

UX, AI & Community Gardens

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Community Garden Network: A Local-First AI Platform

Community gardens depend on interconnected systems of people, knowledge, land, water, labor, and community partnerships. Their value extends beyond food production, encompassing nutrition, physical activity, food security, community cohesion, neighborhood pride, civic engagement, conservation, and social and environmental resilience (Egli et al., 2016; Firth et al., 2011; Ohmer et al., 2009; Okvat & Zautra, 2011). Digital systems designed for these spaces should therefore strengthen the relationships and resources that make these benefits possible.

Technology Description

This paper proposes a locally hosted AI platform to support community gardens in coordinating work, preserving shared horticultural knowledge, monitoring environmental conditions, and facilitating learning about local plants, animals, land history, and the community's relationship to the land. A server in or near the garden would store records and perform AI processing locally. Garden coordinators, members, volunteers, and community partners of different ages and levels of digital access could interact with the system through a mobile app, web interface or shared kiosk. Local hosting would also reduce dependence on cloud services while supporting privacy, responsiveness, and community control (Losavio, 2020; Shi et al., 2016).

The system would support everyday garden care by recording plots, crops, planting dates, volunteer tasks, irrigation, plant-health observations, treatments, harvests, and donations. Sensors could monitor soil moisture, temperature, humidity, rainfall, sunlight, and water use, while members could upload photographs for AI-assisted analysis of possible pests, diseases, nutrient

deficiencies, or environmental stress. A conversational assistant could answer questions using garden records, sensor data, local horticultural sources, and verified ecological, anthropological, and historical resources. In addition to practical guidance, it could encourage curiosity about local plant and animal life, land history, and community relationships. The assistant would cite its evidence and present explanations. The platform could connect records over time, identify unusual patterns, retrieve relevant local knowledge, and help members assess plant needs. For example, if a flower bed were drying faster than usual, it could display moisture and weather trends and recommend checking the mulch before adding more water. Members could accept, revise, or reject its recommendations. Each garden could adapt the platform to its crops, microclimates, languages, workflows, and priorities. Community-established rules would determine who could access, revise, export, or delete information and which actions the AI could perform. The community would retain authority over how its records, images, sensor data, and institutional knowledge were stored and used.

Existing technologies provide parts of this concept. FarmBot combines a web interface with robotic planting, watering, imaging, and data collection. HortusFox offers self-hosted plant records, collaborative tasks, reminders, communication, and plant identification. Home Assistant supports locally controlled sensors, connected devices, automations, and conversational interactions (FarmBot, Inc., n.d.; HortusFox, n.d.; Open Home Foundation, n.d.). However, these tools primarily serve automated cultivation, plant management, or home automation, and their interfaces may assume personal ownership, continuous connectivity, or technical confidence. Using them in a community garden may therefore require combining systems not designed for shared governance, varying levels of digital access, collective input, or group deliberation. The

proposed platform integrates these capabilities within a community-garden system centered on coordinated work, accessible participation, and collective decision-making.

Course Lens Analysis

This paper adopts the User Psychology and Social Impact lenses because the platform is intended to encourage voluntary participation while strengthening the garden's social, educational, environmental, and cultural roles.

The User Psychology lens is relevant because AI-generated reminders, recommendations, and conversational guidance could shape participation. Community gardening can support autonomy and competence by creating opportunities to learn and connect with others (Quested et al., 2018). The platform would support these needs through member-selected tasks, accessible guidance, peer knowledge sharing, and community-defined goals. Because personalized AI messages can influence behavior, suggestions would be transparent, optional, and based only on preferences that members explicitly provide (Matz et al., 2024). To avoid manipulative social pressure (Alberts et al., 2024), the assistant would maintain a neutral, nonhuman identity and facilitate rather than replace relationships within the garden.

The Social Impact lens is relevant because the platform could affect environmental learning, cultural knowledge, wellbeing, and community connection. Community gardens can provide diverse ecosystem services, including food production, biodiversity support, and environmental regulation (Evans et al., 2022). They can also function as local learning environments that support perceived wellbeing and social connection (Gray et al., 2022). The platform would reinforce these benefits through shared garden records, environmental monitoring, ecological and historical information, and opportunities for members to learn from

one another. Its success would be evaluated through community-defined environmental and social goals rather than app engagement.

UX Vision

The ideal user experience would prioritize human interaction, minimize reliance on screen-based interfaces, and remain grounded in the garden's physical and social environment. When volunteers arrive, a community member would welcome them and introduce the locally hosted system as one of several resources available in the garden. After joining the local network, members could use natural-language voice interaction through a phone, wearable, or shared device to ask questions, request guidance, or initiate approved tasks. The experience should help members feel comfortable, capable, informed, connected, and in control. For example, a gardener could speak out loud and ask which beds require water and receive a concise spoken response, with supporting evidence and uncertainty available on a nearby device. Providing explanations that address practical questions and information needs follows guidance for user-centered explainable AI (Liao et al., 2020). Members could cancel requests, stop authorized automations, inspect conditions, correct recommendations, and pause AI functions, consistent with human-AI interaction guidelines emphasizing clear system capabilities and user correction (Amershi et al., 2019). After members leave, the system could monitor environmental conditions, operate equipment, and document each action for later review. Together, these decisions support autonomy, competence, and relatedness, the basic psychological needs examined in community gardening by Quested et al. (2018). The community-led, multimodal experience also draws on Bardzell's (2010) feminist interaction design qualities of pluralism, participation, ecology, and embodiment.

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