through Human-Cobot Interaction in Critical Infrastructure

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Objectives

- Introduction
- Welding Environment Challenges
- Critical Infrastructure
- Human-Cobot Interaction in Welding Environment
- Overall Implementation of Welding Robot Efficiently Work
- Flowchart of the studied scenario
- Future Directions
- Conclusion

Introduction

- By integrating human workers with collaborative robots (cobots), this approach enhances safety, precision, and productivity in critical infrastructure projects. It's a vital solution for safeguarding and maintaining essential structures in various industries.

Welding Environment Challenges

- Safety Hazards


Fumes and Gases


Physical Hazards


Electric Shock


Fire and Explosion

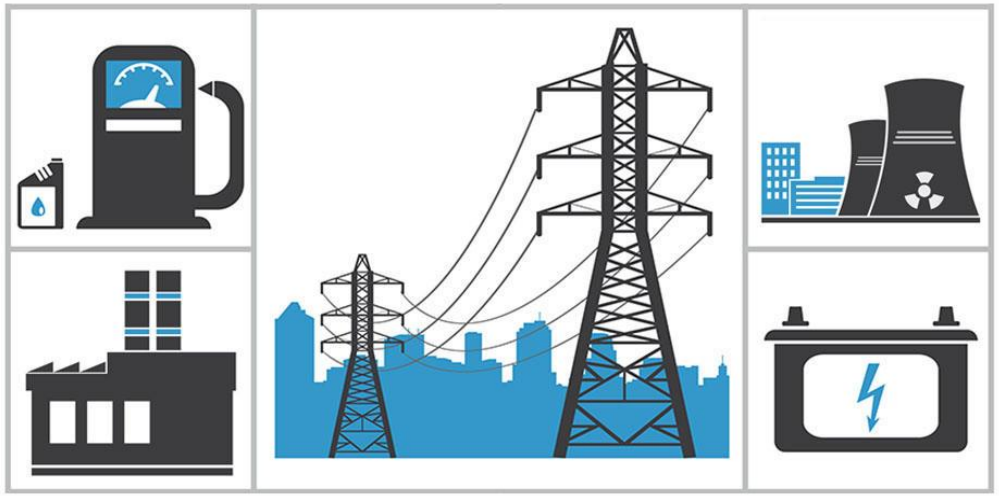
- Efficiency Challenges

The repetitive of welding tasks	Operator *fatigue*	*Reduced productivity*
Requirement of accurate movements	Precise concentration	Hard to maintain over extended periods

Critical Infrastructure

- **What is Critical Infrastructure?**

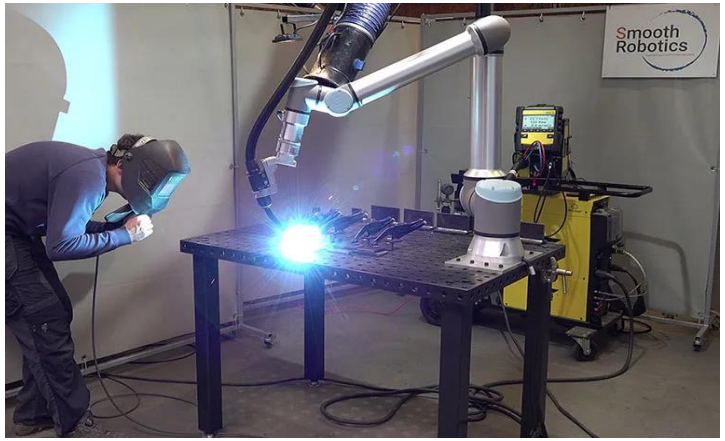
It refers to the **physical** and **cyber systems** and assets that are essential to the functioning of a society and its economy.



- **Why is Human-Cobot Interaction Important in Critical Infrastructure?**

Human-cobot interaction can improve the **safety**, **efficiency**, and **productivity** of critical infrastructure systems.

Human-Cobot Interaction in Welding Environment



- **Improved Safety**

Human-cobot interaction in welding environments reduces the risk of injury and accidents, while also improving overall safety conditions.

- **Increased Efficiency**

Cobots can work at a faster pace and with greater precision than human welders, resulting in increased efficiency and productivity.

Monitoring System

Controller

Critical Spots

Object

Workpiece Sample

Danger Zone

Start

Detect an approaching Object

Making Decision

Controller Presses Emergency Stop

Immediate Stop

Controller Do not Presses Stop Button

Continue Welding

Controller Presses Stop Button

Robot in Critical Area?

No

YES

Stop Robot

Continue Welding

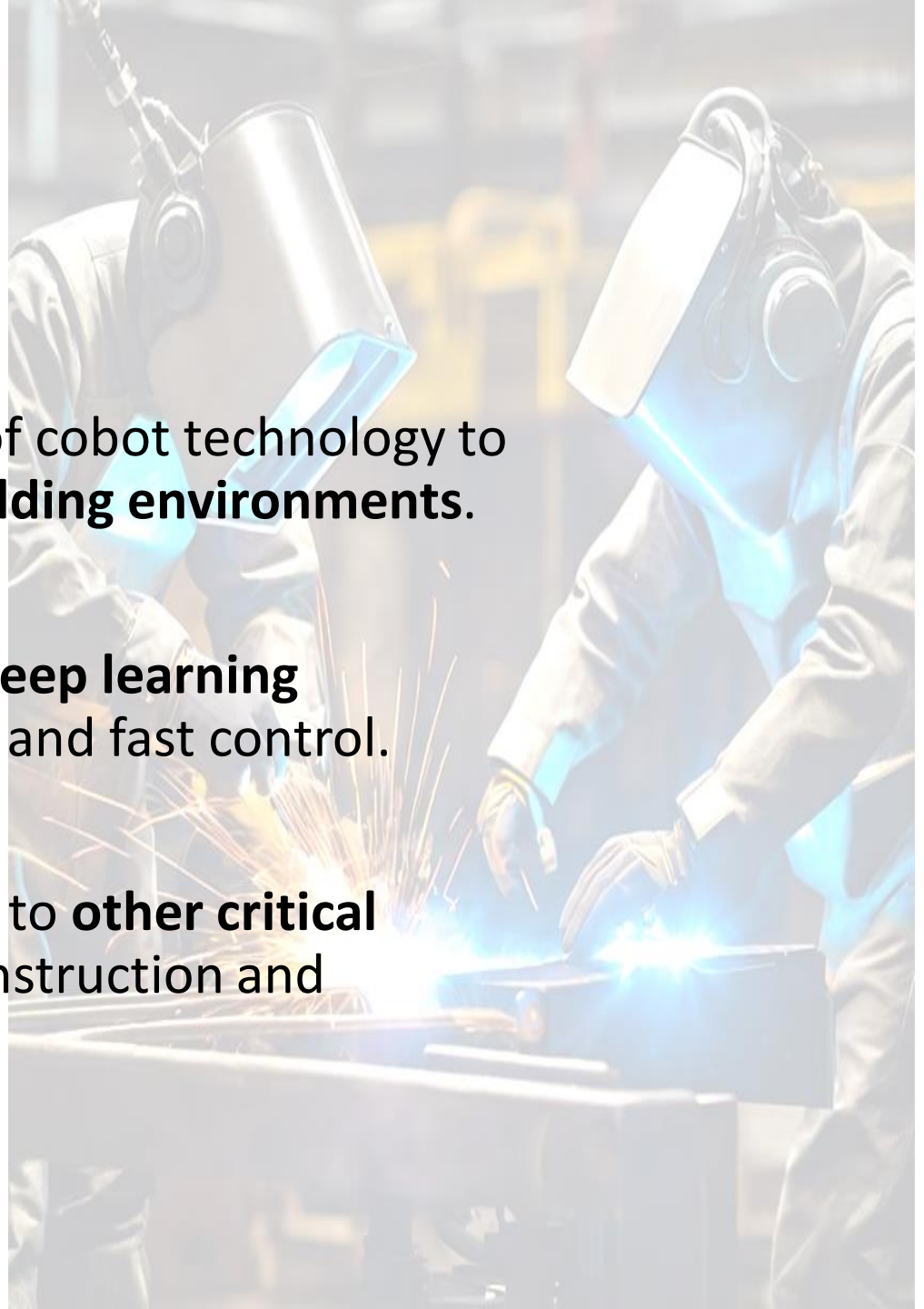
Exit Critical Area

Stop

Relaunch the Welding Robot

Future Directions

- Further research and development of cobot technology to **enhance safety and efficiency in welding environments**.
- The integration of **Intelligence** and **deep learning** methodes will lead to more efficient and fast control.
- Extend the interaction human-cobot to **other critical infrastructure** industries, such as construction and manufacturing.



Results/Conclusion

- The decision-making process is based on the controller input relative to the level of safety and the critical areas.
- It highlights the importance of maintaining both the safety and the quality of production.
- The controller has the full access to the robot control system.

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Thank you for the kind attention!