Partner Finding Platform - Sanjog

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Abstract

Sanjog is an innovative IoT-based partner finding platform designed to facilitate meaningful social connections in large gatherings such as parks, weddings, and festivals. The system enables users to automatically discover nearby individuals with compatible preferences—such as caste, religion, and interests—through a wearable device powered by the ESP32 microcontroller.

The platform comprises three major components: a mobile application built using React Native, an ESP32-based hardware device for real-time data exchange, and a cloud backend using Firebase for authentication and data storage. Profiles are created via the app and stored in the cloud. The ESP32 device periodically fetches this data and broadcasts it to nearby devices using the ESP-NOW protocol—a low-power, connectionless Wi-Fi communication method.

When a user with matching preferences is detected within a range of approximately 220 meters, both individuals receive a real-time notification. This process eliminates the need for constant internet usage by relying on peer-to-peer communication, making it scalable and efficient. The project highlights the integration of embedded systems, real-time databases, and wireless networking to solve a real-world social problem. With future enhancements like chat functionality and AI-based matching, Sanjog holds promise as a scalable and socially impactful product.

The project began with defining the architecture, followed by the development of individual modules, their integration, and simulation. Verification strategies were employed to ensure the correctness of each module and the overall system. The CPU is capable of performing basic arithmetic, logical, and control operations, making it suitable for educational and low-complexity applications such as embedded systems and IoT devices.

The results demonstrate the successful implementation of a functional 8-bit CPU that meets the design specifications. This project highlights the importance of modular design, testing, and optimization in digital system development. Future enhancements could include the addition of pipelining, advanced instruction sets, and interfacing capabilities to improve performance and scalability.

Acknowledgment

We would like to express our sincere and heartfelt gratitude to everyone who contributed, in various capacities, to the successful completion of this project titled SANJOG. This undertaking would not have been possible without the collective support, guidance, and encouragement we received throughout the various stages of planning, design, development, and testing.

We are immensely thankful to our esteemed guide, Dr. B. S. Manoj, whose deep technical knowledge, insightful feedback, and constant motivation were instrumental in shaping this project. His unwavering support, critical suggestions, and thorough understanding of the subject matter enabled us to overcome numerous challenges and refine our architectural approach, ensuring that the final implementation met the desired objectives and technical benchmarks.

Furthermore, we acknowledge the immense help received from our fellow peers, seniors, and colleagues, whose constructive discussions, helpful reviews, and collaborative mindset greatly enriched the quality of our work. Their diverse perspectives, feedback, and occasional troubleshooting assistance helped us discover practical solutions and optimize the system performance.

Lastly, we are grateful to our families and friends for their emotional support and understanding during the course of this project. Their encouragement and patience allowed us to dedicate long hours to research and development, helping us achieve a successful and meaningful outcome. This project has been a remarkable learning experience, and we sincerely thank everyone who played a role in its realization.

1 Introduction

Finding meaningful social connections in large gatherings such as parks, weddings, or cultural festivals can be challenging. **Sanjog** addresses this by leveraging IoT technologies for automated proximity-based matchmaking. The system is designed to function seamlessly in public spaces, using minimal user intervention.

1.1 Objective

- Provide an automated solution to detect and notify users about nearby compatible individuals.
- Support matchmaking using preferences like religion, caste, personality traits, and interests.
- Utilize low-power, short-range wireless communication for data exchange.

2 System Components

The Sanjog platform integrates hardware and software elements to provide a robust matchmaking solution.

2.1 ESP32 Device

- Authenticates with Firebase.
- Uploads device MAC address and retrieves user profile data.
- Uses ESP-NOW for peer-to-peer wireless communication.
- Compares own data with incoming profiles to detect matches.
- Notifies user on the screen.

2.2 Mobile Application

- Built using React Native and Expo framework.
- Allows user registration and profile editing.
- Syncs user data with Firebase.
- Displays match history and current device status.
- Generates QR code consisting Wi-Fi SSID,Wi-Fi Password, Firebase E-mail, Firebase Password.
- Allow chatting option with matched users.

2.3 Cloud Backend – Firebase

- Handles authentication and real-time database.
- Stores data in JSON format using key-value pairs.
- Fields include:
  - Name, Email, Gender, Date of Birth
  - Height, Weight
  - Religion, Caste, Languages
  - ESP32 MAC Address, Location

2.4 ESP32 CAM

- Scans the QR code generated by app and retrieves data.

2.5 LED Screen

- Displays minimal user prompts or matching status.

3 System Architecture

3.1 Workflow

1. User registers through the app and data is synced to Firebase.
2. ESP32 fetches and transmits user profile using ESP-NOW.
3. Nearby devices receive the data and apply matching algorithm.
4. If a match is found, both users are alerted via notification.

3.2 Communication Protocol: ESP-NOW

- Enables low-latency, connectionless communication.
- Peer-to-peer network architecture.
- Works without router or internet.
- Range: Approx. 220 meters.

4 Challenges and Limitations

- Potential privacy issues in open environments.
- Difficulty in optimizing real-time matching under hardware constraints.
- Lack of built-in chat functionality.
- Miniaturization of hardware for real-world use.

5 Future Scope

- Integration of AI-based compatibility scoring.
- Offline profile caching and matching.

- End-to-end encryption for secure data transfer.
- Inclusion of post-match chat/messaging system.
- Commercialization as a wearable gadget.

6 Link

- Download our app: https://sanjog-web.vercel.app/
  Scan the QR code to open the website.

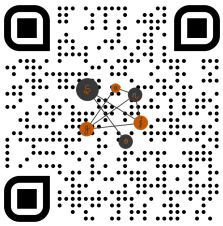

Figure 1: QR code for app download

- GitHub link to ESP32 hardware code: https://github.com/saurabhkr132/sanjog-hardware
- GitHub repository link for the Sanjog App: https://github.com/saurabhkr132/Sanjog-App
- GitHub repository link for the website: https://github.com/saurabhkr132/sanjog-web

7 Conclusion

Sanjog demonstrates the potential of IoT and cloud-based systems in creating real-time, socially beneficial applications. Through efficient use of ESP32 and Firebase, this project lays the groundwork for future smart matchmaking solutions. It provides both a

technological and social benefit by making meaningful connections easier in the physical world.