Universidade do Minho
Escola de Engenharia

DPISE 2021 WORKSHOP
Doctoral Program in Industrial and Systems Engineering

CENTROALGORITMI

THE USE OF AUGMENTED REALITY IN THE LEAN WORKPLACES AT SMART FACTORIES

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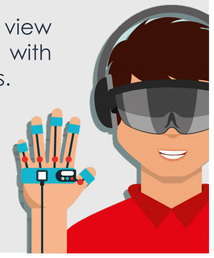
BACKGROUND

- This project intends to understand how Industry 4.0 technologies, namely Augmented Reality, are changing the **Human-Machine Interface**.
- The **operator is the main focus** of this project and the aim is to reduce the human effort, mitigating the safety risks and improving ergonomic conditions in workplaces.
- **Lean Thinking** will enhance the potential for creating waste-free and more efficient workplaces.
- **Augmented Reality** technology is the real-time view of an enhanced real world, combined with computer generated texts, images or animations.
- An **Augmented Operator** has their capabilities and senses enhanced through the link between the information that is embedded within the system and the physical world.



OBJECTIVES

- Augment human capabilities and senses
- Increase productivity and efficiency
- Eliminate non-value added activities
- Eliminate human errors
- Improve HMI and eliminate safety risks
- Reduce human effort during tasks
- Reduce operation times
- Give people more time to learn, think and innovate

RESEARCH QUESTIONS

RQ 1: How AR can enhance human capabilities and senses in lean workplaces?

RQ 1.1: How AR can enhance human capabilities and senses In order to mitigate safety risks?

RQ 1.2: How AR can enhance human capabilities and senses in order to improve ergonomic conditions?

RQ 2: Which type of AR technology is more suitable for each logistic process?

METHODS

LITERATURE REVIEW

DATA COLLECTION

- Interviews and regular meetings
- Company visits and observations
- Questionnaires
- Surveys

CASE STUDY

- Bosch Car Multimedia Portugal

CASE STUDY

1. Logistic tasks evaluation

2. Define human capabilities and senses to augment

3. Define which type of AR best suits each process

EXPECTED OUTCOMES

This project intends to augment humans regarding to:

PHYSICAL CAPABILITIES

- Creation of super-strong workers encased in exoskeletons
- Easier tasks and reduced physical stress
- Higher productivity and quality
- Improved ergonomic conditions and safety
- Improved quality of life to people with special needs or elderly people

HUMAN SENSES

- Extension of human senses: sight, hearing and touch
- Increased risks awareness
- Providing relevant information to operators
- Simplifying decision making processes

COGNITIVE ABILITIES

- Support the increased cognitive workload
- Enhance operators' well-being
- Increase performance
- Reduce mental stress

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