This is the template for the 1 page proposal (500-600 words) that presents a solution (new usage or suggest improvements on a new technology).

If your proposal is selected for the second stage of the Challenge, you will be asked to expand the description to 10 pages (5000-6000 words) which should be a development of the previously submitted proposal.

IMPORTANT: Students are strongly encouraged to team up in pairs, finding a partner in a different university or country. Teams will get an additional point in the final score.

A fresh view is valued. Please, defend your proposal by including not only technological, but also socio-economic, political, ethical and/or environmental aspects.

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MIND: Mine Identification and Neutralization Database

Landmines continue to pose a significant threat to civilian populations and military personnel in post-conflict regions. Despite numerous efforts to clear affected areas, traditional methods of landmine detection remain costly, time-consuming, and dangerous. The proposed solution seeks to address this issue by developing an integrated, interactive, open-source database capable of receiving thermal images captured by drones, analysing them using state-of-the-art landmine detection algorithms, and storing the results in the cloud making them publicly accessible.

The thermal images captured, along with **GPS coordinates** are uploaded to the app, which processes them in the cloud using **advanced detection algorithms**. These algorithms, like those highlighted in studies on aerial thermographic images for landmine detection[1], help identify temperature anomalies in the soil that may indicate the presence of a landmine. Furthermore, we imagine the system to be flexible and **scalable**, with the potential to expand data collection methods by integrating different sources and technologies.

1.Detection and data collection

The core of the system revolves around the use of **drones** equipped **with thermal imaging sensors** to detect buried landmines. Unlike expensive, specialized equipment, the solution encourages the use of commercially available quadcopters, which can be easily fitted with thermal cameras. These drones are relatively affordable and **user-friendly**, making the solution **accessible** to a wide range of operators, including non-specialists. By enabling the use of these multi-purpose, low-cost tools, the solution significantly reduces the financial barrier to entry for landmine detection efforts. The thermal images captured, along with **GPS coordinates** are uploaded to the app, which processes them in the cloud using **advanced detection algorithms**. These algorithms, like those highlighted in studies on aerial thermographic images for landmine detection[1], help identify temperature anomalies in the soil that may indicate the presence of a landmine. Furthermore, we imagine the system to be flexible and scalable, with the potential to expand data collection methods by integrating different sources and technologies.

2. Cloud-Based Data Processing and Centralized Database

All data processing is conducted in the **cloud**, allowing for scalable and efficient analysis of large image datasets. The processed results are then integrated into a central, **open-source database** that can be accessed by a wide range of users, from military personnel to humanitarian organizations. This database becomes a vital resource for **planning and logistics**, as it provides an up-to-date **map of suspected landmine locations**. Additionally, the cloud infrastructure ensures that the solution can be deployed on a large scale without requiring high-end devices for data analysis, making it accessible to users with limited technological resources.

3. Community-Driven Contributions

One of the most **innovative aspects** of this solution is its capacity to accept contributions from a diverse range of users, including civilian authorities, NGOs, and even private individuals operating drones. By allowing users to upload thermal images from their own drones, the system can **crowdsource landmine detection efforts**, dramatically increasing the coverage area and **speed of data collection**. This community-driven model empowers local populations and authorities to contribute to their own safety, complementing official demining operations.

4. Real-Time Feedback and Decision Support

After analyzing the thermal images, the system provides users with **real-time feedback**, including potential landmine locations and a **risk assessment**. This data can be used by military or humanitarian demining teams to **prioritize areas for clearance**. Furthermore, civilians using the app will receive **warnings about dangerous areas**, helping to prevent accidental encounters with landmines. However, the system should also include clear legal disclaimers to ensure that users understand the risks associated with demining operations, should they choose to proceed at their own risk.

REFERENCES

[1] Forero-Ramírez, J. C., García, B., Tenorio-Tamayo, H. A., Restrepo-Girón, A. D., Loaiza-Correa, H., Nope-Rodríguez, S. E., ... & Buitrago-Molina, J. T. (2022). Detection of “legbreaker” antipersonnel landmines by analysis of aerial thermographic images of the soil. Infrared Physics & Technology, 125, 104307.

Tenorio-Tamayo, H. A., Forero-Ramírez, J. C., García, B., Loaiza-Correa, H., Restrepo-Girón, A. D., Nope-Rodríguez, S. E., Barandica-López, A., & Buitrago-Molina, J. T. (2023). Dataset of thermographic images for the detection of buried landmines. Data in Brief, 49, 109443. https://doi.org/10.1016/j.dib.2023.109443.