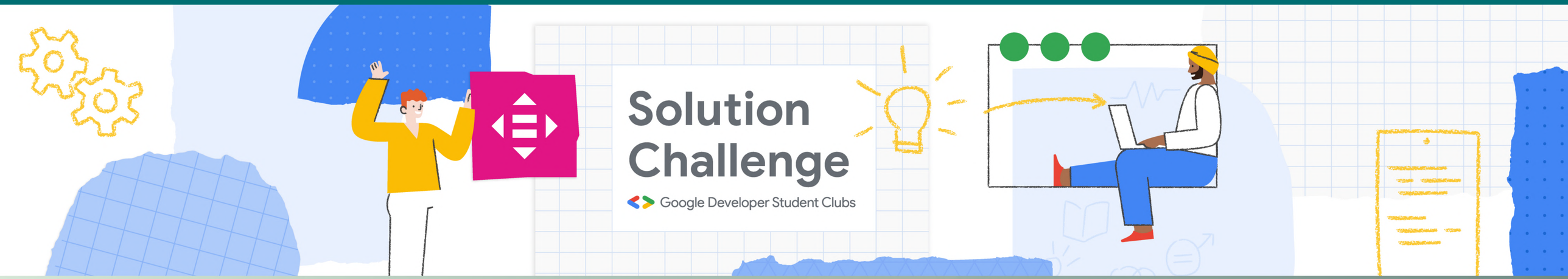
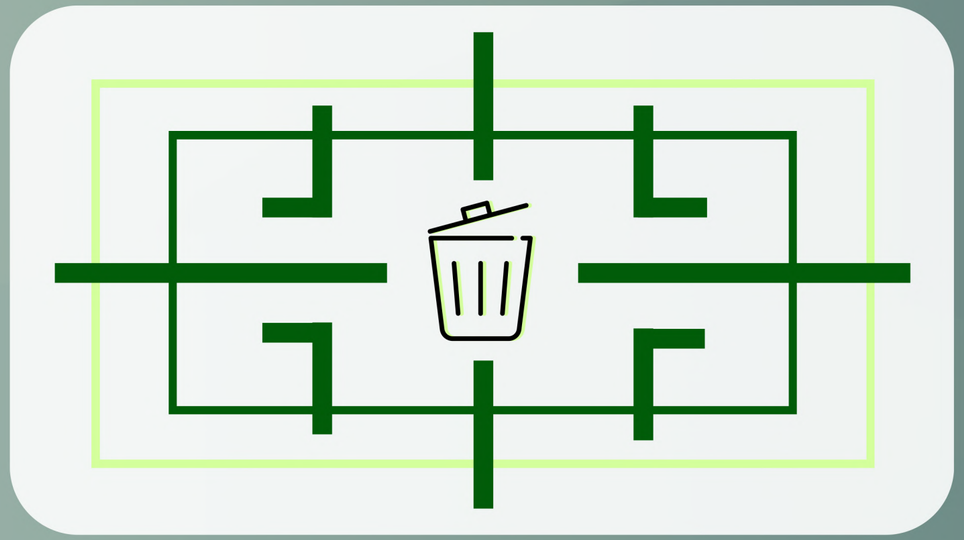


Clean Scan

Cleaning the world, one scan at a time.



SYMBIOSIS INSTITUTE OF TECHNOLOGY - PUNE

Google Devlopers Student Clubs

Clean Scan

Meet The Team

Apoorv Gupta

apoorv.gupta.btech2021
@sitpune.edu.in

A sophomore at SIT- pune. Studying and researching in the department of Artificial Intelligence and Machine Learning

Jainil Patel

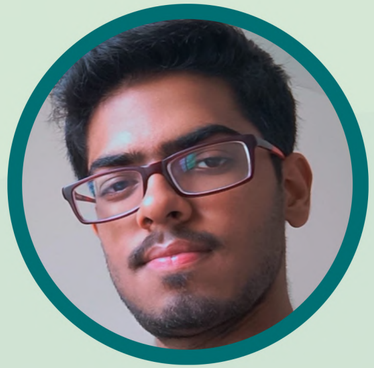
jainil.patel.btech2021@s
itpune.edu.in

A sophomore at SIT- pune. Student at Artificial Intelligence and Machine Learning Depatment

Amitesh Patra

amitesh.patra.btech2021
@sitpune.edu.in

A sophomore at SIT- pune. Enthusiastic Learner and AIML Student



Kumar Rohit

kumar.rohit.btech2021@
sitpune.edu.in

A sophomore at SIT- pune. Learning Data Analytics, Machine Learning and exploring the vast ocean of tech.

List of Content

- Problem Statement
- Impacts
- UN Sustainable Development Goal
- System architecture and Workings
- Technologies used
- Feedback and challenges
- Peek into the Solution
- Future Scope and Scalability

We believe

that a clean environment is essential to our health and well-being, and that it is our duty to protect it for future generations.

~Barrack Obama

Problem Statement

- There is a growing concern for the environmental impact of waste and litter on our planet.
- Waste and litter can lead to health hazards and ecosystem damage.
- Waste management authorities often rely on citizen reports to detect litter and illegal dumping in public spaces.
- Reporting trash can be time-consuming and cumbersome for citizens.
- There is a need for a user-friendly and efficient solution that empowers citizens to report waste and litter in their community easily.
- Such a solution can make the mission of people who clean the world easier.

Clean Scan

Impacts

Who

Is affected :

- Residents
- Tourist
- Waste Management Authorities
- Business Owners

What

Is the problem:

- Harmful waste management practices
- Littering by citizens damages the environment
- Reporting a problem is time-consuming and cumbersome.
- Lack of timely action by authorities.

Where

does it occur:

- Parks
- Beaches
- Streets
- Roads
- Natural Enviroments

does it effect:

- Reduced property values
- Decreased tourism
- Increased costs for waste management authorities
- Harms wildlife and natural habitats.

Why

Is it a problem:

- Harm both humans and wildlife
- Leading to environmental damage
- Health hazards
- Ecosystem harm

Is it important to adress:

- Protecting the environment
- Improve public health
- Promote sustainability

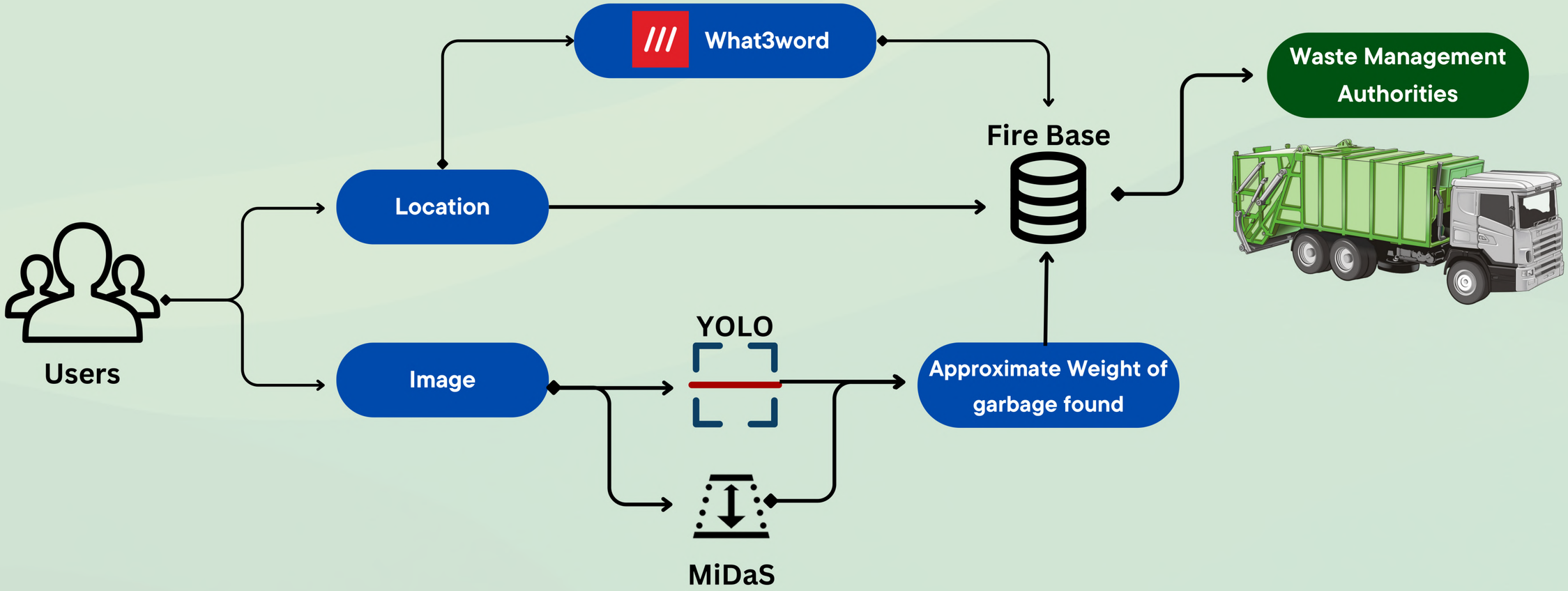
UN Sustainable Development Goals

- The problem of waste and litter in public spaces is related to several of the United Nations Sustainable Development Goals (SDGs), but the most relevant one for this problem is likely SDG 11: Sustainable Cities and Communities.
- In particular, SDG 11.6 aims to "reduce the adverse per capita environmental impact of cities, including by paying special attention to municipal and other waste management."
- By empowering citizens to report waste and litter in their community and encouraging responsible waste management practices, we can contribute to achieving SDG 11 and creating more sustainable cities and communities.
- The inspiration for addressing the problem of waste and litter in public spaces comes from a deep concern for the environment and the health and well-being of communities.

System Architecture

- **Object detection:** We use the YOLO algorithm to detect the number and class of objects present in an image captured by the user.
- **Depth estimation:** We utilize the Midas depth map to estimate the depth of objects in the image.
- **Weight prediction:** Using the area of the bounding box, density of the material detected, and depth information, we predict the weight of the objects.
- **Data storage:** The predicted weight is then stored in a database for future analysis and reporting to relevant authorities.
- **Geolocation:** The location of the picture is recorded using GPS technology to identify the specific area where waste and litter are being reported.
- **what3words:** We use the what3words tool to identify similar complaints in a particular area.
- **Management interface:** Our database can be accessed by authorized management bodies to review the data and take necessary actions.

System WorkFlow



Technologies Used

Flutter

Flutter allowed for efficient and seamless development of a cross-platform mobile application for waste management reporting.

Firebase

Simplified development, improved scalability and security, and allowed for real-time data synchronization and storage.

What3Words

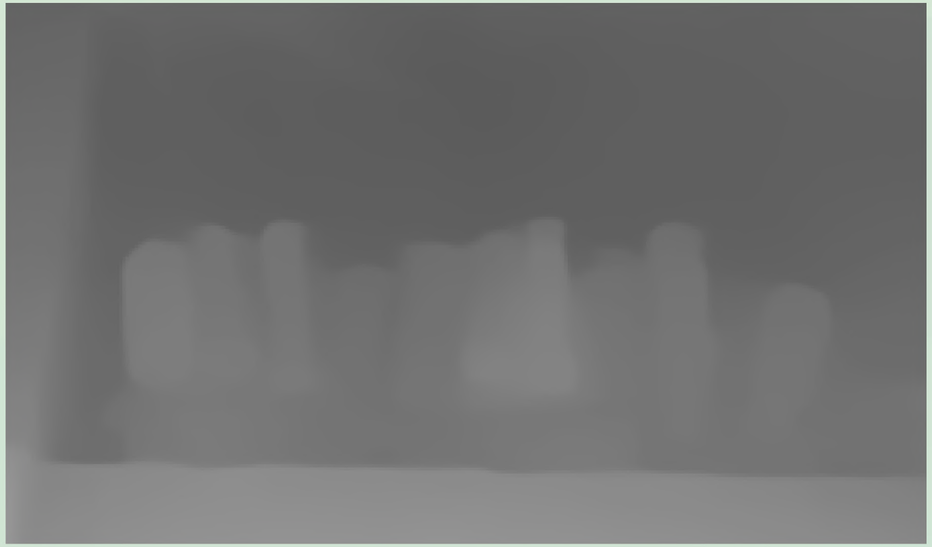
Enabled efficient communication and location-based tagging of waste hotspots.

Technologies Used

YOLO

Enabled object detection and classification with high accuracy and speed, improving the efficiency and effectiveness of the waste reporting system.

MiDaS



Provided depth map information to help estimate the weight of objects and improve waste management.

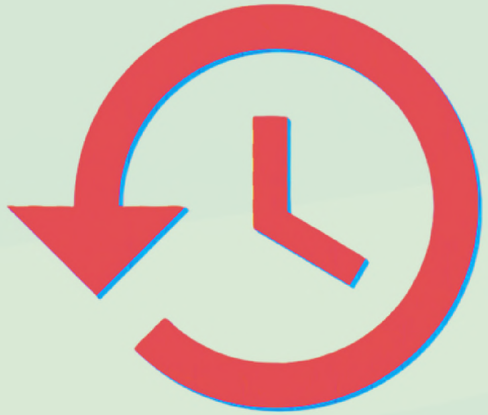
Testing and FeedBack

User 7 suggested that the ML model should be user-friendly. This feedback inspired the team to integrate the model into an app, making it more accessible and easy to use for citizens reporting waste and litter. This implementation improved the overall user experience of the solution.

User 11 provided feedback on the importance of tracking time and date of when a problem is reported. This feedback helped the team understand the importance of accurate data and reporting. As a result, they added a column for time and date in the reporting feature, enabling authorities to better track and monitor waste and litter issues in the community.

*People giving feedbacks are kept anonymous on personal request

Testing and FeedBack

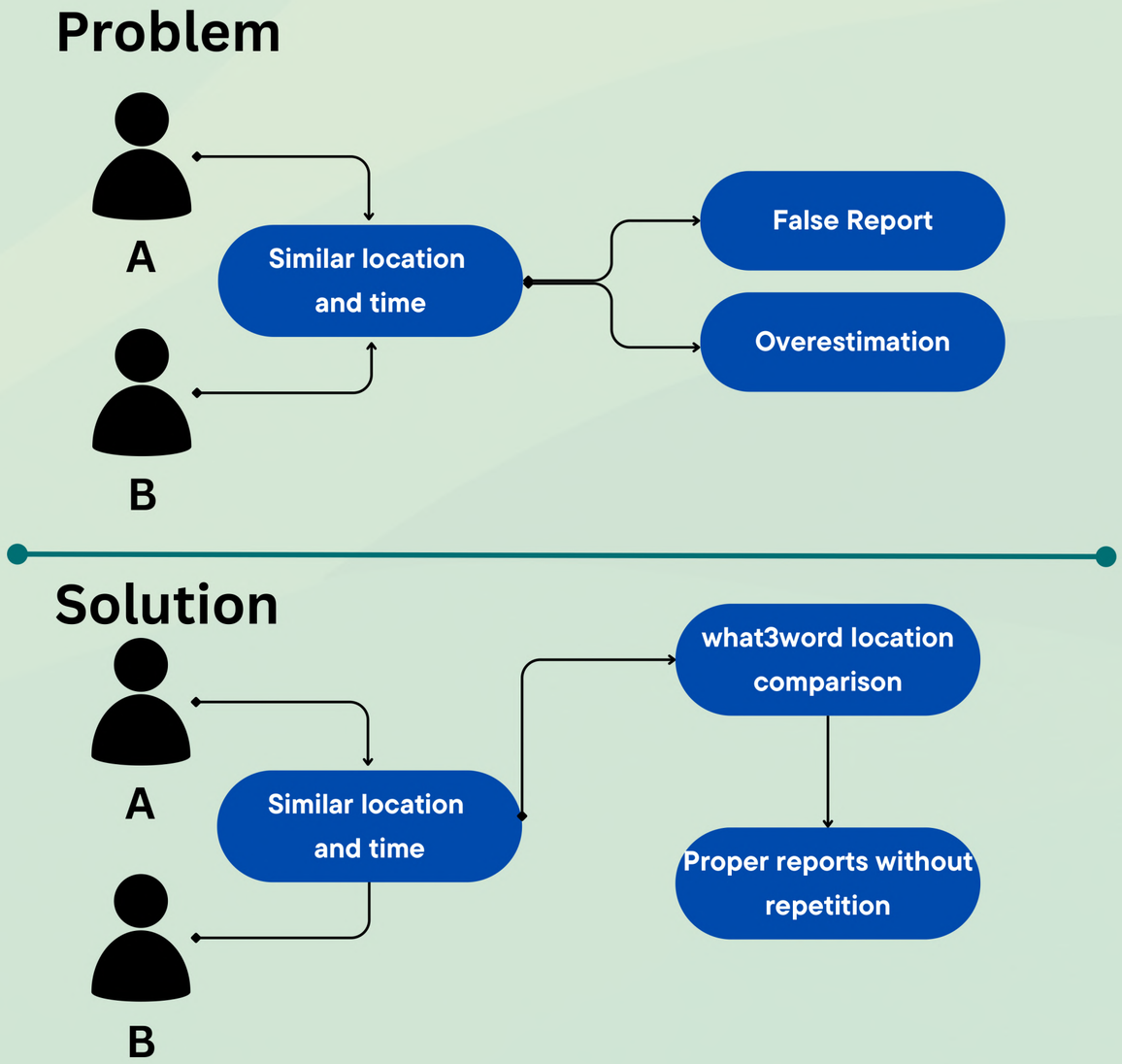


User 22 requested a history of their past reports, which was a reasonable request. This feedback highlighted the need for a reporting history feature that allows citizens to track their past reports and monitor the progress of the solution. The team implemented this feature, improving the overall functionality and user experience of the solution.

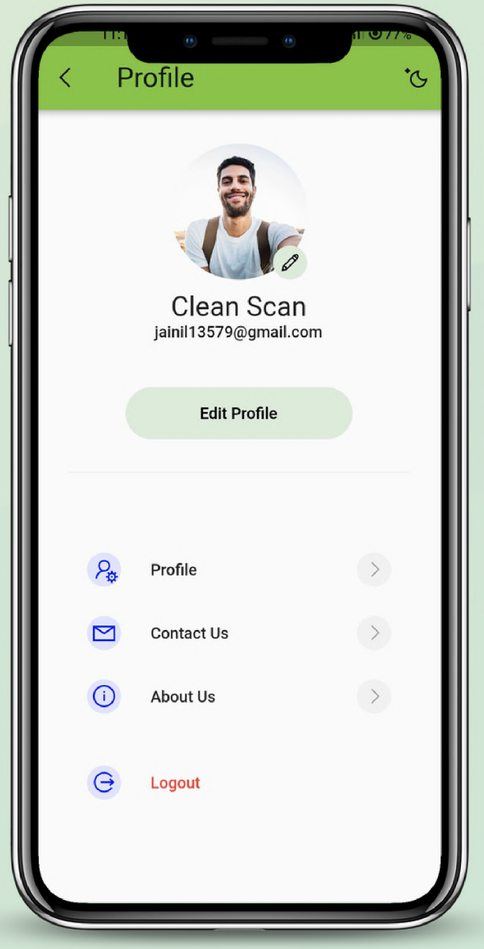
By incorporating user feedback into the development process, the team was able to make improvements to the solution that directly addressed the needs and concerns of its users. These changes improved the usability and functionality of the solution, making it more effective in addressing the problem of waste and litter in public spaces.

A challenge to overcome

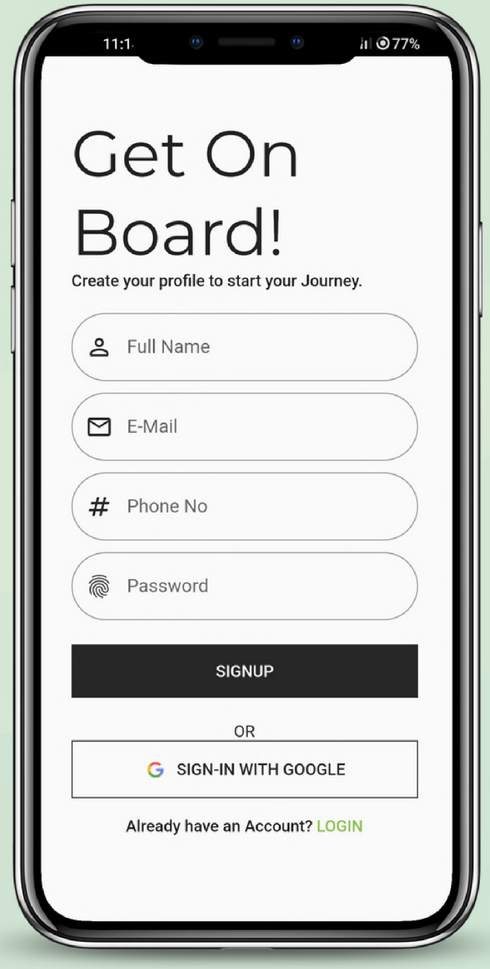
- One major challenge we faced during the development of our solution was the issue of repetitiveness in reports due to similar images taken at similar times.
- We realized that relying solely on code to solve this problem was not feasible, so we looked for external solutions.
- After careful consideration, we decided to integrate the what3words platform to identify repetitive or similar complaints by their location and time.
- This decision was based on the fact that it provided an efficient solution to address the challenge and ultimately improved the accuracy of our solution.



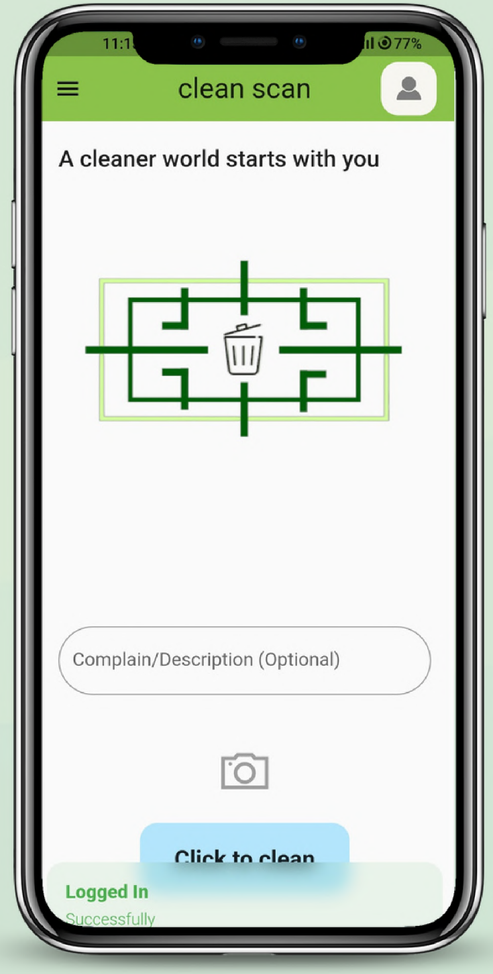
Peek to the solution

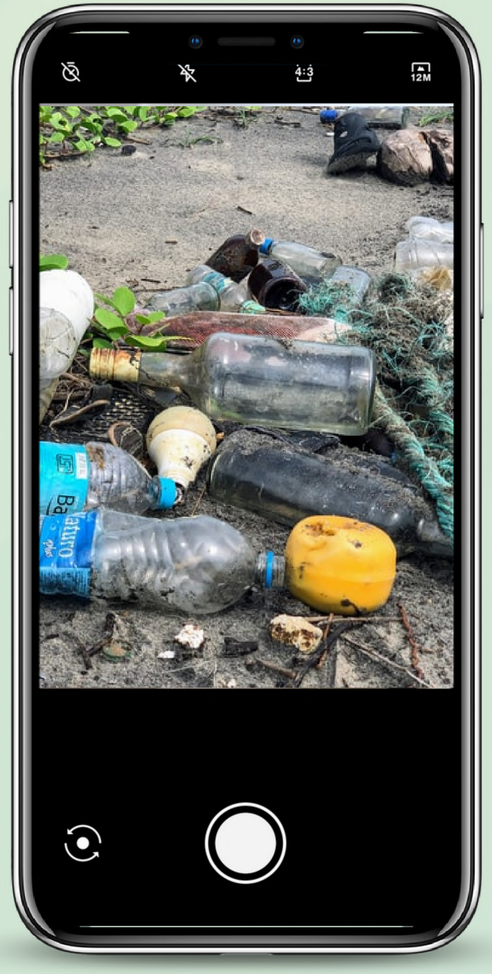


Peek to the solution

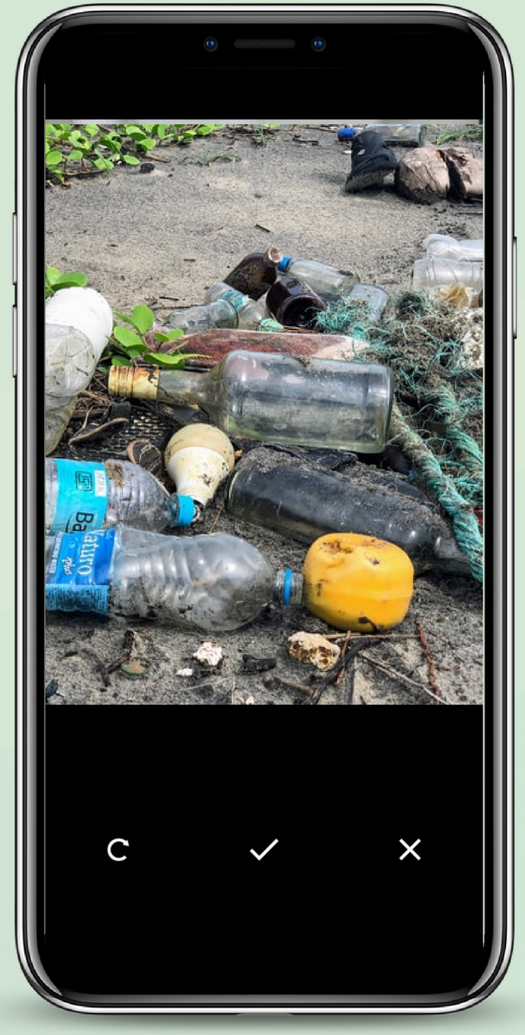


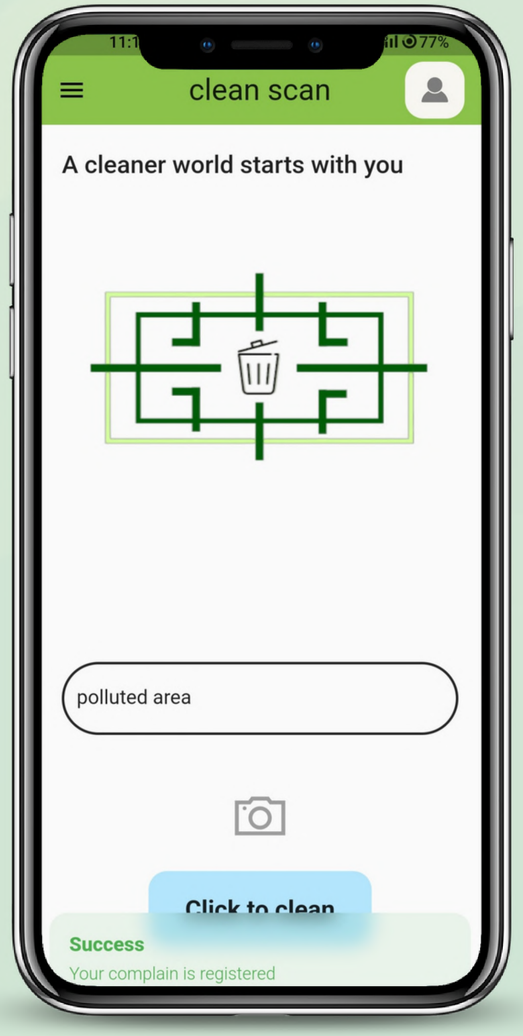
Peek to the solution



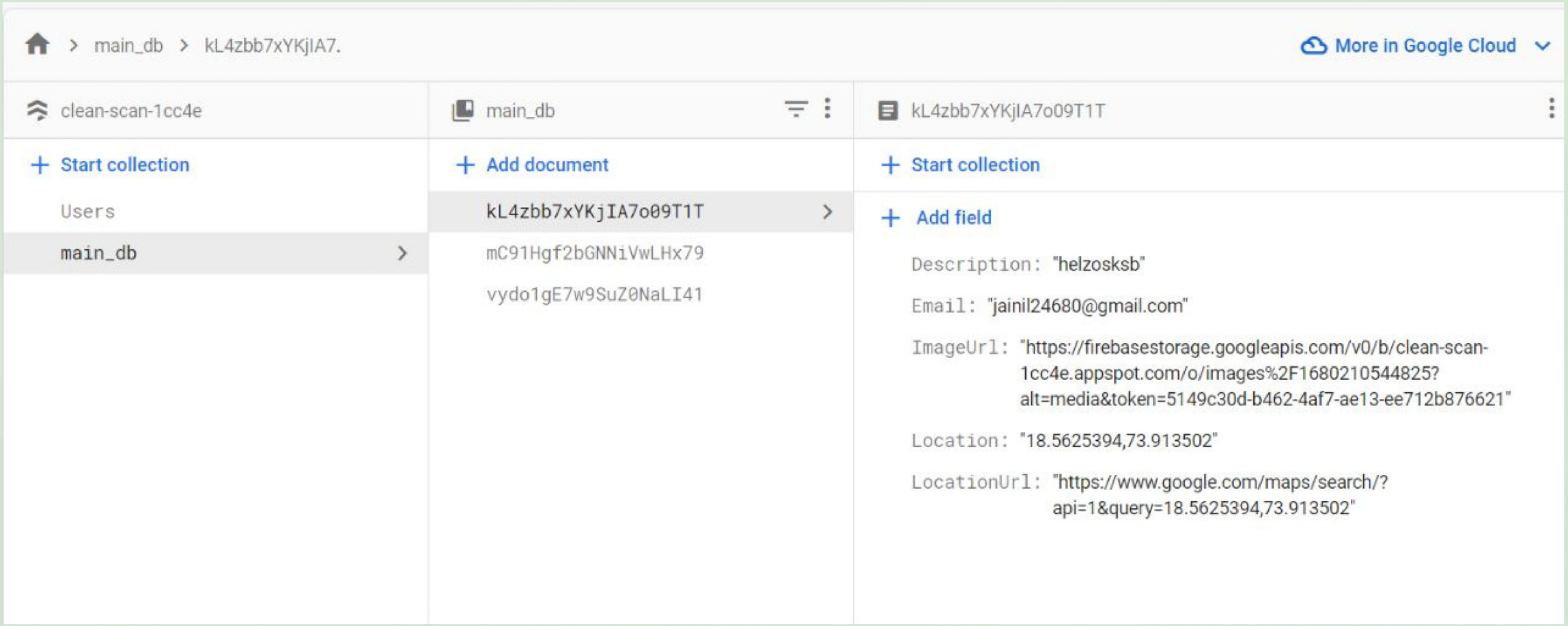


Peek to the solution





Fire Base Preview



Scaling

Machine Learning:

Dataset Size:

Our current Dataset has -- of labels that mean we can detect waste kinds of -- types so far. As we expand our dataset we can get even more accurate result form the already present dataset as well as the new class/labels we form on the dataset.

Better Models:

Every day hear about something new happening the world of Machine Learning. So as better models become available, we can improve our accuracy from the previous data as well.

A Whole Different Approach:

Unlikely but not negligible, we might be able to find a another approach for our image detection and depth/weight calculation ideas.

Scaling

Customer Support:

FAQ Section:

A section can be implemented for better understanding of how and when our solution should be used. It will also have general doubts from frequently asked questions.

General audience Feedback:

Apart from the feedback during our iterations of solution we don't have a feed back system yet if the user has any issue. This is very easy to implement as our user base grows.

Future scope

- **Integration with other applications:** Our solution could be integrated with other applications, such as inventory management systems, e-commerce platforms, or supply chain management systems. This would allow businesses to automate their weight measurement processes and improve efficiency.
- **Expansion to new industries:** Our solution could be adapted and customized for use in other industries such agriculture (for measuring crop yield), or construction (for measuring the weight of building materials).
- **Integration with IoT devices:** Our solution could be integrated with IoT devices, such as smart scales or sensors, to enable remote weight measurement and monitoring. For better reporting and management of waste caused by business that are accountable to government.
- **Integration on Maps for better Understanding:** We can show the location on a map for easier path tracing for the cleanup crew.

Thank you!