

REPORT 1: PROJECT PROPOSAL

Work up to project definition and proposal finalization

Project title: Automatic ramp in trains that reduce the gap between the train and platform.	Team ID: 5
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1. The team (Team leader at top, others in alphabetical order)

Enrolment no.	Name	Mobile no.	Email ID (@ahduni.edu.in)
AU25L40001	Dhairya Sanathara	7801906876	dhairya.s7@ahduni.edu.in
AU2440126	Hirva Vekariya	6352024178	hirva.v@ahduni.edu.in
AU2440024	Jahnavi Patel	9106129923	jahnavi.p@ahduni.edu.in
AU2440069	Shaanay Kothari	6356400444	shaanay.k@ahduni.edu.in
AU2440238	Tirth Pathar	7874222507	tirth.p7@ahduni.edu.in

2. Project milestones

Start date	04 August 2025
Project Proposal (Report 1)	25 August 2025
Design Proposal (Report 2)	08 September 2025
Final Design Report (Report 3)	01 October 2025
Making and Internal Product Display #1	07 November 2025
Product Display #2 (Open House)	15 November 2025
Project Closure ((Report 4))	22 November 2025

3. Team's ideas (8 nos., finalized idea at No. 1)

No.	Idea in brief	End user	Nature of benefit
1.	Auto table cleaner – Automatically cleans the table after use.	Students, office, cafeteria users	Convenience & hygiene – saves time and keeps surfaces clean.
2.	Drone-based cleaning system – Drone that cleans dust and dirt at heights (walls, glass, or industrial spaces).	Cleaning staff, industries, offices	Efficiency & safety – avoids manual high-risk cleaning.
3.	Public spot for leftover food distribution – Collection points for extra food from homes/hotels for underprivileged people.	NGOs, public, hotels, needy people	Social welfare – reduces food waste and supports hunger relief.
4.	Alternative to plastic bottles using cardboard – Eco-friendly bottle concept to reduce plastic waste.	General public, beverage industry	Environmental – reduces plastic pollution and promotes sustainability.

5.	Module holder + Anti-usage desk setup – Desk design for students to increase focus and concentration during study/work.	Students, office workers	Productivity – improves focus, reduces distraction.
6.	RU-Q Sensor for Rail – A sensor system to detect and alert when passengers get stuck between the train and platform due to height mismatch or large gaps.	Railway authorities, passengers	Safety – prevents injury and loss of life by providing quick detection and alert.
7.	Animal detection system on rail/metro tracks – Detects animals on tracks to prevent delay and accidents.	Railway/metro authorities	Safety & efficiency – reduces train delays and animal deaths.
8.	Helmet with in-built sensor – Helmet concept (from sketch) possibly with road safety or smart sensing features.	Motorbike riders	Safety – reduces head injury risk or adds smart alert function.

4. Societal need to be served

It is difficult to board or alight the train to some people such as the old, children and individuals with physical issues due to a large gap between the train and the platform. This disjunction can in some cases make individuals slip or fall and get injured. The solution to this issue that our project is aimed at finding is the opening of an automatic ramp that just appears and makes it easier and safer to get in and out of the train.

5. Customer attributes (List requirements/expectations as said by customer during your conversations)

CA1	Ramp should extend and fold automatically
CA2	It should be strong and safe for all users
CA3	Should fit easily on existing train doors
CA4	Must be affordable and easy to maintain

6. Novel features of chosen project

Our ramp is semi-automatic and based on a rack and pinion system. This renders it lightweight and not too expensive. It does not require having a complete automatic installation, and therefore can be installed easily to trains that are already in operation. The ramp also has sensors capable of detecting when the train is not moving and it will automatically emerge to bridge the distance between the train and the platform without harm to any one.

7. Specifications of your proposed product

Parameter	Description (quantitative)

Commented [SK1]: They do not have any design so may be product specifications is not suitable here

8. Project completion criterion (After which activities at Expo will you say that the project is over)

Our project will be complete when the ramp is able to open and close itself, and support the weight of people without any issues, and be able to operate correctly on many occasions. It must be clear-cut between the train and the platform to enable the individuals to move in and out of the train easily and safely.

9. Human and Societal aspects

9.1 End-user / Operator Profile

Age : 10 – 80 years	Gender - All	Geographical location: Urban & rural railway stations in India	Annual income : ₹1 lakh – ₹10 lakh (varies from person to person)
Educational qualifications: All levels		Skills: Basic train travel experience	
Physically challenged: Yes, some users may be		Mentally challenged: Few, but the system helps them travel safely too	
Ownership (land, tools, machinery, etc.): Not applicable (they are passengers)		Any other: Frequent train travellers with luggage or wheelchairs	

9.2 Owner / Purchaser Profile: Is owner same as end user/operator? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe Write about owner, if not same as end-user/operator: Ans : No			
Age : 30 – 60 y	Gender : Mostly Male	Geographical location: Across different railway stations in India	Annual income : ₹5 lakh – ₹20 lakh (railway officials or company employees)
Educational qualifications: Diploma or degree in mechanical/electrical engineering		Skills: Maintenance and safety knowledge	
Physically challenged: No		Mentally challenged: No	
Ownership (land, tools, machinery, etc.): Works for Indian Railways or private train company		Any other: Responsible for installing and checking the ramp system	

9.3 Maintenance / Repair persons' Profile: Could be same as end user/operator? <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe Write about the profile of these people: Ans - No			
Age : 25 – 50 y	Gender : Mostly male	Geographical location: Railway workshops or depots	Annual income : ₹2 lakh – ₹6 lakh per year
Educational qualifications: ITI / diploma in electrical or mechanical field		Skills: Repairing, wiring, assembling, and testing small machines	
Physically challenged: No		Mentally challenged: No	
Ownership (land, tools, machinery, etc.): Basic toolkits and repair equipment		Any other: Work under railway maintenance team	

9.4 Profile of persons involved with recycling: Who will do the recycling, and their profile?			
Age : 25 – 45 y	Gender: Male or Female	Geographical location: Metal recycling centers or scrap shops	Annual income : ₹1 lakh – ₹3 lakh per year
Educational qualifications: Basic school education		Skills: Handling and separating metal parts safely	
Physically challenged: No		Mentally challenged: No	
Ownership (land, tools, machinery, etc.): Owns or works in small recycling units		Any other: Helps reuse metal parts to reduce waste	

9.5 Societal aspects:	
Impact on employment generation / destruction / displacement	Creates new jobs for installation, testing, and maintenance of ramps.

Impact on environment at all stages, incl. raw materials, manufacturing, during use, and scrap	Low, since materials like aluminum or steel are reusable and the ramp uses low power.
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10. Acceptance tests

Test type/name	Parameters to be evaluated	Procedure of testing and acceptance
Extension/Folding Test	Speed and smooth motion	Check automatic movement 10 times continuously
Load Test	Weight capacity	Place weights up to 150 kg on ramp
Safety Test	Stability and sensor accuracy	Run under varied distance and detect platform correctly

11. Major concerns in successful execution of the project (Write 3 most important concerns that you have)

MC1	Ensuring the ramp is strong but lightweight
MC2	Sensor accuracy and timing with train movement
MC3	Cost and ease of installation in existing trains

12. Time spent on project until 25 August 2025

Number of team meetings, date venue and duration

Individual time spent on project

Name	Time spent and work done
Dhairya Sanathara	2 meetings – Idea discussion and proposal draft
Hirva Vekariya	Research on existing train ramps (3 hours)
Jahnvi Patel	Prepared customer feedback points (2 hours)
Shaanay Kothari	Made sketches and concept outline (3 hours)
Tirth Pathar	Compiled and edited the report (2 hours)

In addition, prepare the following in a separate Word file.

- Annexure 1-A Team picture with names and cell no. at bottom and identifier for leader.
- Annexure 1-B Various ideas considered by the team (*Record Book/Chart paper snapshots*)
- Annexure 1-C Attach pictures of your visit and write what you learnt from people you met.
- Annexure 1-D Products, Patents and Designs that are available, and similar to your idea.
- Annexure 1-E Work distribution amongst team members.

Ahmedabad University ENR215 Design, Innovation and Making

2025-2026 Monsoon

Work up to 01 October 2025

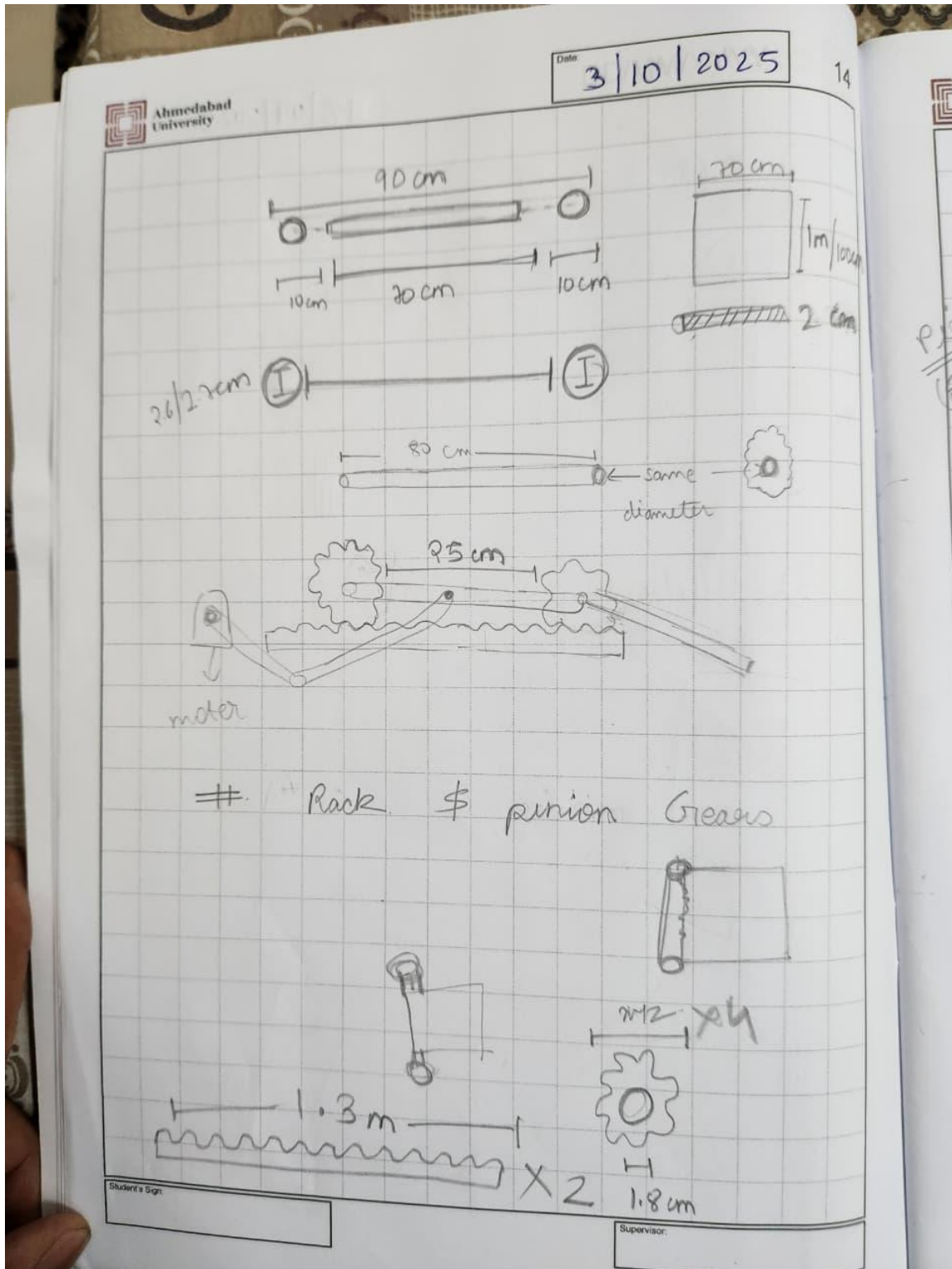
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Annexure 1B-





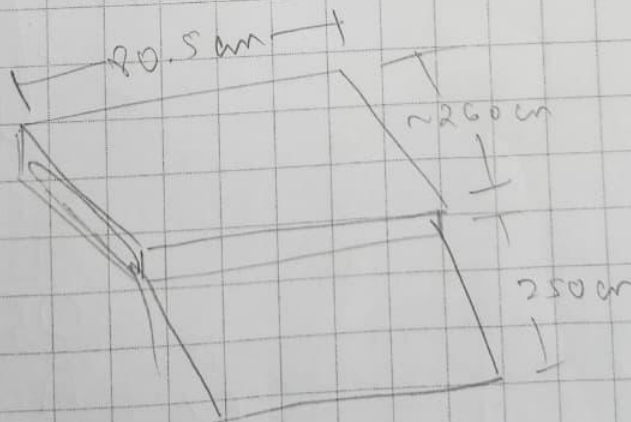
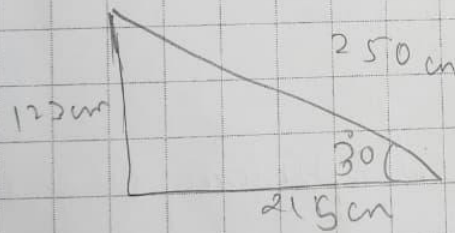
① left & Right Side corners.

① Nematic cylinder / actuator
solenoid

② also get information at
metro.



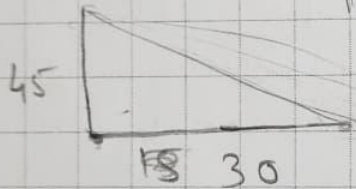
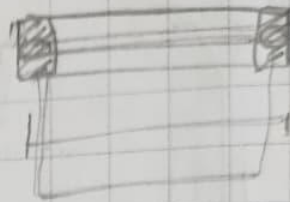
③ Hydraulic mechanism.



Student's Sign:

Supervisor:

- ① Box
- ② Rod.



76

$$x^2 = (45)^2 + (30)^2$$

$$= 2025 + 900$$

$$x = \sqrt{2925}$$

$$x = 54.083 \text{ cm}$$

526.92



Design, Research, making

① Size of Boggy compartment :- (LNB)

length :- 23.54 m
 height :- 4.039 m
 width :- 3.24 m

Total

need to
 verify
 in
 person

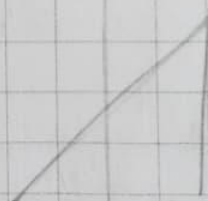
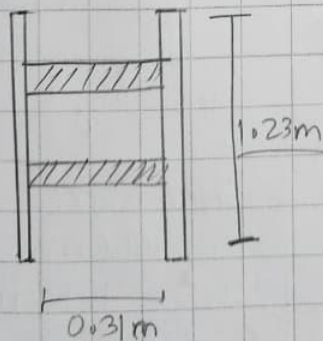
length :- 0.825 m
 height :- 1.9 m
 width :- 0.2 m

door

length :- 0.31 m
 height :- 1.23 m
 width :- 0.17 m

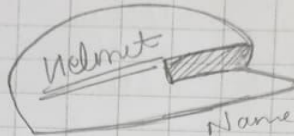
ladder

distance between step :- 0.35 m



Student's Sign:

Supervisor:



Name :- Res-Q Sensor for Rail

① Problem - Statement :-

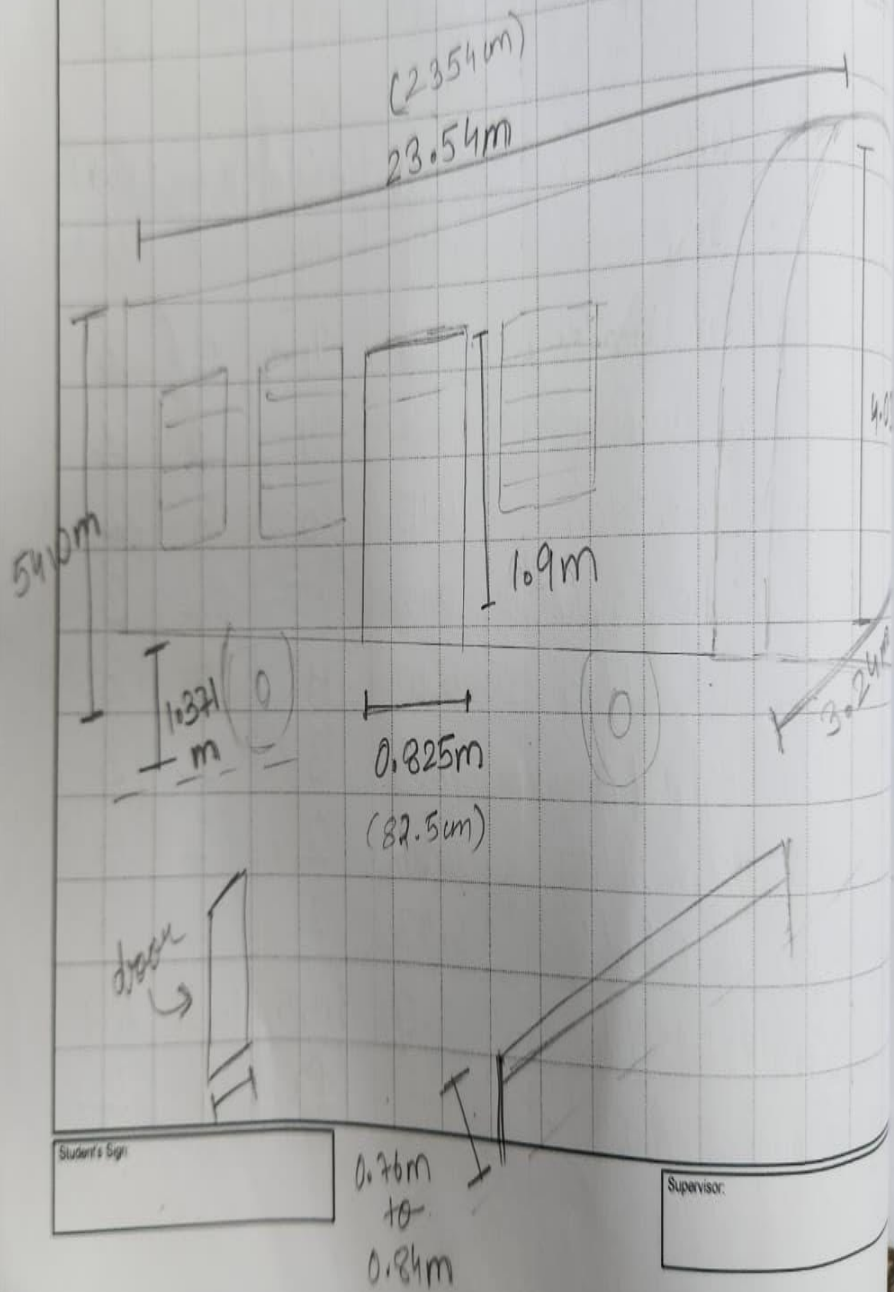
In India, many passengers lose their lives after getting stuck in the gaps between the train and the platform due height mismatch or larger gap, the absence of Res-Q System delays time leads to injury, sometimes death.

Name :- " Res-Q Sensor for Rail "

② Problem - Statement :-

Student's Sign

Supervisor



Student's Sign:

Supervisor:

Verify in
plan

Student's Sign:

Annexure 1-C

Visit Location: Ahmedabad Railway Station

Date of Visit: 20th September 2025

Team Members: Hirva Vekariya, Shaanay Kothari, Tirth Pathar, Dhairya Sanathara, Patel Jahnvi

Purpose of Visit

The main purpose of the visit was to understand the challenges faced by passengers—especially elderly and differently-abled individuals—when boarding and alighting trains. The team observed accessibility gaps between train coaches and platforms and interacted with passengers and railway staff to identify key pain points.

Observations

- There exists a significant height difference between the platform and the train floor, causing inconvenience to passengers.
- Manual ramps are used but require manual lifting and alignment, which is time-consuming.
- During peak hours, the boarding process becomes unsafe, especially for elderly or disabled passengers.
- Railway staff expressed a need for an automatic, easy-to-operate ramp system that can save time and improve safety.

Learnings

- Accessibility solutions must focus on both efficiency and passenger safety.
- An automatic ramp with motorized deployment can eliminate manual effort.
- Incorporating motion and proximity sensors ensures that the ramp activates only when the train is stationary.

- Using lightweight aluminum alloys can make the ramp durable and easier to maintain.
- Solar-powered or energy-efficient mechanisms can make the system sustainable for long-term use.



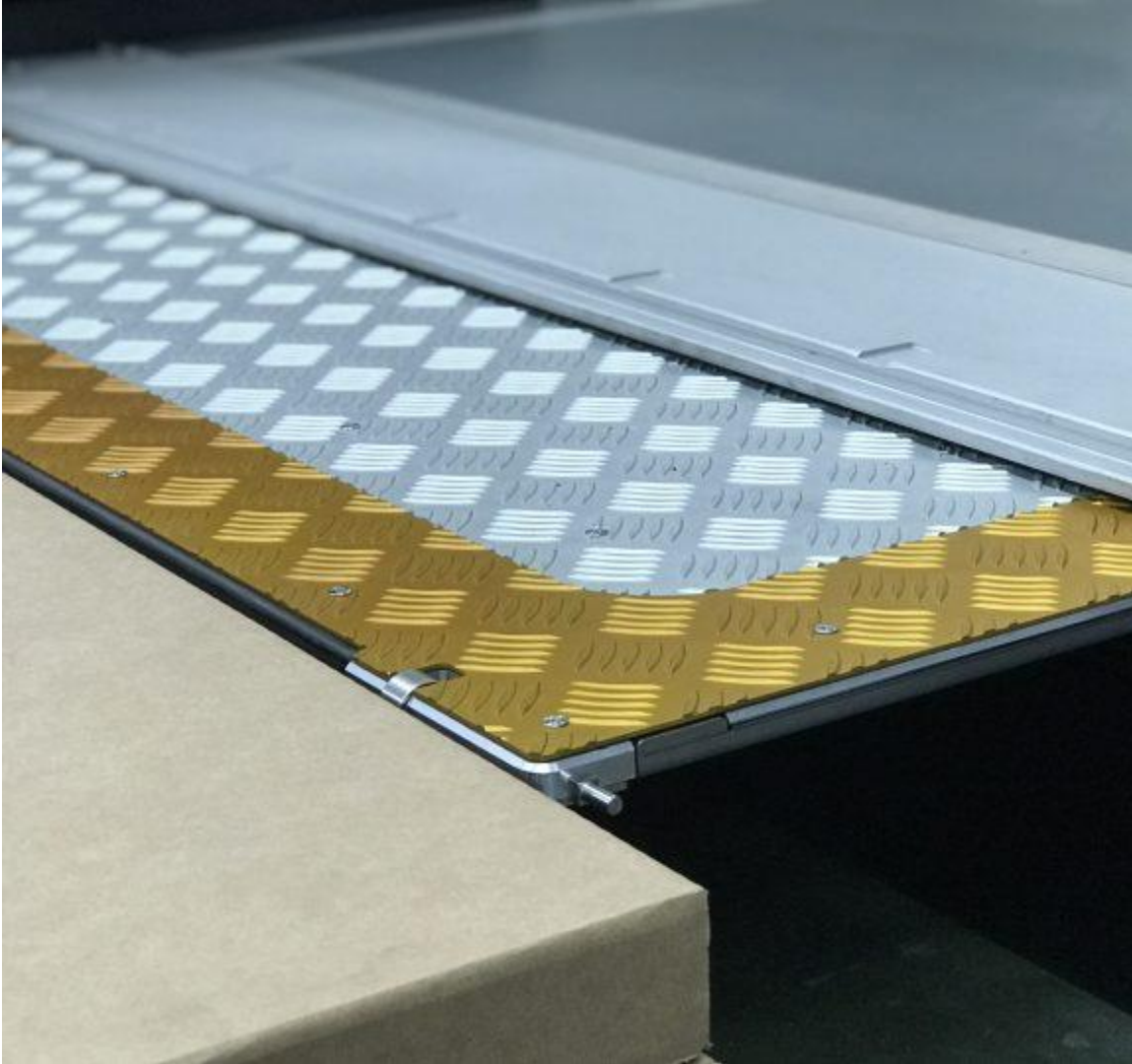
Annexure 1-D



The first image shows a mechanical gap filler at a station.



The second shows a portable train ramp (Aerolight style) bridging platform and train.



Annexure 1-E

Name	Time spent and work done
Dhairya	8-10 hours for design finalization, talk with fabrication manager.
Shaanay	6-7 hours for prototyping and error rectification
Hirva	9-10 hours on cad model, bugs and sketching
Tirth	5-8 hours dealing with vendors and dimension and analysis
Jahnvi	5-6 hours report making, model making

