

## **Abstract**

SAFE BITE is an innovative system designed to enhance food safety for individuals with allergies by providing real-time allergen detection using image-based food recognition. With food allergies becoming an increasing public health concern, even minor exposure to allergens can trigger severe or life-threatening reactions. In many cases, especially when dining out or consuming unpackaged food, ingredient details are unavailable or unclear. SAFE BITE addresses this issue by enabling users to assess the risk of allergen presence in food items through visual input, ensuring a safer and more informed eating experience.

At its foundation, SAFE BITE combines food identification with personalized health data to detect potential allergens. When a user captures or uploads an image of a food item, the system analyzes the visual content, maps it to a known set of ingredients, and compares the result against the user's allergy profile. If any risky ingredients are identified, the system alerts the user, helping to prevent allergic reactions. This proactive and personalized approach empowers individuals to make confident dietary choices, even in unfamiliar environments.

The system offers several key features, including user registration, allergy profile management, food image scanning, and immediate allergy warnings. Users can also view safe alternatives and maintain a personal history of previously scanned food items. These functionalities not only support day-to-day food decisions but also encourage greater awareness and control over allergy management. The intuitive interface and responsive feedback make the system suitable for a wide range of users, including students, frequent travelers, and those managing complex or multiple allergies.

SAFE BITE places strong emphasis on user safety and data privacy, ensuring that personal health information is protected while delivering accurate and timely alerts. Its design supports scalability and adaptability, enabling future improvements and expansion to cover a broader range of food types, allergens, and user needs.

Overall, SAFE BITE stands as a valuable and practical solution for individuals with food allergies. By combining real-time detection with personalized data, it bridges the gap between awareness and action, helping users navigate food choices with greater confidence, safety, and peace of mind.