Zento !

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Problem Being Addressed

Public WiFi in cafes and co-working spaces is often:

- **Unsecured**
- **Open to abuse**
- **Lacking accountability**
- **Without access controls**

There is no efficient way to limit access time, track usage, or ensure responsible internet use.

To design a secure, offline WiFi access system for cafes:

- Validates users via phone
- Controls access duration
- Filters unsafe content
- Sends admin alerts without relying on cloud infrastructure

Objective

- Enable user-specific internet access
- Enforce 3-hour access window per device
- Alert staff via Discord when a new device connects
- Block malicious content automatically
- Provide real-time monitoring dashboard for staff

Zento is a Raspberry Pi-powered local captive portal system that:

- Creates a local WiFi hotspot
- Redirects users to a login page
- Accepts tokens generated via Discord bot
- Activates timed internet access per device
- Maintains staff dashboard for visibility and control

Technology / Tools Used :

Hardware:

- Raspberry Pi 3
- USB WiFi Adapter

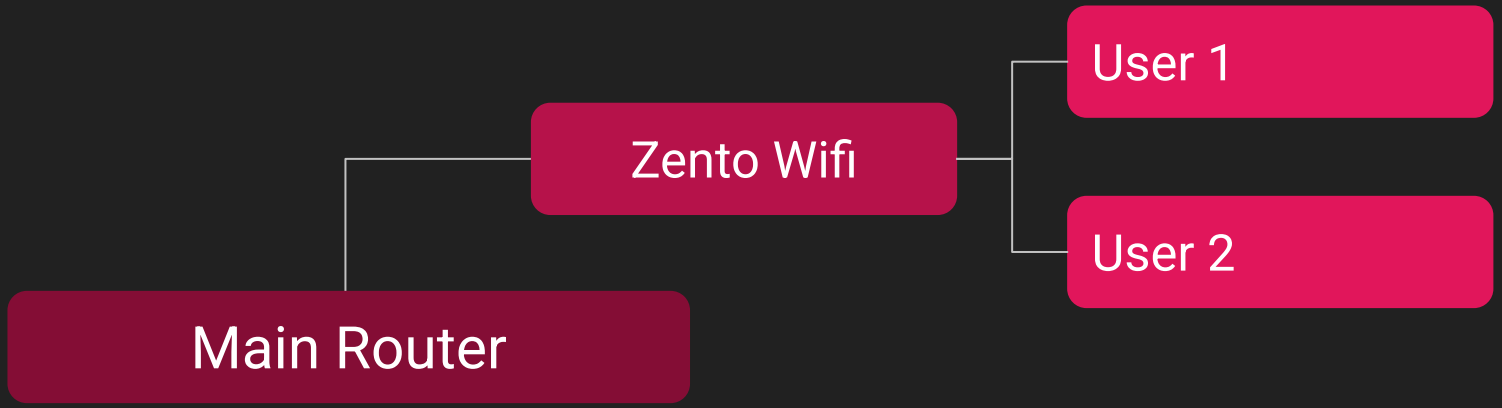
Software:

- Raspberry Pi OS
- Flask (Python)
- iptables, dnsmasq, hostapd
- Discord
- systemd services
- HTML/CSS (Bootstrap for splash/dashboard)

Architecture / Design

1. User connects to Zento WiFi
2. DNS redirection brings them to splash page
3. User enters token from Discord bot
4. Token validated locally
5. iptables opens access for 3 hours
6. Dashboard logs and shows active devices
7. Content filtering via dnsmasq/blocklist

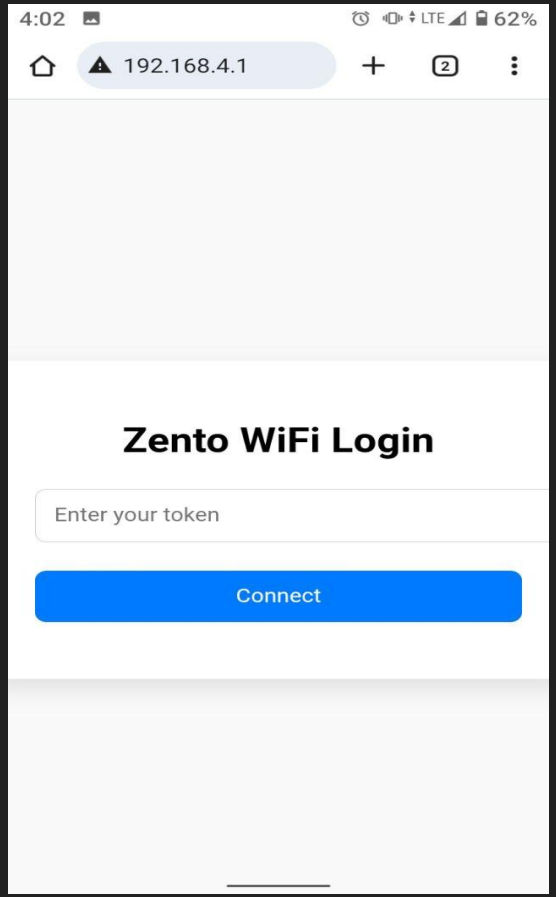
Architecture



Key Features

- Captive portal splash page
- Discord bot with token generator
- Auto disconnect after time expires
- Staff dashboard with login
- Real-time device tracking
- Unwanted Site blocking
- Hiding main router

Prototype Demo



Results / Impact

- WiFi misuse minimized
- No more free loaders
- Admin has full control
- Time-bound access = fair bandwidth use
- Reduced need for paid cloud solutions
- Privacy preserved

Challenges Faced

Challenges Faced:

- Captive portal compatibility on different phones
- Flask thread & port conflicts
- DNS redirection reliability
- IP whitelisting not persisting on reboot
- Auto-starting systemd services
- Dash + Flask port collision

How I Solved Them:

- Tuned DNS & iptables for broader redirect compatibility
- Separated Flask apps by port (8080 for splash, 9090 for dashboard)
- Used `iptables-restore` in rc.local for persistent rules
- Created dedicated systemd services for Flask & Discord bot
- Avoided conflicts by isolating dashboards from main server

Future Scope

- SMS OTP verification for user entry
- Usage analytics and bandwidth charts
- Payment-based premium access
- AI-based user behavior pattern detection
- Public deployment toolkit for cafes

Zento WiFi is a secure, intelligent, locally-hosted WiFi access system designed for cafes, events, and community spaces. It empowers admins to manage networks effortlessly without expensive infrastructure.