

CI.AI Challenge 2024

Briefing session

May 6th 2024

Overview

CI.AI Challenge 2024 provides a unique opportunity for data scientists worldwide to design, develop, deploy, and validate AI-driven cybersecurity solutions that ensure the efficiency and resilience of ICS.

Organizing Team

Advisors



Prof. Aditya Mathur



Francisco Furtado

Chair



Dr. Gauthama Raman

Technical Lead



Dr Muhd Azmi Umer

Dataset Lead



Ivan Christian

Logistics Lead



Jillian Chin

Marketing & Communications Lead



Vanessa Lee

Secure Water Treatment Testbed - Overview



SWaT Testbed*

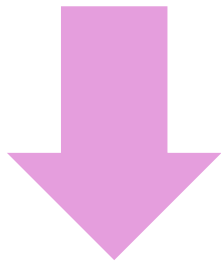
*https://itrust.sutd.edu.sg/itrust-labs-home/itrust-labs_swat/

- **Six-Stage Water Treatment Facility** that produces 5 gallons per minute of treated water.
- Scaled-down version of the **modern water treatment facilities** found across Singapore.
- Physical processes in each stage are controlled and monitored by **PLCs** with dedicated sensors and actuators.
- Sensor measurements and actuator statuses are **archived in a data historian** every second.

Challenge – Timeline

Phase-1: Historical Challenge

- **Registration Deadline:** 11 June 2024, 23:59 hrs GMT+8
- **Solution Submission Deadline:** 18 June 2024, 23:59 hrs GMT+8
- **Announcement of Results:** 25 June 2024, 10:00 hrs GMT+8



Phase-2: Live Challenge

- **Setup Phase:** 3 July 2024 to 8 July 2024
- **Baselining Phase:** 9 July 2024, 10:00 hrs to 16:00 hrs GMT+8
- **Final Evaluation:** 10 July 2024, 10:00 hrs to 16:00 hrs GMT+8

Phase 1 – Historical Datasets

Dataset
(72 hrs)

```
graph TD; A[Dataset (72 hrs)] --> B[Training_data.csv (36 hrs)]; A --> C[Testing_data.csv (36 hrs)];
```

Training_data.csv (36 hrs)

Contains data from the normal operation of the SWAT plant.

Testing_data.csv (36 hrs)

Anomalies introduced at random, either through physical manipulation or cyber attacks, with the specifics kept confidential.

Dataset format

Timestamp in YYYY-MM-DD HH:MM:SS format

Sensor measurements and actuators status

Timestamp	LIT101	MV101	...	LIT601
2024-03-26 00:00:00	800.1	2	...	230.1
2024-03-26 0:00:01	800.2	1	..	231.1
...

Actuator Status Representation:

- MVXX – Motorized valve: 1 - Closed; 2 - Open; 0 – In transition
- UVXX – Dechlorinator: 1 - Inactive; 2 – Active
- PXX – Pump: 1 - Not running; 2 - Running

Response format

Timestamp in YYYY-MM-DD HH:MM:SS format

Plant in anomalous or normal state

Components identified under threat

Timestamp	Anomaly	Tag
2024-03-26 00:00:00	1	LIT101:MV101
2024-03-26 0:00:01	0	0
...

submission.csv

Evaluation score

$$\text{Overall Metric} = W1 * DR - W2 * FAR + W3 * TIR$$

where,

1. Detection Rate (DR) = $TP / (TP + FN)$
2. False Alarm Rate (FAR) = $FP / (TN + FP)$
3. Target Identification Rate (TIR) = Number of tags correctly identified as target / Total number of tags under target
 - TP (True Positives) is the number of attacks correctly identified as attacks.
 - FN (False Negatives) is the number of attacks incorrectly identified as normal activities.
 - FP (False Positives) is the number of normal activities incorrectly identified as attacks.
 - TN (True Negatives) is the number of normal activities correctly identified as normal.
4. The weights $W1=0.4$, $W2=0.2$, and $W3=0.4$ have been carefully chosen to address the class imbalance issue, given the significantly higher number of normal samples compared to anomaly samples.

Registration process

CI.AI Competition Registration Form

CI.AI Challenge 2024 is a one-of-a-kind competition that invites and challenges data scientists worldwide to devise, deploy and validate AI-driven solutions that help to enhance the security, efficiency, and resilience of ICS, thereby contributing to the fight against cyber threats. Through a series of tasks, participants will have the opportunity to apply their AI expertise to solve real-world security problems that impact ICS.

* Required

1. I would like to Join the Competition Anonymously* *

*While anonymity is an option during registration, only non-anonymous participants and teams will be eligible to progress to the live challenge and compete for the final awards. This ensures transparency and facilitates communication during the later stages of the challenge.

Yes

No

2. Team Name *

Enter your answer

Awards & Recognition

1st

S\$ 2,000

2nd

S\$ 1,000

3rd

S\$ 500

Questions ?

Get in touch

Have Questions? Email us at itrust@sutd.edu.sg with the subject "AI.CI Challenge 2024 Query" for assistance.