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Walkers' Union: Designing New Urban Walking Rituals with Blockchain

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Abstract

This paper describes a blockchain-enabled system aimed to facilitate urban walking as a lifestyle choice. This work-in-progress is based on a provisional classification of blockchain's social affordances into four core features. These features are used as design materials to enable 'walking contracts' between humans and non-humans as triggers for urban walking.

Author Keywords

Blockchain; DApp; DAOs; healthy lifestyle; behavioral change; socio-environmental moderators.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Urban rituals of walking as a means for commute or recreation are increasingly marginalized [1], making it harder for a person to commit to adopt urban walking as a lifestyle choice.

Though efforts have been done in HCI to persuade people to active lifestyles by becoming more aware of their performances and physical achievements [2,3], urban walking is not just about physical exercise. As the most basic form of mobility, walking is an inherently social activity that helps establish and maintain a sense of community [4,6]. Researchers in

behavioural science [5] position the physical benefits of urban walking as merely one moderating factor for a walking decision. Moderating factors at the individual, group and regional level [5] play equally important roles.

This paper describes a blockchain-enabled DApp (Decentralized Application) attempting to embody the above mentioned moderators, and function as an incentive system for new urban walking rituals. This DApp is the first artifact in a Research-through-Design process aimed to investigate the socio-environmental factors contributing to healthy lifestyle choices. Within this broader context, the proposed DApp is meant to serve not just as prototype to research barriers to and triggers for urban walking specifically. It will also serve as an experiment to research and document matchmaking algorithms for new social contracts and healthy rituals that will be useful in a further phase of the project.

Understanding Social-Environmental Moderators for Urban Walking

According to [5], moderating factors at the individual, group and regional level play a key role in urban walking. At the group level, societal norms, group associations and the level of social support a person can expect, all contribute to an individual's decision to walk. While walking with others is often an incentive, social barriers can occur in seeking a walking companion [6], especially if this is a stranger or where recreational walking with people from other social hierarchies is not a well-established societal norm. At the regional level, whether the route is perceived to be safe and worth exploring mediates a person's attitude on whether a walking decision is pleasurable and

rewarding. Finally, at the individual level, a person's pre-existing attitudes toward walking and perceived rewards or effort expectancy jointly affect a person's decision [7].

A digital platform empowering people to safely propose a 'walking deal' and build social support for new walking rituals could address potential barriers at all these different levels. In the proposed design approach, we expect to produce a shift in social appropriateness and thus individual attitudes by broadening the social discourse on the meaning of walking through new routines [8].

A Review of the Social Affordances of Blockchain Technology

Blockchain technology originates from the concept of cryptocurrencies like bitcoins. These aim to remove the authentication mechanism of a networking system from the need for a centralized third-party institution. This is achieved by distributing authentication via a so called distributed ledger system, in which stakeholders within the network alternatively govern the validity of the system. In this system, all data and transactions are distributed to and stored by any node in the network. A consensus protocol exists to guarantee that the ledger in every node has the same record, thus enabling a 'trustless' proof mechanism of all transactions in the network [9]. In a further development of blockchain (e.g. Ethereum), a smart contract protocol has been added above the consensus layer. This enables automated consensus on transactions according to the agreements embedded in the database. An organization that is run through rules encoded in smart contracts is referred to as a DAO (Decentralized Autonomous Organization).

These technical features have inspired and enabled designers to build DAOs to reconfigure authentication and consensus in our society, and to explore new paradigms of assets allocation especially in contexts where friction often occurs and efficiency is challenged due to the lack of a coordinator of trust [9]. We provisionally classify the social affordances of blockchain technology into four main categories: (1) *Distributed authentication*: Distributed ledger systems enable an immutable and traceable public record storage to authenticate UGC (User-Generated Contents) and reinforce data irreversibility. No data can be rewritten once created and all modifications will be constantly visible, making malicious tampering on UCG virtually impossible. (2) *Smart consensus*: Validation of transactions is automated according to the terms of consensus stored in the smart contract. Users can host initial algorithms in self-regulated communities and benefit from the consensus protocol to ‘trustlessly’ execute data transactions. (3) *Data ownership*: Data in a distributed ledger system is not anonymous but rather pseudonymous [10], users can be empowered with a trusted place to store their data and a safe routine for sharing it, protected by smart contracts [11]. (4) *Data attribution*: Because blockchain technology enables flexible attributions of data to a variety of algorithms of smart contracts in the network, users can be facilitated to flexibly set smart contracts to authorize the visibility, access and affiliation of their data.

Experimenting with ‘Walking Contracts’: Four Envisioned Scenarios

Instead of a DAPP that motivates walking through a single fixed rewarding routine (e.g. SweatCoin[12]), the envisioned DApp supports 4 modes of ‘walking contracts.’ People can use these different modalities as resources to shape new urban walking rituals. Mode 1 and Mode 2 aim to facilitate the signing of a *social* ‘walking contract’ with either (1) a walking companion who shares the same routes, or (2) a remote companion sharing the same time and walking distance but in a different location. Mode 3 and Mode 4 enable users to sign an *environmental* ‘walking contract’ with non-humans. In Mode 3 users can sign a contract with a physical resort or another user’s pet. Mode 4 is designed for contracting with digital contents.

In Mode 1, we introduce a matching system as social facilitator for users to share their availability, intended routes and possible topics of conversation, so that they can find ideal walking companions with whom to sign a ‘walking contract’. We employ blockchain’s *distributed authentication* affordance to guarantee a trustworthy authentication system that can validate a companion’s profile and reputation. The fulfilment of this contract will be validated by both GPS coordinates on the cellphone and the consensus protocol on the blockchain, so that each walking contract would constitute a trustworthy piece of record that builds up the user’s reputation. We expect in a further stage, data of achieved contracts could be equipped with agency [13] to further recommend companion matches based on the revealed preferences of routes and topics. In the context of social walking, social barriers often block this behaviour from happening due to a lack of tactful routines to share one’s availability, intended

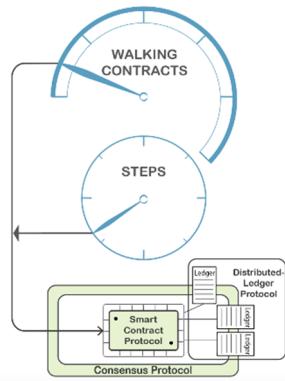


Figure 1: High-level system architecture

| | MODES OF WALKING CONTRACTS |
|-------------|--|
| ① | INTERPERSONAL ROUTE CONTRACT 人际路线合约 |
| ② | INTERPERSONAL DISTANCE CONTRACT 人际距离合约 GMT+1 GMT+8 |
| ③ | PERSONAL PHYSICAL ASSET ROUTE CONTRACT 个人物理资产路线合约 云朵、人物、箭头 |
| ④ | PERSONAL DIGITAL ASSET DISTANCE CONTRACT 个人数字资产距离合约 人物、ID卡 |
| ⑤ ⑥ ⑦ | HYBRID WALKING-CONTRACT 混合步行合约 人物、ID卡、加号 |

Figure 2: Modes of 'Walking Contracts'

route and preferred topic for a short walk. We attempt to compensate this by providing tactful matchmaking algorithms that make ‘proposing a walk’ more socially accessible and that decrease social embarrassment by adjusting the contract according to both parties’ interests. Additionally, blockchain’s affordance of *data ownership* is adopted to empower users with the transparency and traceability of their UGC. We expect that with social barriers being decreased, the proposed DApp could make people in a higher occupation hierarchy more likely to spare a short walk with those in lower ranks and to exchange opinions in a relaxed manner. Similarly, users in different locations can sign a contract by agreeing on time and walking distance in Mode 2. A ‘walking chat’ can be enabled through the conversation protocol in the DApp, but we will also use the blockchain’s affordance of *data attribution* to validate chats from external messaging apps.

Mode 3 instead enables users to sign a contract with physical assets or animals as an environmental facilitator to gain trustworthy information on whether a walking would be pleasurable and rewarding. Users can share realtime information regarding a resort on the platform, or whether they would take their pet to a particular area. Apart from peer-to-peer algorithms, we will also experiment with self-generated algorithms and third-party generated algorithms in this mode. Users can generate individual contract with a resort or an object (e.g., a statue) as a self-triggering activity, and invite other users as a consensus network. Third party institutes (e.g., shop keeper) are also welcomed to generate contracts rewarding people who choose to walk to their places.

In Mode 4, users can sign ‘walking contracts’ with digital contents. One foreseeable scenario in this Mode would be to invite audio content providers (e.g. podcast, news) to set rewarding algorithms for people who listen to their content while beating distances. In a ‘Hybrid Mode,’ users could also benefit from the data attribution affordance of blockchain to tailor their ‘walking contract’ and link one of the previous modes to cross-platform digital contents by means of an additional contract. In this stage, we are still ideating on possible scenarios.

Conclusions

The potential contributions of this work-in-progress are twofold. First, the work has the potential to further investigate the socio-environmental moderators that can motivate a person’s decision to integrate walking in daily routines as a lifestyle choice. Second, the work also has the potential to shed light on how to use the social affordances of blockchain as design materials by introducing the DAPP in a Research-through-Design attempt to facilitate and trigger walking decisions. In addition to these two specific contributions, we see this work as a building block for a new realm of lifestyle empowerment solutions using the social affordances of blockchain technology, and for how HCI designers may use ‘things’ such as blockchain-enabled DAOs to reveal and tap into unexpected daily practices and rituals [14].

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