

SBS Transit Hackathon 2024



A member of
COMFORTDELGRO

SBS Transit

PLEASE ACKNOWLEDGE OUR TERMS & CONDITIONS FOR THE HACKATHON

Hackathon Terms & Conditions
Acknowledgement Form



HACKATHON

TRANSCEND WITH TECHNOLOGY

PRIZE:

1ST \$3,000

2ND \$2,000

3RD \$1,000

PROBLEM STATEMENTS

1. Develop a brightness measurement system for Electronic Display Signs on buses and establish readability limits/ criteria.

2. Design a Wi-Fi or Mesh network to remotely override timer-controlled lighting, enabling control from the Passenger Service Centre or Operation Control Centre.

3. To explore the feasibility of incorporating road travelling capabilities on Rail Grinding Vehicle and Wagons to facilitate transfer between train lines.

4. Develop a software solution that integrates maintenance schedules, manpower planning, spare parts availability, and budget for optimised preventive maintenance.

5. Automating bus cleanliness quality checks.



Agenda

Introduction to SBS Transit

Timeline & Submission

Attractive Prizes

Assessment Criteria

FAQ





Company Profile

A listed company and part of the ComfortDelGro Group since 2003, has over 10,000 staff.

We are a market leader in bus and rail operations, aiming to provide safe, comfortable, and reliable public transport.

Operates more than 200 bus services with a fleet of approximately 3,000 buses.

Runs the North-East MRT Line, Downtown MRT Line, and Sengkang-Punggol LRT Line.

Timeline

Briefing Day

6 Nov 24

Proposal
Submission

12 Nov 24

Shortlisted
teams /
individuals will
be announced
by
25 Nov 24

Consultation
with
Mentors
in
December 24

Project
Submission

3 Jan 25

Pitch Day

17 Jan 25

- PowerPoint Slides in PDF Format
- Maximum of 10 Slides per submission
- *File name format:* <Problem Statement Number_School Name_Team Name>

Proposal Submission

Email to:

PS 1 & 5: Clarence
clarencefoo@sbstransit.com.sg

PS 2,3 & 4: Hui Ying
yiphuiying@sbstransit.com.sg

By 12 November 24

Attractive Prizes



Assessment Criteria

20% Innovation/Creativity

20% Sustainability/Cost Effectiveness

20% Implementation/
Feasibility

20% Usefulness/Usability

20% Conciseness/Delivery

FAQ

- **Who can participate in the hackathon?**

The hackathon is open to students from the six universities in Singapore. We welcome all skill levels, and participants from all backgrounds are encouraged to join. Hackathons thrive on diverse perspectives and collaborative teamwork!

- **Can I participate if I don't have a team?**

Yes! Individual participants are welcome. If you win, you will receive the entire prize yourself.

- **Is there a team size limit?**

No, there is no team size limit. However, please note that a larger team means the prize will be shared among more members.

- **Can we form teams across different faculties within the same school?**

Yes, you are welcome to form cross-faculty teams within the same school. For example, if you need someone with a finance background, you can team up with students from the Business Analytics faculty.

FAQ

- **Can we form teams with members from different schools?**

No, teams can only be formed with members from the same school, although members may come from different faculties within that school.

- **Is there any cost to participate?**

No, participation in the hackathon is free!

- **Will there be mentorship during the event?**

Yes, mentors will be available throughout the hackathon to provide guidance, answer questions, and keep teams on track with regular check-ins.

- **Will we meet with mentors online, in person, or in a hybrid format?**

The hackathon will be held in a hybrid format. You can meet your mentor in person for in-depth discussions, workplace tours, or project analyses. Follow-up meetings may be conducted virtually to monitor progress.

FAQ

- **Who will own the intellectual property (IP) rights to the prototype or solution developed during the hackathon?**

Shortlisted participants will need to sign an IP agreement to finalize ownership details. Please note, the IP agreement is required only if your project is selected for further development.

- **Is the Presentation Day physical or hybrid, and do all team members need to attend**

Presentation Day will **Only** be conducted in person. Only one team representative is required to be physically present to deliver the presentation on behalf of the team.

- **Will each team member receive a prize if our team wins?**

For prize-winning teams, a single cheque will be awarded to the designated team leader, who can then distribute the prize among team members.



Thank you!



Department Sharing



PS1: Develop a brightness measurement system for EDS on buses and establish readability limits/ criteria.

Problem Statement

Background:

The readability of service information on Electronic Display Signs (EDS) mounted on bus can be affected by various factors such material properties & surface condition of windscreen/ glass, environmental lighting, particulate matter in the air, commuters' angle/ position/ distance of sight etc. Hence the need to define an acceptable brightness as dimness of these LEDs is irreversible and, optimal interval for replacement is encouraged for Environmental Sustainability to reduce electronic waste. .

Challenge Statement:

Students need to understand various factors affecting the readability of Service Information, characteristic of lights and design of experiment for an empirical approach to establish a pass/ fail criteria with a confidence interval of at least 95%.

For Environmental Sustainability, students need to study how to prolong the life of LED modules and reuse them to prevent generating more carbon footprint.

Benefits:

A more robust & sustainable maintenance system to determine an acceptable brightness objectively hence optimise the maintenance effort.

Improve customer experience.

Background

- Lack of brightness measuring system, objective measurement/ guideline and better manage the feedbacks on dimness issue.
- Bus called back to visually check, no fault found or minor brightness different compared to a new unit.
- The light meter on the shelf is more for measuring the environmental brightness.
- The different bus models and brands of EDSes on buses.
- The deteriorated LED modules, non-uniform brightness (i.e. Dimness) and with burn-in prints, need to prolong lifespan of LED modules and reuse of removed unit for environmental sustainability.

EFFORTS TO TEST THE FUNCTIONALITY OF LIGHT SENSOR AND MEASUREMENT OF DISPLAY BRIGHTNESS



Light Sensor Testing Tool



Brightness Measuring Jig – Enhancement In Progress

LTA or BU Guidelines (If any)

No known guideline

Challenges

- Robust & sustainable brightness measurement system
- Environmental factors affecting the brightness of EDSes
- The EDS light sensor is in between the LED Light Modules
- Commuters' perspective of brightness/ acceptable readability and enhanced customer experiences.
- Various Bus Models & Electronic Display Sign Brands
- Prolong the useful life EDSes, reuse it and contribute toward net zero carbon emission target.

Benefits

- The optimum use of LED modules lead to environmental sustainability through objective measurements with determined reference.

Q&A



PS2: Design a Wi-Fi or Mesh network to remotely override timer-controlled lighting, enabling control from the Passenger Service Centre or Operation Control Centre.

Problem Statement

Background:

Insufficient lighting at station entrances may pose safety challenges, especially under conditions such as occasional dark weather or during extended train service hours.

Challenge Statement:

The project will challenge students to understand station lighting operational needs and propose remote lighting control designs to ensure availability while meeting the safety requirements

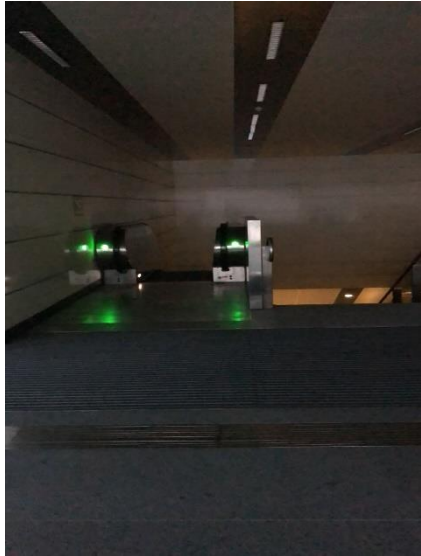
Benefits:

Ensuring commuters safety while optimising energy usage

Background

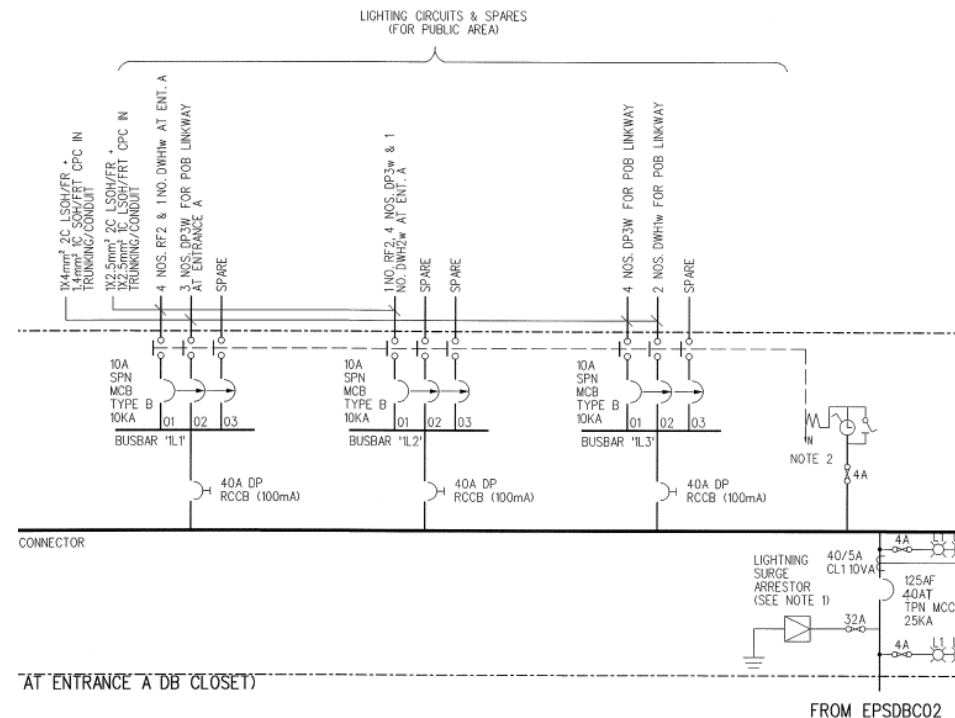
- Station entrance lightings has been always been timer-controlled since the inception of Downtown Line.
- During rainy days or public holiday train service extension, the entrance lightings may be switch off (based on timer setting).
- Current control is to manually bypass station entrance lightings one at a time.
- Limitation includes manpower constraint, missing out station
- Inefficient manpower utilization.
- Waste of energy resource.

Case Study



Challenges

- Multiple entrance lightings to consider for control
- Final circuit comes from different Distribution Boards (DB)
- Integrate control/communication components to existing DB panels
- Design to meet regulatory requirements
 - Lux level
 - Cybersecurity



Benefits

- Improve manpower efficiency & productivity
- Quicker response to inclement weather
- Enhance safety of commuters
- Extended lamp life
- Save energy



Q&A



PS3: To explore the feasibility of incorporating road travelling capabilities on Rail Grinding Vehicle and Wagons to facilitate transfer between train lines.

Problem Statement

Background:

The specialist Pway vehicles, e.g Rail Grinding Vehicle, in DTL and NEL acts as backup to each. However, as the tracks on both lines are not joined, transferring of such vehicles between the 2 lines can be complicated (hoisting and lowbed trailer).

Challenge Statement:

Students need to study into the feasibility of incorporating road capabilities on Pway specialist vehicles (RGV or wagon) to make road transportation easier.

Benefits:

An easier and safer option for SBST Rail to transport Pway Specialist vehicles across lines.

Background

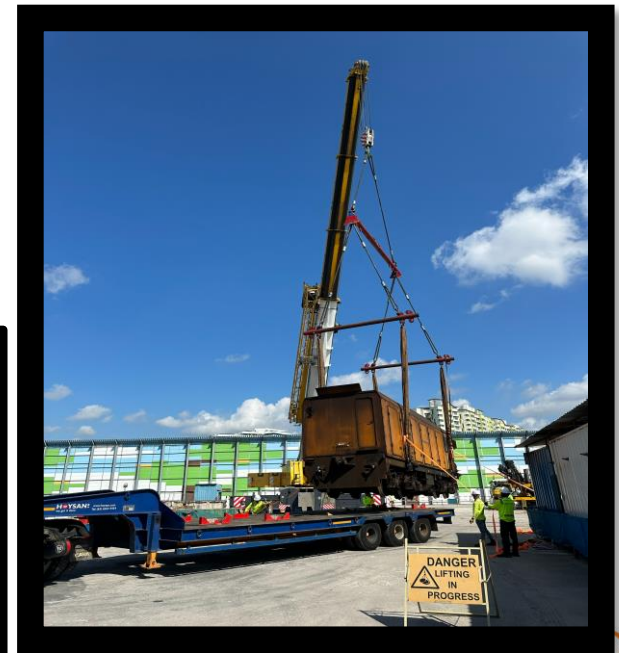


Hoisting of RGV at DTL Delivery Track:

- Requires high tonnage crane
- Lifting Plan & Crew
- Inherently hazardous task

Loading of RGV onto lowbed trailer:

- Needs to be secured



LTA or BU Guidelines (If any)

- Adhere to oversized vehicles requirements

Challenges



Benefits

- An easier (**no requirement for lowbed; but prime mover may be needed**) and safer option (**removes hazard of lifting operations**) for SBST Rail to transport Pway Specialist vehicles across lines

Q&A



PS4: Develop a software solution that integrates maintenance schedules, manpower planning, spare parts availability, and budget for optimised preventive maintenance.

Background

- **Lifecycle Management Complexity:** The organization manages rolling stock lifecycle activities, including preventive and corrective maintenance, through multiple software tools that currently operate in silos.
- **Integration Gaps:** These disconnected systems result in inconsistent data, making it difficult to maintain a unified view of spare parts inventory and maintenance schedules.
- **Manpower Planning Needs:** Effective planning of manpower resources—including skill sets and attrition rates—is essential for aligning workforce capabilities with maintenance demands

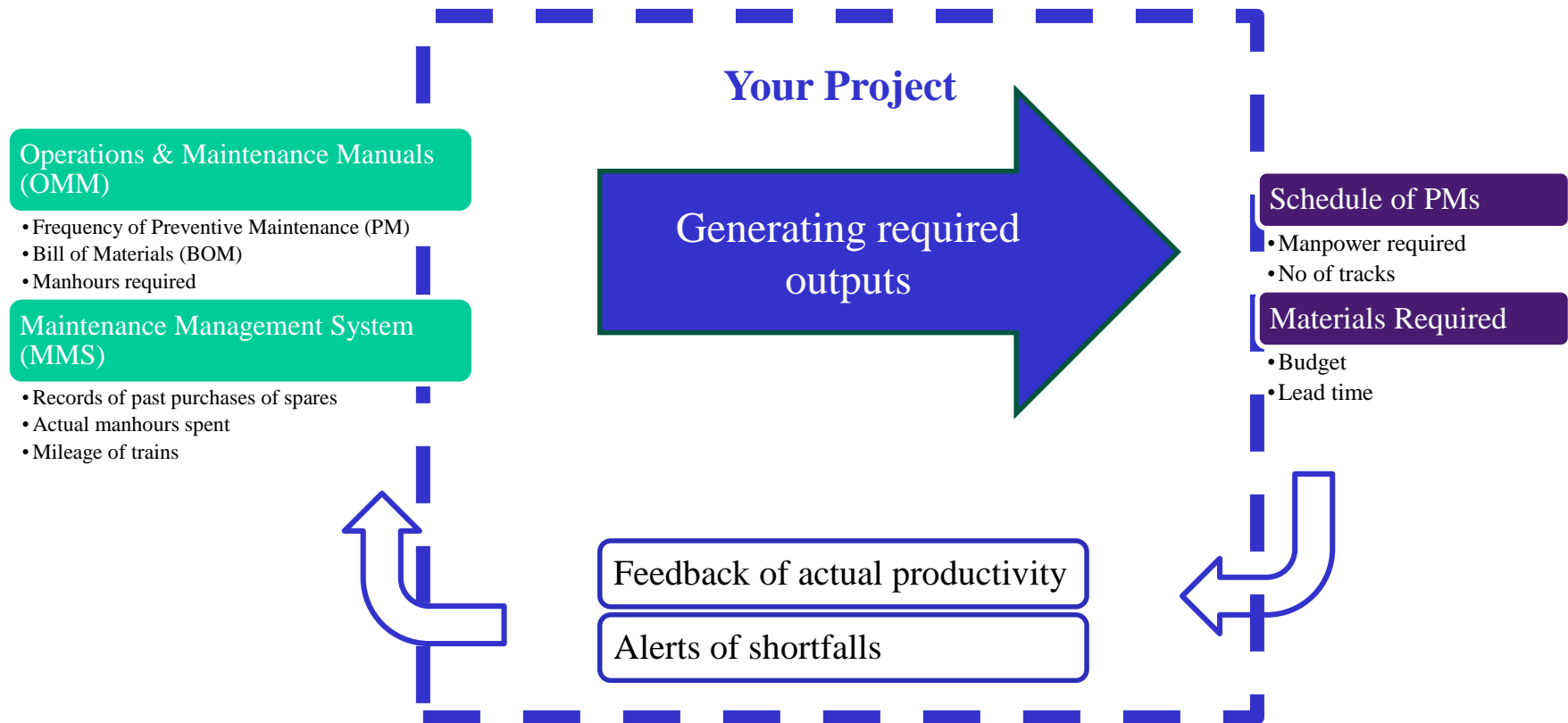
Challenges

- **Inefficient Resource Allocation:** The fragmentation leads to challenges in tracking manpower and identifying necessary spare parts, resulting in potential skill shortages or excess inventory.
- **Inadequate Expenditure Tracking:** Without integrated financial tracking, managing budgets for manpower, spare parts, and associated costs becomes complicated, leading to unexpected overruns.
- **Unforeseen Circumstances:** Issues like obsolescence management are not effectively addressed due to insufficient data insights, risking unplanned downtime and further complicating maintenance planning.

Benefits

- **Streamlined Operations:** Integrating software tools would enhance data consistency, improving the identification of spare parts and scheduling of maintenance activities.
- **Optimized Resource Management:** Effective manpower planning would lead to better utilization of skills and resources, aligning workforce capabilities with maintenance needs.
- **Cost Efficiency:** Improved tracking of expenditures would facilitate better budget management, helping to minimize waste and optimize spending on maintenance activities

Overview of Systems



Q&A



PS5: Automating Bus Cleanliness Quality Checks

Problem Statement

Background:

All buses need to undergo a weekly cleaning regime, to ensure buses are regularly kept in good cleanliness condition, to provide a comfortable experience for commuters. Each week, approximately 25% of fleet holding are done at washing bay for interior and exterior cleaning, while 75% undergo only interior cleaning in-situ at bus park.

This cleaning regime translates to many buses that need to be checked by Ops Staff each night, to ensure the quality of work done by service provider. As cleaning activities are done over the short span of a few hours at night, it can be challenging with limited manpower resource, to execute comprehensive checks while also having to also handle other operational tasks.

Challenge Statement:

Develop a system using AI or image processing technology to automate quality checks.

Benefits:

Improve on operational efficiency with limited resources, and enhancing the quality of checks

Background

- Limited time and manpower to execute comprehensive checks.
- Different quality (areas checked, cleanliness expectation, etc) of checks by different operations staff.
- Different areas required to be cleaned on different bus models.
- Planning of cleaning schedule and tracking of buses cleaned are done manually.

Challenges

- Ability to identify the level of cleanliness.
- Ability to immediately flag out areas that require additional cleaning to cleaners.
- Different model of buses with different cleaning requirements.
- Ease of use for operations staff to verify, via the system, if the buses are cleaned up to standard.

LTA or BU Guidelines (If any)

No known guideline

Example of Stain/Dusty

Entrance door frame corner dusty.



Nearside 1st speaker cover dusty.



Exit door seal dusty.



Seat casing stain.



Handle stained.



Seat casing stain.



Example of Stain/Dusty

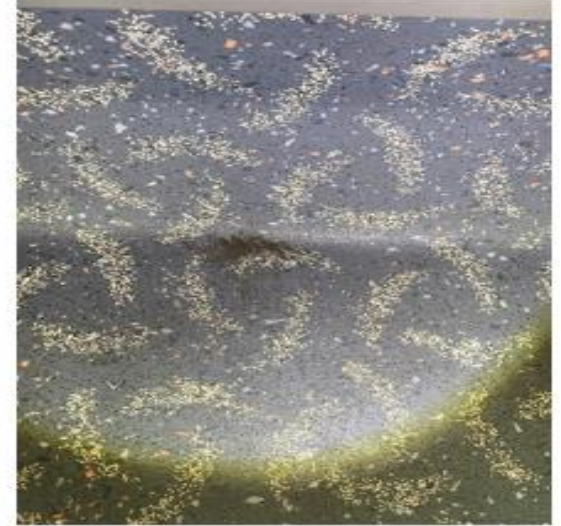
Seat cushion cover stain.



Bell button stain.



Hard stain on floor.



Window panel stain mark.



Nearside panel stain.



Window frame corner dusty.



Q&A

TO OUR LOVELY GUESTS,

Thank You

FOR YOUR ATTENDANCE