

As the “Internet of Things (IoT)” grows, more and more such controller-based devices are connected to one another and/or to the Internet, significantly increasing the complexity of programming. In real-world scenarios, such controller-based devices may communicate with one another and/or to a gateway such that the gateway becomes a proxy for the Internet communications for the so-called edge devices. Edge devices may communicate through one or more gateways, or directly as independent devices. Within a group, all the devices (gateway and edge) must be programmed in a compatible manner to facilitate interoperability, which further increases the complexity of programming such devices significantly. Further, managing compatibility every time a customization is implemented may also be excessively time consuming. Programming groups of controller-based devices is very challenging for users as one has to memorize coding commands, understand hierarchies, utilize proper calling syntaxes, and the like. Even if one device is programmed incorrectly, a written program for that or another controller-based device in the group may fail to run, or produce errors.

[0004] Thus, there is a need in the art for simplifying programming for controller-based devices, while automatically doing so for a group of controller-based devices.

SUMMARY OF THE INVENTION

[0004a] According to a first aspect of the present invention, there is provided a computer-implemented method for creating and managing a controller based remote solution, the method including: receiving, at a code virtualization server (CVS), from a graphical user interface (GUI) on a user device remote to the CVS, an input of a solution designed on the GUI, the solution including at least one controller communicably coupled with and operable to control at least one of a sensor or an actuator, wherein the at least one controller is remote to the CVS and the user device, a condition at the at least one of the sensor or the actuator, an action for execution by the at least one controller, wherein the action is executed upon the condition being met, and at least one parameter for the solution; automatically generating on the CVS, based on the input solution, a program for execution on the at least one controller, wherein the program comprises code to check if the condition is met, and to execute the action when the condition is met; and downloading the

automatically generated controller program (AGCP) from the CVS to a storage on the user device, or sending the AGCP from the CVS to the at least one controller, for installation on the at least one controller.

[0004b] According to a second aspect of the present invention, there is provided an apparatus for creating and managing a controller based remote solution, the apparatus including: a processor; and a memory comprising executable instructions, which when executed using the processor, implement a method comprising: receiving, at a code virtualization server (CVS), from a graphical user interface (GUI) on a user device remote to the CVS, an input of a solution designed on the GUI, the solution comprising at least one controller communicably coupled with and operable to control at least one of a sensor or an actuator, wherein the at least one controller is remote to the CVS and the user device, a condition at the at least one of the sensor or the actuator, an action for execution by the at least one controller, wherein the action is executed upon the condition being met, and at least one parameter for the solution; automatically generating on the CVS, based on the input solution, a program for execution on the at least one controller, wherein the program comprises code to check if the condition is met, and to execute the action when the condition is met; and downloading the automatically generated controller program (AGCP) from the CVS to a storage on the user device, or sending the AGCP from the CVS to the at least one controller, for installation on the at least one controller.

[0005] Embodiments of the present invention generally relate to a method and apparatus for creating and managing controller based remote solutions, substantially as shown in and/or described in connection with at least one of the figures, as set forth more completely in the claims.

[0005] These and other features and advantages of the present disclosure may be appreciated from a review of the following detailed description of the present disclosure, along with the accompanying figures in which like reference numerals refer to like parts throughout.