Method for the standardized production, financing and delivery of housing using a distributed ledger technology and decentralized artificially intelligent cyber-physical system

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5. Abstract: This disclosure provides a method for the standardized production, financing and delivery of housing using distributed ledger technology and a decentralized artificially intelligent cyber-physical system (CPS or invention) for compiling data and executing human and deep learning sequences for the purposes of standardizing the planning and execution of real estate development, regulatory compliance, financing, supply chain procurement, industrial manufacturing processes, logistical processes as well as project management tasks, and other various construction, manufacturing and delivery tasks and procedures to standardize development, production, and delivery of standardizes building modules and standardized building components in a standardized smart factory that are used to assemble structures.
6. BACKGROUND OF INVENTION
    (3) The housing market has failed to produce affordable housing at the scale and speed demanded by consumers, as evidenced by homelessness, sub-standard housing with poor access to basic services, and key segments of society being unable to afford to live near to their place of work. In other words, the housing market does not deliver housing efficiently and equitably.
    (4) The reasons for the failures are multi-faceted: the construction industry is extensively regulated, subject to everything from permits and approvals to safety and work-site controls, and lowest-price rules in tenders make competition based on quality, reliability, or alternative design offerings more complicated; bespoke projects with unique features and varying topology have a limited degree of repeatability and standardization; each project involves many steps and companies with scattered accountability, which complicates the coordination, substantially increasing costs; contractual structures and incentives are misaligned; risks are often passed to other areas of the value chain instead of being addressed, and participants make money from claims rather than from good delivery.
    (5) Further, the regulatory agencies have misaligned and inconsistent requirements for the affordable housing programs they administer resulting in a cumbersome approval process for developers who need state resources to support their projects. Because these developers must often use multiple sources of funding for their developments to be financially feasible, the misaligned requirements slow development and increase project costs. Projects often get stalled at the local level and there is no oversight from the state to ensure projects are facilitated and completed rather than stalled by local regulations having to do with density, design, building materials, setbacks, parking, lot size and location.
    (6) Governments play a critical role in supporting affordable housing development and private investment alone cannot achieve the needed amount of housing construction at costs that are affordable. Governments lack an effective approach to planning and

financing development at both the state and local levels. Governments are unable to formulate a clear plan describing how or where its billions of dollars for housing will have the most impact nor can they effectively prepare or respond to natural or man-made disasters. And there is nothing in place, which facilitates a population level response in case of a natural or man-made disaster and governments have no way to prepare for an emergency, much less respond to one, be it Covid, a hurricane or the inability to house its population resulting in an ever-growing number of unhoused individuals and families.

(7) There is no predictability and no transparency and there is no way to improve on the current system, which would make a large enough impact to spur the construction at the scale required to meet the population-level need. Governments cannot formulate housing plans explaining how state financial resources will contribute to meeting current and future housing need and identifying where those resources will have the most impact—highest and best use. Governments are also unable to identify sites suitable to accommodate the building modules needed and cannot take proper action to mitigate any barriers to development at the local level.

(8) Everyone agrees that there is a problem, but no one knows how to solve it and therefore cities cannot generate any actionable plans. Worse yet, governments can only look to the past as a guide for the future and therefore can only project or define plans based on old data and outdated methods because planning based on untrustworthy, non-transparent, unknown, new methods or data is simply too unreliable.

(9) A supply-side solution to the housing crisis is not achievable without the alignment of all stakeholders along the value chain (including public and private parties) and the standardization of the relevant processes, methods and products. Housing comes down to many individual and local choices and consequently there is a great need for a system to align the various needs around the core objective of meeting the housing need at scale in order to respond to the housing crisis as well as natural and man-made disasters.

(10) Until now, there has never been a way to converge either the stakeholders or the technology in order to facilitate the standardized production, financing and delivery of housing. Governments and private parties had no way to interact at scale. Convergence of the technology facilitates the convergence and alignment of the stakeholders in one system where predictability, reliability and transparency are paramount and facilitate the standardized production, financing, manufacturing and delivery of housing at population levels to meet the needs of the community.

(11) Additionally, the inability of governments to efficiently deploy funding and release land to support the creation of affordable housing has made projects reliant on private donors to fund projects as charitable donations, which keeps both governments and developers from having a steady, reliable and transparent way to finance housing projects.

(12) Thus, a continuing need exists for cyber-physical system that incorporates the various needs of stakeholders into an efficient system that enables the standardized production of housing in a streamlined and efficient manner.

7. SUMMARY OF INVENTION

(13) The present disclosure provides a decentralized artificially intelligent cyber-physical system for standardized production and delivery of building modules enabling the planning, regulatory and financing decisions to be based on the standardized output capacity. In one

aspect, the system (also referred to as the “cyber-physical system”) includes one or more processors and associated memory. The memory is a non-transitory computer-readable medium having executable instructions encoded thereon, such that upon execution of the instructions, the one or more processors perform several operations, such as receiving pre-defined objectives according to a master contract, the pre-defined objectives including at least standardized production of one or more standardized building modules; receiving, from a master knowledge generator, Workforce specific data as related to fulfillment of the pre-defined objectives; receiving, from an integrated knowledge base, real-property information related to fulfillment of the pre-defined objectives; generating a standardized work order (STANWO) recommendation for the Workforce based on the Workforce specific data and the real-property information; receiving production data on the Workforce while the Workforce is executing at least a portion of the STANWO recommendation; and updating an Electronic Building Component Master for the Workforce based on the production data.

(14) In another aspect, the system performs an operation of causing one or more automated Workforce components to execute at least a portion of the STANWO recommendation by constructing one or more modular components for the one or more building modules.

(15) In yet another aspect, the system causes one or more automated Workforce components to execute at least a portion of the STANWO recommendation includes an operation selected from a group consisting of causing a robotic system to weld two building components together, cutting building components, geographic movement of one or more building components, and painting one or more building components.

(16) In another aspect, the system further comprises one or more computer process system (CPS) nodes, such that the one or more CPS nodes are operable for monitoring and generating production data for the one or more automated Workforce components.

(17) In another aspect, the system performs an operation of altering the STANWO based on the production data and causing the one or more automated Workforce components to execute an altered STANWO.

(18) In another aspect, the real-property information includes at least some of aggregated and verified geospatial information on jurisdictional zones, property lines, population information, and geospatial regulatory information.

(19) Further, the master knowledge generator checks the personalized STANWO recommendation against a regulatory database to ensure regulatory compliance, such that if the STANWO is within regulatory compliance, then generating instructions to cause the one or more automated Workforce components to execute the at least a portion of the STANWO recommendation.

(20) Additionally, one or more of the CPS nodes are emergency response sensors that, when activated, cause an emergency response system to activate a physical response to mitigate an emergency as sensed by the emergency response sensors.

(21) In another aspect, the system includes computer-assisted acquisition (CAA) module, the CAA module operable for performing operations of: receiving parameters detailing a resource type used to acquire data; receiving parameters detailing a data type and condition of data to acquire; receiving performance information from a device to capture

the data; transferring the data that has been captured to a processing module that allocates the data to a program (CAX) for machine learning and deep learning analysis; reporting on the data obtained using a report module; and archiving the data using an archive module.

(22) In another aspect, the system includes decentralized computer-assisted processing (CAP) module, the CAP module operable for performing operations of: receiving parameters detailing computer resources needed to access additional data receiving parameters detailing a source and data type to acquire the additional data; receiving parameters detailing conditions to acquire the additional data; updating a Workforce data record in the private database with the additional data; transferring the additional data to other computer processing modules for machine learning and deep learning analysis and storage; reporting on the data using the report module; and archiving the data using the archive module.

(23) The system also include a computer-assisted data operating algorithms (CAD) module, the CAD module operable for performing operations of: receiving parameters, from a computer-assisted program detailing the data, an machine learning and deep learning analysis of the data, a type of the data, a source of the data and logic needed to conduct decentralized artificial intelligence routines that extract abstract features from the data and augment decision making for building purposes; receiving parameters detailing the conditions to initiate the decentralized artificial intelligence routines; updating a Workforce data record with the additionally acquired decentralized artificial intelligence/deep learning information obtained; updating other databases within the computer infrastructure with the additionally acquired decentralized artificial intelligence/deep learning information obtained; updating the newly acquired decentralized artificial intelligence/deep learning information obtained to other computer processing modules for additional machine learning and deep learning analysis and storage; reporting on the machine learning and deep learning analysis and decentralized artificial intelligence/deep learning information obtained using the report module; and archiving the machine learning and deep learning analysis and decentralized artificial intelligence/deep learning information obtained.

(24) Finally, the present invention also includes a computer program product and a computer implemented method. The computer program product includes computer-readable instructions stored on a non-transitory computer-readable medium that are executable by a computer having one or more processors, such that upon execution of the instructions, the one or more processors perform the operations listed herein. Alternatively, the computer implemented method includes an act of causing a computer to execute such instructions and perform the resulting operations.