

# spidAR

SMART PERFORMANCE for INDUSTRIAL DEVICES using AUGMENTED REALITY



# PROBLEM STATEMENT

- Industries are the soul to any civilisation, crucial for any progress.
- Today, industries face problems more complex than the industries in the past have and this is due to the ever-increasing complexities in demand and supply.
- The solutions to these problems are not driven by powerful machines, larger factories but they are driven by information (data).
- Use of Augmented Reality (AR) and Virtual Reality (VR) in the SMART Manufacturing scenario where in the workforce is enabled with devices to access contextualized information in real-time to enable quick decision making which improves productivity.

# CHALLENGES IN INDUSTRIES



Need for transformation  
ability of manufacturing  
systems



Growing and falling lot  
numbers



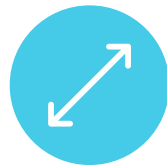
Newer products and shorter  
product life cycles



Mass customization,  
individualized products with  
high variance(Agile systems)



Competition leads to need  
for high production  
efficiency



Increasing age of work force  
amidst need for modern skill  
sets



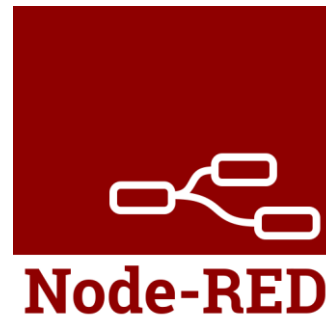
Need for high quality work  
safety regulations

# PROPOSED SOLUTIONS

The following will be demonstrated:

- VR tour of shop floor/industrial plant
- Worker training and assessment
- Digital twin of a 3D printer ( Data abstraction)
- Part traceability and arrangement (Improved inventory)

# TECHNOLOGIES USED



# VR TOUR OF SHOP FLOOR/INDUST RIAL PLANT

## Purpose:

- Aids in visualising the designs
- Provides navigation across a virtual replica of the industry/shop floor

## Methodology:

- Vuforia is used to create a virtual environment
- The respective assets are added and arranged accordingly
- A joystick controller is added to help the user navigate throughout the virtual environment
- Appropriate physics is applied to make the experience realistic

## Benefits:

- Visualisation of designs helps one get crucial insights even before the design physically exists
- Tour of huge factory from a remote place

# WORKER TRAINING AND ASSESSMENT

## Purpose:

- To help train workers to operate specific sequences of operation
- To assess the skill level of workers and categorize them accordingly

## Methodology:

- The control panel of the required machine is scanned and its controls are mapped
- When a specific sequence is given, the application guides the user step by step, helping them complete the process.
- Evaluation is then carried out by comparing the user inputs to the actual sequence of the required operation

## Benefits:

- Reduction of training costs
- Improved worker efficiency
- Reduced spoilage of parts

# DIGITAL TWIN OF A 3D PRINTER

## Purpose:

- Achieve data abstraction and help focus on important data
- Aids in remote monitoring of crucial parameters

## Methodology:

- Upon identification of the image target and 3D model of the actual machine is embedded on top of it
- The model and the machine are connected by appropriate channels and a link is now established
- This 3D model provides not just visualization but also responds to real time data from the machine
- The sensory data are processed and only the essential values and indications are displayed over to the user

## Benefits:

- Reduction in requirements of highly-skilled technicians
- Immediate precautionary actions can be taken based on the alerts
- Monitor and analyse data for appropriate design changes



# PART TRACEABILITY AND ARRANGEMENT

## Purpose:

- To keep track of different parts/components
- To help worker understand on how to assemble parts

## Methodology (Algorithm):

- Database is created to identify various parts.
- The object target is detected using Vuforia and the corresponding image target would be highlighted upon identification
- The correct placement of the part in its desired location is evaluated by using collision mechanism wherein the Image and Object targets are checked if they are colliding and the user is intimated the same via UI.

## Benefits:

- Helps to achieve organised workflow.
- Helps to achieve efficient Inventory management.

---

## CHALLENGES

- Need for transformation ability of manufacturing systems
- Growing and falling lot numbers
- Competition leads to need for high production efficiency
- Newer products and shorter product life cycles
- Mass customization, individualized products with high variance(Agile systems)
- Need for high quality work safety regulations
- Increasing age of work force amidst need for modern skill sets

---

## PROPOSED SOLUTION

- Digital Twin
- Promoting skilled workers
- A mix of the above proposed solutions
- Quick adaptability of workers to the product requirements
- Ensuring Quality control by regularly assessing the workers

# BUSINESS VALUE AND IMPACT

## IMPACT

- Drastic reduction in training time and costs
- Assessment of worker's skill and customised training for workers
- Establishment of standardised instruction set
- Improved field service productivity
- Reduction in spoilage, rework and waste
- Promoting organised workspaces
- Reduce planning time and costs using better design insights

## REPORTS

- 50% reduction in new hire training
- 10 – 12% reduction in overtime spent

# REFERENCES

- <https://www2.deloitte.com/us/en/insights/focus/industry-4-0/smart-factory-connected-manufacturing.html>
- <https://library.vuforia.com/getting-started/overview.html>
- <https://docs.unity3d.com/Manual/index.html>
- <https://blog.thomasnet.com/augmented-reality-manufacturing>
- <https://www.ptc.com/en/resources/augmented-reality/report/forrester-total-economic-impact>



# THANK YOU

SUNDARA PARIPOORANAN

ABISHEK R

KARTHIK S

D C VIVEK

SPIDER, R&D CLUB, NIT TRICHY