

# Industry 4.0 and Augmenting the Millennial Worker: AR for Offshore Wind

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## INTRODUCTION

Augmented Reality (AR) technologies combine a view of the real world with digital information, in the user's line of sight. This could be via a smartphone/tablet, or a dedicated wearable device.



Fig. 1 – Example of head worn AR device<sup>1</sup>

In industrial environments, AR has been shown to improve maintenance performance, in terms of both completion time and error rate<sup>2</sup>.

For offshore wind farms, this could be very valuable as highly skilled maintenance technicians are required to work in remote and hazardous environments



## OBJECTIVES

- Assess the current state in Industrial Augmented Reality (IAR)
- Capture key requirements for offshore maintenance guidance
- Create a concept design for the offshore wind environment
- Develop and test prototype IAR system
- Recommendations for industrial implementation

## SURVEY

A questionnaire to wind industry professionals revealed top priorities for maintenance guidance:

- Health and Safety (liability)
- Cost savings vs implementation cost
- High value or high frequency tasks
- 3D preferred to text
- Hands free
- Fault diagnosis



## AR APP

An AR web app has been developed to guide the user through a simple assembly task. This will be used to optimise user interaction and information display through a series of experiments.

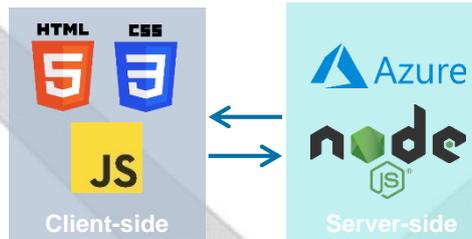


Fig. 2 – AR application web technologies<sup>3,4</sup>

Game engines are often used to develop in AR, but web apps offer some key benefits:



Comparisons will be made between PDF (portable document format) instructions, mobile AR and wearable AR.

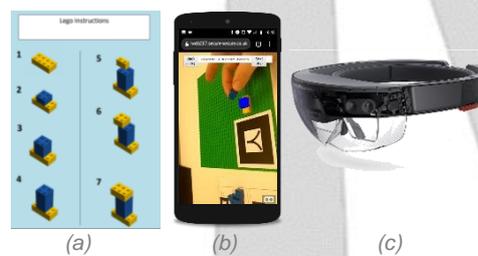


Fig. 3 – Instruction display modes (a) PDF, (b) mobile AR, (c) wearable AR device<sup>5</sup>

As well as this, a series of experiments will explore the most effective way to communicate instructions to users in AR, in a range of different conditions

Measure changes in:



Based on:



## INDUSTRY

The results of the experiments will then be validated in an operational turbine environment. Results from this will feed into a cost benefit model which will aim to help assess appropriate use cases for AR.

Information from the survey, experiments and validation stages will contribute towards implementing a tool in order to assist others to consider using Industrial Augmented Reality



Fig 4. – Levenmouth Demonstration Turbine [6]

## Acknowledgements

This project is part of the Renewable Engine INTERREG programme. As a collaboration between the AFRC at the University of Strathclyde with support from industrial partner Booth Welsh, this project has a strong industrial focus.



Integrated Engineering Services

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