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DYNAMIC, CONTEXT-AWARE COMPUTING DEVICE INITIALIZATION FOR PERSONALIZED USER EXPERIENCES

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ABSTRACT

This document describes techniques for tailoring the initial setup and default configuration of computing devices such as smartphones and smartwatches, to individual users. The proposed computing device personalization engine utilizes a multi-faceted analysis of user data, environmental context, and device usage patterns, collectively referred to as contextual signals, to derive a set of abstract dimensions and scores that encapsulate user preferences. In some instances, the personalization engine uses machine learning models to derive the abstract dimensions and scores. The set of abstract dimensions and scores are translated into a predefined set of default Enum values that are indicative of a type of user who is setting up the computing device and a corresponding set of default configuration parameters for that type of user. The Enum values may be communicated to a smartwatch Original Equipment Manufacturer (OEM) and used to configure a highly personalized default experience during computing device setup without sharing any user-specific data with the OEM.

DESCRIPTION

The ubiquity of smartwatches has led to a homogenization of the initial user experience. Regardless of individual preferences, regional considerations, or specific use cases, users are presented with an identical default configuration upon completing the setup process. This often necessitates a time-consuming and potentially frustrating period of manual customization to align the device with their needs. For example, a user in Tokyo might prefer a different default watch face and complication layout than a user in New York City. Similarly, a user who primarily uses their smartwatch for fitness tracking might want different default apps and settings than a user who prioritizes communication and productivity.

The present disclosure aims to overcome this limitation by introducing a dynamic, context-aware initialization system. This system leverages user settings, application ecosystems, and environmental factors, to create a profile for each user. The profile associates a preference to each default configuration setting (e.g., complex complications, dull colors, and power efficient). This profile is then utilized to generate a personalized default configuration, thereby enhancing user satisfaction and reducing the need for extensive manual customization and without sharing user data with the computing device manufacturer.

FIG. 1, below, is a conceptual diagram illustrating computing device 100, new wearable computing device 120, and manager system 150. Manager system 150 may include, but is not limited to, portable, mobile, or other devices, such as mobile phones (including smartphones), wearable computing devices (e.g., smart watches, smart glasses, etc.), laptop computers, desktop computers, tablet computers, smart speakers, smart television platforms, server computers, mainframes, infotainment systems, or the like. For example, manager system 150 may include a companion device (e.g., a smartphone) for computing device 100 and/or wearable computing device 120 that may include functionality for configuring, monitoring, or otherwise controlling computing device 100 and/or wearable computing device 120. Manager system 150 may include functionality to control computing device 100 and/or wearable computing device 120 based on explicit user consent that may be provided via login credentials associated with a user operating manager system 150, computing device 100, and/or wearable computing device 120, for example. In some instances, manager system 150 may include, but is not limited to, remote computing systems, such as one or more desktop computers, laptop computers, mainframes, servers, cloud computing system, etc. capable of sending information to and receiving information from computing device 100 and/or wearable computing device 120.

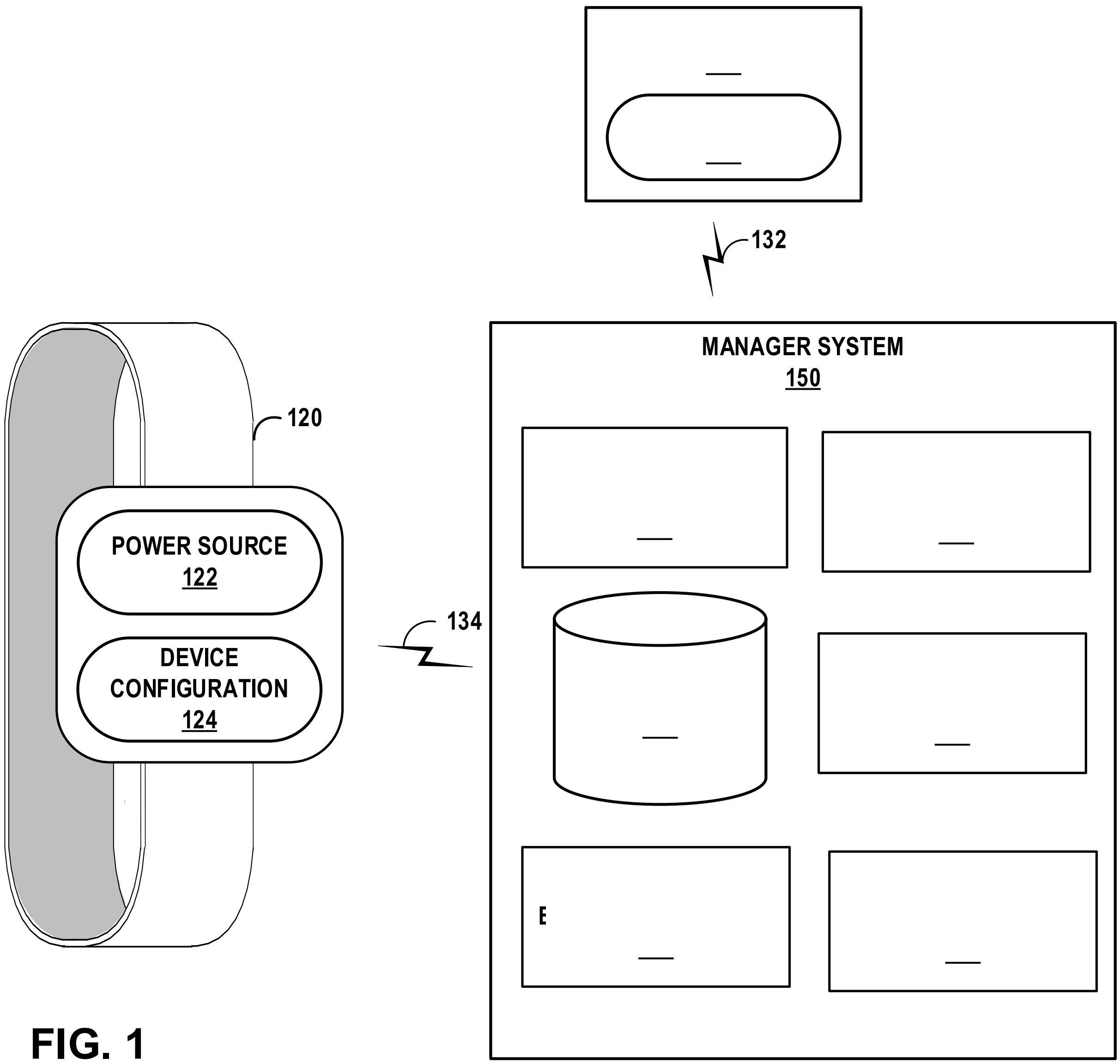

FIG. 1

Manager system 150 may be communicatively coupled to computing devices 100 via connection 132, as well as communicatively coupled to wearable computing device 120 via connection 134. Connections 132, 134 may include wired or wireless connections and may be direct or require one or more intermedia network devices and may or may not traverse the Internet. Examples of connections 132, 134 include near-field communication (NFC), Bluetooth® or different profiles thereof (e.g., Bluetooth® low energy (BLE)), WIFI Direct, Ethernet, and Universal Serial Bus (USB) or different profiles thereof, e.g., USB-C, etc.

Computing device 100 and/or wearable computing device 120 may be examples of mobile computing devices. For example, computing device 100 may be a smartphone or another type of portable or mobile device. Other examples of computing device 100 may be a mobile phone, a laptop computer, a tablet computer, a portable gaming device, a portable media player, an e-book reader, or an automobile navigation/entertainment system. Wearable computing device 120 may include a wearable computing device such as a computerized watch, a computerized fitness band/tracker, computerized eyewear, computerized headwear, a computerized glove, or any other type of mobile computing device that can attach to or be worn on a person's body or clothing. In the example of FIG. 1, computing device 100 may include one or more applications 102 and wearable computing device 102 may include power source 122, and device configuration 124.

While not shown in FIG. 1, computing device 100, wearable computing device 120, and manager system 150 may include processors, memory, sensors, communication units, etc. that support operations of computing device 100, wearable computing device 120, and manager system 150. For example, computing device 100 and wearable computing device 120 may include sensors that generate data based on environmental factors, such as a heart rate sensor, an oximetry sensor, an ambient light sensor, an accelerometer, a gyroscope, a microphone, a barometric pressure sensor, an ambient temperature sensor, a magnetometer, a skin conductance sensor, a skin temperature sensor, a global positioning system (GPS), or the like. Each of computing device 100, wearable computing device 120, and manager system 150 may include communication units such as a network interface card (e.g., Ethernet card), an optical transceiver, a radio frequency transceiver, a GNSS receiver, or any other type of communication unit that can send and/or receive information.

Power source 122 may provide power to one or more components of wearable computing device 120. In some examples, power source 122 may include, but are not necessarily limited to, batteries having zinc-carbon, lead-acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and/or lithium polymer (Lipo) chemistries.

Device configuration 124 may include configuration information for software (e.g., software applications, operating systems, etc.) executing at wearable computing device 120. For example, device configuration 124 may include configuration information representing software application data, user preferences (e.g., display settings), or the like. Device configuration 124 may include computer-readable software for implementing configuration information via various components of wearable device 120. For example, device configuration 124 may implement configuration information corresponding to a display always-on setting by generating and outputting corresponding instructions to a display device of wearable computing device 120.

Typically, when a user setups up wearable computing device 120, the user may restore device configuration 124 from a backup or may configure wearable computing device 120 using a standard setup process. However, the standard setup process is typically the same for each user and results in the same default user experience. Rather than using a generic setup process that results in the same default user experience, manager system 150, according to the techniques described herein, may utilize a multi-faceted analysis of contextual signals to derive a set of abstract dimensions and scores that encapsulate user preferences that may be applied to wearable computing device 120 during setup.

In instances where user of computing device 100 and wearable computing device 120 provide explicit authorization, manager system 150 collects a wide range of contextual signals from various sources, such as from computing device 100 and/or an application ecosystem provider. The contextual information may include language preferences, region settings, preferred units of measurement, and accessibility options directly from the user's settings at computing device 100. Manager system 150 may also delve into the user's application ecosystem, analyzing applications 102 installed at computing device 102, their usage frequency, and patterns of interaction to gain insights into which applications 102 are most frequently used, how much time is spent in each application 102, and the types of actions typically performed using each application 102. Manager system 150 may obtain such usage information from computing device 100 or from cloud-based application usage data 154.

In addition to user-specific data, manager system 150 may gather, from computing device 100 and only with explicit consent from the user, relevant data such as location information (country, city, time zone), weather data (temperature, conditions), and time-based data (time of day, day of the week, season). If available, manager system 150 may infer the user’s current environment and activity level from environmental sensor data such as ambient light data, temperature data, and motion data.

Once collected, the raw data is passed to feature extraction module 156. Feature extraction module 156 processes and transforms the raw data into meaningful features relevant to personalizing wearable computing devices such as wearable computing device 120. These features might include linguistic preferences (e.g., preferred language, writing system, and communication style), temporal features (e.g., time zone, daily routines like wake-up and sleep times, work/leisure patterns), geographic features (e.g., country, city, climate, and cultural preferences), application usage features (e.g., most frequently used applications, categories of applications like fitness, communication, or productivity, and typical usage patterns within each application), and environmental features (e.g., ambient light level, temperature, and activity level).

The extracted features are then fed into dimension and score generation module 158. dimension and score generation module 158 translates the features extracted by feature extraction module 156 into a set of abstract dimensions and scores. Each dimension represents a different facet of user preferences and needs, while the scores quantify the user's affinity for specific options within each dimension. For instance, an aesthetics dimension could include scores for minimalism, complexity, and color preferences, while a functionality dimension might have scores for fitness tracking, communication, and productivity.

To further refine the personalization process, manager system 150 includes personalization model 160. Personalization model 160 is a machine learning model trained on a vast dataset of anonymized smartwatch usage data. Personalization model 160 predicts user preferences and needs based on the extracted features, enabling manager system 150 to personalize the smartwatch experience for new users who haven't generated enough usage data for accurate feature extraction. Personalization model 160 is continuously updated with new data to improve its accuracy over time.

Enum mapping module 162 translates the generated dimensions and scores into a set of predefined default Enums. The predefined default Enums represent a wide array of possible smartwatch configurations, encompassing watch faces, complication layouts, default apps, notification settings, and other customizable features. The mapping of the abstract dimensions and scores to Enums is designed to ensure that the chosen configuration aligns with the user's preferences and needs as captured by the dimensions and scores.

Provisioning module 152 securely communicates the generated default Enums to the smartwatch manufacturer during the initial setup process of wearable computing device 120. The manufacturer's software then utilizes these Enums to configure wearable computing device 120, resulting in a seamless and personalized out-of-the-box experience for the user. For example, the Enums may specify one or more configuration parameters for watch faces, complications, tiles, local events, notifications, date and time settings, power settings, display settings, or any other configuration setting.

The proposed system prioritizes user privacy. All data processing occurs within the operating system's secure environment. No personally identifiable information is shared with device manufacturers. The generated Enums are abstract representations of user preferences, not raw data points. Additionally, manager system 150 performs the personalization process only if the user provides explicit consent. If a user prefers to manually configure wearable computing device 120, the user need only refrain from providing explicit permission to manager system 150.

By dynamically tailoring the initial setup experience to individual users, the techniques described herein enhances user satisfaction, reduces friction, and fosters a stronger connection between users and their devices. This approach has the potential to improve the way users interact with their smartwatches, making them more intuitive, relevant, and enjoyable to use from the very beginning.