

# EWA Young Talent Award

## Poster Guideline

A poster is a method on which researchers, students, etc. can present their research or project in an event, which combines written and visual elements to present verbally the results. It is about identifying the core of ones' research/project in order to present it.

### Planning a poster

Designing a poster can be tricky. Our advice is to first be clear on the content and then focus on its visual presentation. You will find many online sources offering guidance on this topic, so we do encourage you to explore these!

Nevertheless, here a few guiding questions regarding the content:

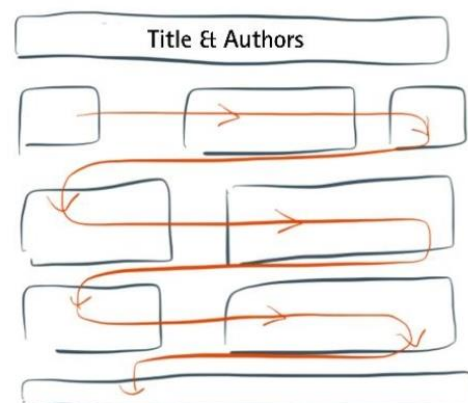
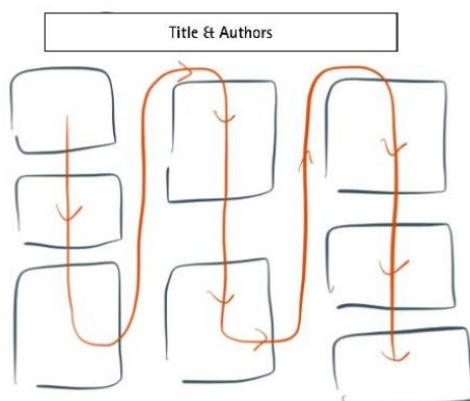
- What is the big picture i.e. industry, sustainability? How does your project relate to it?
- What is the question or problem you explored?
- What strategy did you employ to solve your problem or answer your question? (methods, materials, methodology)
- What were your results?
- Why are these results significant in terms of the big picture? What is your interpretation?
- What are your recommendations and/or lessons learned?

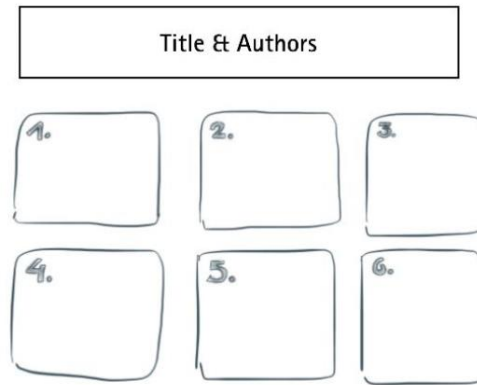
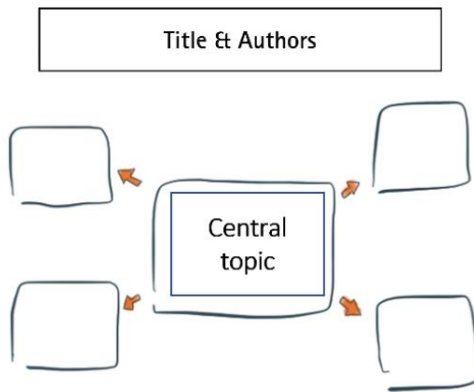
### Do not forget to include:

- The name/title of your project
- Your name/group members
- Professor supervisor(s)
- Company supervisor(s)
- Logo of the supporting company
- Logo of you institution

### Structure of a poster

There are different ways of structuring a poster. Most importantly, there has to be a logical structure to! It is crucial that the audience can easily recognize its flow and identify information. Do not forget that it should be understood by someone who does not know the project and subject.







## Poster Design

Use your creativity! There are many digital tools and software available that can help you design a great poster. However, some things are important:



- No clutter, no overflow of information
- Focus on the essentials (text + visuals)
- Check if it is comprehensible
- Stick to a branding or a coherent style i.e. color palette
- Adjust the size of the fonts as required for a poster
- Make sure there are no spelling mistakes
- Cite sources as required.

## Examples to inspire you





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### Introduction

Efficient management of water, especially in areas where water is being used in large quantities, will help us to move towards the sustainable goal to "Ensure availability and sustainable management of water and sanitation for all," at a faster pace.

"LESS water urinal" optimizes the water usage in gents urinals in restrooms of public workspaces. It limits the usage of water in flushing by pressure cleaning and reduced flushing frequency. The odor which may arise due to reduced frequency in flushing is controlled by sealing the urinal drain using solenoid valves.

### Background

Throughout the world, water for flushing in multi urinal washrooms consumes the majority of water usage in workplaces and schools/ universities.

Optimising water usage without compromising sanitation hygiene has always been a challenge. Waterless urinals with liquid odor sealing is a solution but the need for regular cartridge replacement remains a drawback of waterless urinals apart from being expensive.

The proposed mechanism is an optimized solution with up to 80% of water saving and odor control without replacing the existing urinal pans.

### Result

#### Water Saving

"LESS water urinal" in a public restroom can save up to 80% of water consumption. This amounts to 24,000 liters of water savings per year for a workplace with 100 male employees.

#### Hygiene

Power flush improves the urinal hygiene and the double solenoid system effectively seals off bad odors in the urinal usage area. Minimal colonization of bacteria because of less moisture presence.

#### Customisable & Scalable

The system uses a programmable logic controller (PLC) as the controller, which enables customization to meet the customer's cleanliness standards.

- The frequency of flush is customisable
- The duration of power flush is customisable
- Manual bypass flush option gives a feel of normal urinal
- System can be scaled to any number of urinals

#### Maintenance

No frequent replacement of liquid seals needed and clogging due to sedimentation of uric acids, uric salt crystals, and calcium in waterless urinals as in liquid seal waterless urinals.

### Methodology

The water flush inlet is replaced with a DC pump whose outlet is guided through nozzle opening. This pressurized water ensures proper cleaning of the urinal pan with less volume of water. The PIR sensor will sense each urinal use and PLC connected will limit the flushing once per five usage or 10 minutes after the first use if 5 usage doesn't happen within 10 minutes.

The odor control is done with two solenoid valves in the outlet urinal drain. Solenoid 1 will open when the sensor detects the presence of usage and will continue to be open till the usage is over. Urine will be trapped in between solenoid 1 and solenoid 2 during this time and when solenoid 1 shuts off after usage, solenoid 2 will open to expel the urine to the main drain. This double check mechanism will seal the odor from the main urine drain to the urinal usage area.

### References

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- Bristow G. McClure, J. D. Fisher. 2004. A review of waterless urinal systems. In: Presented at the Fourteenth Symposium on Improving Building Systems in Hot and Humid Climates, Texas, May 2004.
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### Less water urinal system flow diagram



## INTELLIGENT AIR HANDLING UNIT BASED ON DIGITAL TWINS

TONGJI UNIVERSITY CDHAW

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### BACKGROUND

**CURRENT STATUS OF AHU IN CHINA**

65%

**MODEL OF AN AHU**

**DIGITAL TWIN TECHNOLOGY**

**AHU BASED ON DIGITAL TWINS**

### FRAMEWORK

Real physical system, Cloud over Internet Server, Cloud Computing Platform, Digital cyber space model.

Flowrate, CO2, Temperature, etc.

### DATA COLLECTION AND OPTIMIZATION

Edge Control Cabinet, PLC Cabinet, Data Collection, Optimization.

### DIGITAL TWIN MODEL

Input Layer, Hidden Layer, Output Layer.

Temperature of Return Air, Temperature of Supply Water, Speed of the Fan, Speed of the Pump.

### CONTROL STRATEGY OPTIMIZATION

Control Strategy Optimization.

### TECHNICAL SCHEME

API Token, EPC 1522, AXCF 2152, Data Collection, Sensors, I/O Module, PWM Module, Fan Pump, Speed Control.

### HIGHLIGHTS

Digital Twin Model, Control Strategy Optimization.

### APPLICATION

Application of the digital twin model in a real-world scenario.

## HoloLEIV – AR based setup and operation of in-line robotic systems

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### Problem Statement & Derived Goal

The LEIV (Nationale Leichtbau-Validierungszentrum) has a new production machine for making injection moulded parts, developed by the start-up Anybrid. Typically, the machine setup, operation and process control require a separate desktop computer, which takes up space and is often not in close proximity, making it inefficient and adding unnecessary lead time. Anybrid wanted to take a new approach to solve this problem. My envisioned solution uses a controller-free AR approach to achieve a faster machine setup, quick and dynamic process control and live data access while maintaining the worker's mobility.

### Technical Solution

My solution is based on a self-developed (I)IoT gateway which enables a bi-lateral communication between the worker's AR device and the machine. Information is retrieved from the machine in real-time and broadcast via an MQTT-broker to the AR device. The newly developed AR app displays the information dynamically based on eye-tracking or manual user input. Control inputs from the user are transferred through the same bi-directional interface, which are translated to real parameters in the control of the machine.

### Methods & Tools

**Unity 2022**

- State of the art 3D engine
- Long term support

**Microsoft HoloLens 2**

- Already used in the industry
- Fallsafe AR display construction
- Robust & intuitive handling
- Truly controller-free enabling dual-hand operation of machines
- Capable of spatial computing
- Does not disturb regular vision

**OPC-UA**

- Machine-to-machine protocol
- Widespread industrial adoption

**MQTT**

- Open IoT network protocol
- Robust, fast and efficient

### Machine Setup

The machine setup mode allows technicians to intuitively configure the machine while keeping their hands free. The technician can see and tweak process parameters of the tool and the robot arm itself. Information is overlaid on the real machine to facilitate an easy determination of the desired parameters just by looking at the respective parts.

- Supply engineer with needed data on demand
- Using eye tracking to show the desired information
- Pre-selected data is overlaid on the respective part
- Increase efficiency by reducing reliance on computer
- Reduce downtime & increase accessibility

Application: After the manual assembly, the operator can click on the displayed parameters and adjust them for the current setup straight from within the HoloLens without any additional computer.

### Process Control

Process control enables users to supervise the current process in real-time. Through various tools, such as graph representations and data table views with current and target values, a deep insight into the process can be gained. The data is displayed flexibly as per the user's preference, independent of the user's current position.

- Deep insights into current process
- Access to historical data & dataset comparison
- Quick opportunity for intervention through live control
- Increase product quality through tighter monitoring
- Enables remote control & training

Application: During the ongoing process, the engineer can quickly and easily monitor the process and all sensor data. Live adjustments of process control parameters can be performed based on the user's analysis.

### Conclusion

Based on first test runs carried out in the company, the following was discovered:

- Intuitive way to help & support engineers
- Increase efficiency & reduce downtime
- Improved accessibility & reaction time
- Extra benefit: Remote control & training

### **Any questions our doubts?**

Please, feel free to contact Klaus Hengsbach from EWA ([hengsbach@edunet-wa.com](mailto:hengsbach@edunet-wa.com)) if you have any questions.