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MILAAN:
ENHANCING MISSING CHILDREN RECOVERY

1st Dr. Priyanka Meel
Department of Information Technology
Delhi Technological University
Delhi, India
priyankameel@dtu.ac.in

2nd Yash Kumar Jarwal
Department of Information Technology
Delhi Technological University
Delhi, India
yashkumar1980@outlook.com

3rd Rupesh Sharda
Department of Information Technology
Delhi Technological University
Delhi, India
rupeshsharda09@gmail.com

4th Rakshit Kumar
Department of Information Technology
Delhi Technological University
Delhi, India
rakshitk72@gmail.com

Abstract—As the number of missing children continues to rise, and old-school search methods fall short, the need for smarter, faster solutions has never been more urgent. That's where Milaan steps in—a mobile app built to rethink how we find lost children, blending cutting-edge tech with ease of use. It features Facial Recognition for swift identification and a Guardian Registration system to securely log crucial details. The app's enhanced searching bridges the gap between various stakeholders like families, authorities and NGOs, speeding up the response time while streamlining the reporting process. An addition to this is, Geofit-a compact, easy to place tracking device that is designed to fit into everyday products like backpacks, shoe insoles, etc. All this works in integration ,removes unnecessary overheads in time, minimizes paperwork, all this while equipping people with the right tools. It brings a more efficient, connected way to reunite families-safe and fast.

Index Terms—child safety, collaborative search, facial recognition, GeoFit, GPS tracking, missing children, mobile application, React Native, real-time tracking, Sanity CMS.

I. INTRODUCTION

Losing a child comes as a worst nightmare- filled with fear, heartbreak and confusion. The sad part is, the systems designed to help are too slow and outdated with manual steps, the systems of finding missing children has not evolved to keep up with the current fast-paced world. The first few hours are very critical and this is where our existing protocols fail. Seeing the numbers, the scale of this is problem is scary worldwide- let alone India, thousands of children disappear annually with majority of the cases going unresolved. The case is even worse for girls where the rates rose even during the pandemic. The conventional searching methods-like loudspeaker announcements, door-to-door checks often prove ineffective, mainly in metropolitan cities or remote villages where coordination is limited. Advanced tools like facial recognition or real time tracking see little use in these cases. The disjointed systems and no tech integration across stakeholders makes thing worse. This is where out solution-Milaan comes in play. A mobile first design, built with latest features like facial recognition, and intuitive reporting process and, GeoFit- a

small tracker designed to conceal in daily products-Milaan aims to remove unnecessary delays and reinforce collaboration between families and all the stakeholders, making search faster, smarter and much more coordinated

II. RELATED WORK

A. Overview

The issue of missing children remains a scaring situation worldwide, especially with countries like India with added complexities due to procedural lags and late adoption of technology. Often, the families/guardians are forced to wait before filing an official report- this initial time make all the difference. Although some digital mechanisms, such as online complaint portals, have been introduced, they frequently fall short in terms of urgency and system-wide coordination. Data is typically spread out across multiple channels and manually inputted, which not only increases the margin for error but also drags down the speed of critical response efforts.

B. Integration of Facial Recognition and Tracking Technologies

Recent advancements in technology offer potential solutions. Facial Recognition Technology has shown promise in various identification scenarios. Similarly, advancements in GPS and GSM technologies enable real-time tracking systems, which could be adapted for child safety. Platforms utilizing mobile applications built with frameworks like React Native offer cross-platform accessibility, while backend systems like Sanity CMS provide robust data management capabilities. Machine learning models, particularly Convolutional Neural Networks (CNNs) deployed via frameworks like TensorFlow Lite, allow for on-device image processing and facial feature extraction, crucial for real-time identification. Milaan builds upon these existing technologies, integrating facial recognition, a custom-built low-cost tracking device (GeoFit) using Arduino Nano, NEO-6M GPS, and SIM800L GSM modules,

and a collaborative mobile platform to create a more holistic and effective solution than currently available methods.

III. RESEARCH METHODOLOGY

A. System Architecture

- **Mobile App (Frontend):** Developed using React Native with Expo for cross-platform compatibility (iOS/Android). Key UI components include login (Aadhaar-based), home screen (displaying nearby registered children, initiating scans), and a results/tracking screen (map view, guardian details, scan history). Redux is used for state management, and Tailwind CSS for UI styling. React Native Maps provides geolocation visualization.
- **Backend:** Sanity CMS serves as the primary backend and database, managing structured content like user profiles, case details, facial recognition data, and GeoFit location logs.
- **Facial Recognition Engine:** Utilizes TensorFlow Lite with Convolutional Neural Networks (CNNs) for on-device, real-time facial feature extraction and matching against the database. Computer Vision (CV) techniques enhance analysis even with lower-quality images.
- **GeoFit Tracking Device:** A custom-built, low-cost hardware unit featuring Arduino Nano, NEO-6M GPS module, and SIM800L GSM module, designed to be embedded discreetly. It provides real-time location updates.
- **Database:** Managed by Sanity CMS, storing children's profiles (biometrics, guardian info, location history), guardian records, and scan logs

B. Key Functionalities

- **User Registration & Profile Management:** Guardians register using identifying details (e.g., Aadhaar) and input child's information, including biometric data (photos for facial recognition).
- **Missing Report Filing:** Guardians can quickly file a missing report via the app, providing crucial details like last seen location and clothing.
- **Facial Scanning & Matching:** App users (including authorities/NGOs) can scan a found child's face. The app uses TensorFlow Lite CNN models to extract features and match against the missing children database.
- **Guardian Notification & Information Display:** Upon a successful match, the guardian's contact details are displayed to the finder/authorities.
- **Real-Time Tracking (GeoFit & Scan Updates):** The GeoFit device transmits location data. Additionally, every facial scan updates the child's last known location in the system. This location is displayed on a map interface.
- **Administrator Features:** Admins manage missing person reports (approval/rejection), access case histories, and handle cases based on system-defined priority (e.g., minors prioritized).

Fig. 1. Workflow

C. Workflow

1) User registers/logs in.
2) Guardian registers child's details or files a missing report if needed.
3) App user encounters a potentially missing child and uses the app's scan feature.
4) Facial recognition attempts to match the scan with the database.
5) If a match occurs, guardian details are displayed, and location is updated.
6) GeoFit (if used) continuously updates location data.
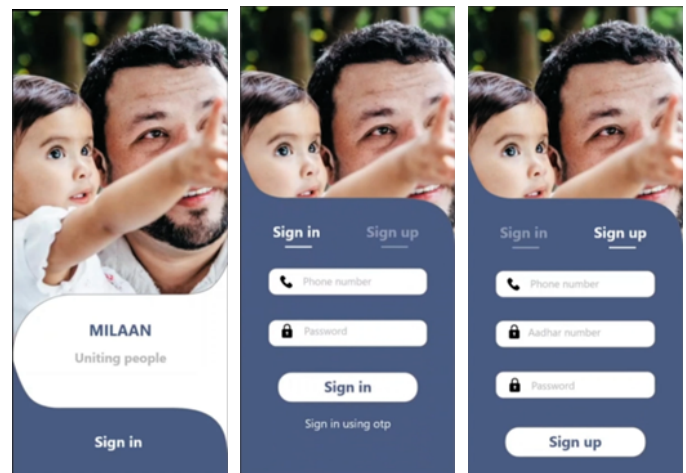7) All interactions and location updates are logged.

Fig. 2. App Screenshots (1)

IV. RESULT AND ANALYSIS

Milaan demonstrates a significant potential to improve the process of finding missing children. Key outcomes include:

TABLE I
TOTAL NUMBER OF CHILDREN REPORTED MISSING IN INDIA (1996–2001)

State/UT	1996	1997	1998	1999	2000	2001	Total	Avg	2001/1996
A&N Islands	47	42	85	76	83	95	428	71	102%
Andhra Pradesh	1642	2048	1936	2054	2011	2353	12044	2007	43%
Arunachal Pradesh	36	26	23	86	95	112	378	63	211%
Assam	576	585	612	850	1030	1055	4708	785	83%
Delhi	6193	6525	6474	5793	6223	6151	37359	6227	-1%
Maharashtra	14470	13988	12797	14045	13875	14108	83283	13881	-3%
Total (ALL INDIA)	41410	44613	43236	45374	45867	46347	266847	44475	12%

TABLE II
PERCENTAGE OF CHILDREN WHO REMAIN UNTRACED (1996–2001)

States/UTs	1996	1997	1998	1999	2000	2001
A&N Islands	2	5	1	5	8	12
Andhra Pradesh	15	51	18	19	19	22
Assam	36	37	44	47	47	49
Delhi	62	65	73	76	62	43
Kerala	25	18	32	2	24	29
Punjab	42	31	37	34	34	39
West Bengal	63	61	16	63	53	56

TABLE III
CHILDREN REPORTED MISSING FROM THE METROPOLITAN CITIES (1996–2001)

Cities	1996	1997	1998	1999	2000	2001	Total of 6 years	Yearly average	2001 over 1996
Delhi	6193	6525	6474	5793	6223	6151	37359	6227	-1
Mumbai	4959	4489	3235	4226	4070	4112	25091	4182	-17
Hyderabad	713	837	805	837	762	878	4832	805	23
Kolkata	NA	1027	1057	995	2519	2397	7995	1599	133
Bangalore	1884	1877	1846	1753	1734	1824	10918	1820	-3
Chennai	954	961	1040	1117	1077	1093	6244	1041	14
Total	14705	15716	14457	14721	16385	16455	92439	15407	12

TABLE IV
TOTAL NUMBER OF CHILDREN WHO CONTINUE TO REMAIN MISSING IN METROPOLITAN CITIES (1996–2001)

Cities	1996	1997	1998	1999	2000	2001	Total of 6 years	Yearly average	2001 over 1996
Delhi	3837	4258	4722	4377	3848	2666	23708	3951	-31
Mumbai	484	711	500	528	549	528	3300	550	9
Hyderabad	100	129	146	170	136	185	866	144	85
Kolkata		779	837	777	1578	1524	5495	1099	96
Bangalore	257	195	227	239	307	272	1497	250	6
Chennai	13	3	30	31	27	26	130	22	100
Total	4691	6075	6462	6122	6445	5201	34996	5833	11

- **Streamlined Reporting:** The mobile interface allows guardians to bypass paperwork and report missing children quickly, initiating the search process faster.
- **Enhanced Identification:** The integration of facial recognition tech allowed Milaan for faster identification of the facial features of the individual, reducing the time spent matching the faces manually with potential sightings. This technology helps authorities and volunteers quickly identify children. The use of CNNs aims for accuracy even in challenging conditions.
- **Real-Time Location Tracking:** The GeoFit device provides a novel, cost-effective (estimated hardware cost INR 1200–1400) and discreet method for real-time GPS

tracking. Scan events also contribute to updating the last known location.
- **Collaborative Platform:** The system is designed to connect parents, public authorities, and NGOs, enabling a coordinated and collaborative search effort.
- **Technological Foundation:** Built on scalable technologies like React Native and Sanity CMS, the platform is prepared for potential future growth and wider adoption.

V. CONCLUSION AND FUTURE WORK

A. Conclusion

Milaan presents an innovative approach to the critical issue of missing children by integrating facial recognition, mobile
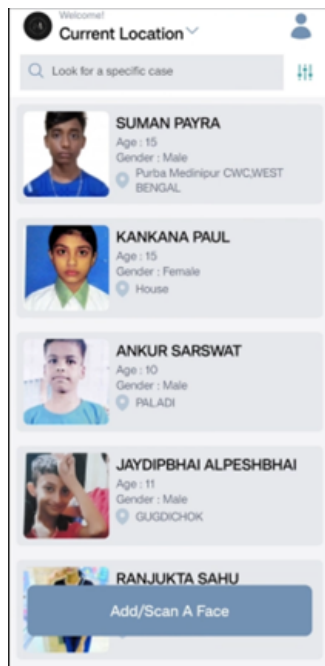
Fig. 3. App Screenshots (2)
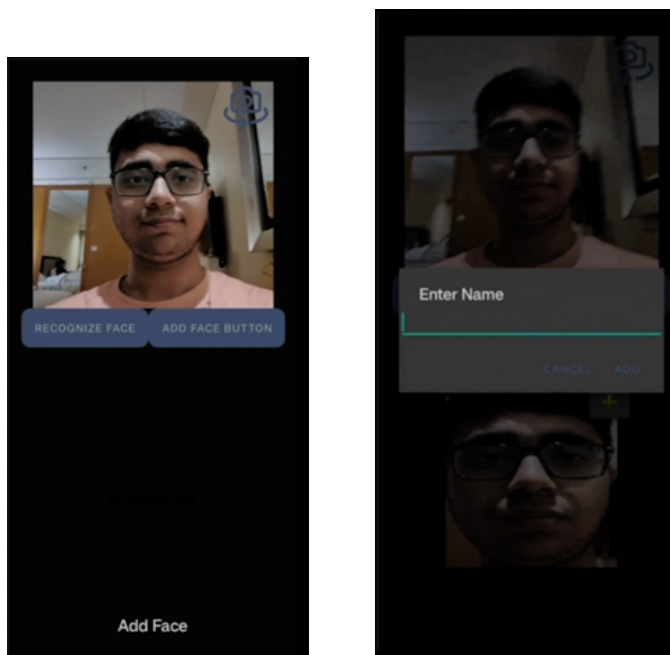

Fig. 5. App Screenshots (4)

Fig. 4. App Screenshots (3)

technology, and a unique, affordable tracking device (GeoFit). It aims to significantly reduce search times, streamline reporting, enhance identification accuracy, and foster collaboration among stakeholders. Taking in account the inefficiencies and gaps in technology of traditional methods, Milaan tries to offer a solution to improve child safety and improve recovery efforts. Milaan provides a robust framework when compared to existing systems, with the potential to mitigate delays and

improve outcome for affected families.

B. Future Work

Our future development plans aim to enhance Milaan's capabilities and reach:

- **Expand GeoFit Features:** Future enhancements could include emergency notifications and health monitoring with the potential to be integrated with other wearables.
- **Increase Adoption & Scalability:** More focus on wider deployment, potentially adapting the app for international use, considering language and regulatory differences. Our main goal is to integrate Milaan with official government systems to enable seamless information sharing and automated alerts.
- **Strengthen Partnerships:** Further collaborations with NGOs, corporations and child protection agencies can increase distribution, awareness and overall impact.
- **Advanced AI Integration:** To make Milaan more reliable in complex environments (crowds, low-resolution images), Enhancements on facial recognition algorithms will be one key goal. Exploring predictive analytics to potentially prevent disappearances is also in the future agenda.
- **Privacy and Security Enhancements:** As the user base expands, maintaining strong privacy policies and constantly enhancing data security safeguards will be essential.

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