United States Patent	12384263
Kind Code	B2
Date of Patent	August 12, 2025
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Systems and methods for an electric machine

Abstract

A machine charging system includes a machine, a charging unit, at least one user locator, and a control system. The machine may include one or more batteries, a cab, and a temperature control system. The charging unit may be configured to be removably coupled to the machine via a cable. The control system may include a controller in communication with the at least one user locator and the cab temperature control system. When the controller detects that the at least one user locator is within a predetermined distance from the machine while the machine is coupled to the charging unit, the controller may initiate one or more pre-start or pre-conditioning procedures with the temperature control system to control a temperature of one or more components of the machine.

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Appl. No.: **17/674497**

Filed: **February 17, 2022**

Prior Publication Data

Document Identifier	Publication Date
US 20230256842 A1	Aug. 17, 2023

Publication Classification

Int. Cl.: **B60L53/18** (20190101); **B60H1/00** (20060101); **B60L58/26** (20190101); **B60L58/27** (20190101); **F15B21/042** (20190101)

U.S. Cl.:

CPC **B60L53/18** (20190201); **B60H1/00657** (20130101); **B60H1/00742** (20130101); **B60L58/26** (20190201); **B60L58/27** (20190201); **F15B21/042** (20130101); B60L2240/62 (20130101); B60L2240/662 (20130101)

Field of Classification Search

CPC: B60L (53/18); B60L (58/27); B60L (58/26); B60L (2240/62); B60H (1/00657)

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
8620506	12/2012	Kummer	180/65.21	H01M 10/486
10293654	12/2018	Treharne et al.	N/A	N/A
10640004	12/2019	Patel	N/A	N/A
11650071	12/2022	Chhajer	701/409	G06F 3/1462
2014/0012447	12/2013	Gao et al.	N/A	N/A
2018/0086181	12/2017	Connell	N/A	B60H 1/3208
2018/0297483	12/2017	Pevear et al.	N/A	N/A
2018/0304765	12/2017	Newman	N/A	B60L 58/26
2018/0334170	12/2017	Liu	N/A	B60W 10/30
2019/0342739	12/2018	Shah	N/A	H04W 4/46
2021/0195367	12/2020	Li	N/A	H04W 4/029
2021/0394636	12/2020	Meyer	N/A	B60L 53/14
2022/0259825	12/2021	Cliff	N/A	B60L 58/14
2022/0371609	12/2021	Vollmann	N/A	B60W 40/08
2023/0120453	12/2022	Rao	340/4.3	H04L 12/2838
2023/0278449	12/2022	Kinsey	701/22	B60L 53/62

OTHER PUBLICATIONS

Optiwatt, “Tesla Extreme Weather Considerations—How To Optimize Your Tesla Driving For Winter Months”, Tesla Owners Club New York State, Dec. 16, 2020 (7 pages). cited by applicant

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Background/Summary

TECHNICAL FIELD

(1) The present disclosure relates generally to an electric machine or vehicle, and more particularly, to systems and methods for charging, starting, or otherwise conditioning one or more parameters of an electric machine or vehicle.

BACKGROUND

(2) The present disclosure relates to systems and methods for machines or vehicles that are used in

construction and/or repairs, for example, in earth-moving procedures such as road construction, mining, etc. Specifically, the present disclosure relates to systems and methods for electric vehicles, and to one or more start-up procedures. Electric vehicles, for example, wheel loaders, excavators, trucks (e.g., dump trucks, haul trucks, articulated dump trucks, etc.), track-type tractors (i.e., bulldozers), graders, etc., include one or more batteries that may be charged while the vehicle is not in operation, for example, overnight. Before the vehicle can be used, the vehicle often must undergo one or more start-up or conditioning procedures. For example, the start-up or conditioning procedure(s) may include warming the one or more batteries, a motor, a cab, and/or hydraulic system(s) (i.e., in cold climates), cooling the one or more batteries, a motor, a cab, and/or hydraulic system(s) (i.e., in hot climates), or otherwise conditioning one or more elements or portions of the vehicle before operation. The conditioning (e.g., heating, cooling, etc.) of the start-up procedure(s) may draw a load (i.e., a parasitic load) from the one or more batteries, which may reduce the available power for the remainder of the operation of the vehicle, reducing the available operational time and/or operational power for the vehicle. Additionally, in some aspects, the start-up procedure(s) may delay the operation of the vehicle or may otherwise affect the operation and/or efficiency of the vehicle.

(3) U.S. Pat. No. 8,620,506, issued to Kummer et al. on Dec. 31, 2013 (“the '506 patent”), describes a method and system for thermal management of a battery for a vehicle. The method and system of the '506 patent include a controller configured to regulate a temperature of the battery to within an operating temperature range when the vehicle is operating. The method and system of the '506 patent also includes conditioning the battery to a battery drive temperature when the ambient temperature is outside an environmental temperature range and when the battery is connected to the charger and power source. Additionally, the method and system of the '506 patent include conditioning a cabin in the vehicle to a cabin temperature when the ambient temperature is outside the environmental temperature range and when the battery is connected to the charger and power source. However, the conditioning of the battery and the cabin in the '506 patent is dependent on a predicted vehicle start time or a predicted departure time (e.g., disconnection from the charger and power source) based on a user's operating habits.

(4) The systems and methods of the present disclosure may address or solve one or more of the problems set forth above and/or other problems in the art. The scope of the current disclosure, however, is defined by the attached claims, and not by the ability to solve any specific problem.

SUMMARY

(5) In one aspect, a machine charging system may include a machine, a charging unit, at least one user locator, and a control system. The machine may include one or more batteries, a cab, and a temperature control system. The charging unit may be configured to be removably coupled to the machine via a cable. The control system may include a controller in communication with the at least one user locator and the cab temperature control system. When the controller detects that the at least one user locator is within a predetermined distance from the machine while the machine is coupled to the charging unit, the controller may initiate one or more pre-start or pre-conditioning procedures with the temperature control system to control a temperature of one or more components of the machine.

(6) In another aspect, a method of automatically initiating one or more pre-start or pre-conditioning procedures for a machine having one or more batteries may include detecting that the machine is in a charging mode. The charging mode may include the machine being coupled to a charging unit, and the machine may include a cab. The method may also include determining one or more parameters for initiating the one or more pre-start or pre-conditioning procedures for the machine. The method may further include receiving one or more locational parameters for at least one user locator. The method may also include, when the one or more location parameters for the at least one user locator are within the determine parameters, initiating the one or more pre-start or pre-conditioning procedures to control a temperature of the cab while the machine is coupled to the

charging unit.
(7) In yet another aspect, a machine charging system may include a machine, a charging unit, at least one user locator, and a control system. The machine may include one or more batteries, a battery temperature control system powered by the one or more batteries, a cab, and a cab temperature control system powered by the one or more batteries. The charging unit may be configured to be removably coupled to the machine via a cable. The control system may include a controller in communication with the at least one user locator, the battery temperature control system, and the cab temperature control system. When the controller detects that the at least one user locator is within a predetermined distance from the machine while the machine is coupled to the charging unit, the controller may initiate one or more pre-start or pre-conditioning procedures with the battery temperature control system to control a temperature of the battery and with the cab temperature control system to control a temperature of the cab.

Description

BRIEF DESCRIPTION OF THE DRAWINGS
(1) FIG. **1** is an illustration of an exemplary system, according to aspects of this disclosure.
(2) FIG. **2** is a schematic representation of a control system, according to aspects of this disclosure.
(3) FIG. **3** is a top view of portions of the exemplary system on a worksite, according to aspects of this disclosure.
(4) FIG. **4** is a flowchart depicting an exemplary method for controlling one or more start-up procedures for a vehicle or machine, according to aspects of this disclosure.
DETAILED DESCRIPTION
(5) Both the foregoing general description and the following detailed description are exemplary and explanatory only and are not restrictive of the features, as claimed. As used herein, the terms "comprises," "comprising," "having," "including," or other variations thereof, are intended to cover a non-exclusive inclusion such that a process, method, article, system, or apparatus that comprises a list of elements does not include only those elements, but may include other elements not expressly listed or inherent to such a process, method, article, or apparatus. Further, relative terms, such as, for example, "about," "substantially," "generally," and "approximately" are used to indicate a possible variation of ±10% in a stated value.
(6) FIG. **1** illustrates a perspective view an exemplary system **10**, for example, a machine or a vehicle charging system. System **10** may include a machine or vehicle **12**, a power station or charging unit **14**, and one or more connections or cables **16**. System **10** may also include one or more user devices or user locators **18**, for example, a cellphone, smartphone, tablet, or other device that includes a locational detection unit (e.g., a GPS unit) and/or interacts with a geofence, a network, position sensors, or other locational identifying systems or devices. Alternatively, the one or more user locators **18** may be integrated into an operator's vehicle, for example, integrated into a navigation unit, controller, a GPS unit, or otherwise integrated into or coupled to the operator's personal vehicle. In another alternative, the one or more user locators **18** may be integrated into a vest, for example, a reflective operator vest. Furthermore, system **10** may include a control system **100** (FIG. **2**), including one or more controllers **102**, sensors, control units or systems, etc. The one or more controllers **102** may be in communication (e.g., via a wireless connection) with user locator **18**. As discussed below, system **10** and other features below may help to initiate one or more pre-start or pre-conditioning procedures on vehicle **12** based on a position of one or more operators, for example, based on information received from the one or more user locators **18**. The one or more pre-start or pre-conditioning procedures may include warming the one or more batteries, a motor, a cab, and/or hydraulic system(s) (i.e., in cold climates), cooling the one or more batteries, a motor, a cab, and/or hydraulic system(s) (i.e., in hot climates), or otherwise

conditioning one or more elements or portions of the vehicle before operation.
(7) As discussed herein, vehicle **12** is an electric vehicle powered by one or more batteries **20** and requires periodic charging, for example, overnight or when vehicle **12** is otherwise not in use. Alternatively, vehicle **12** may be at least partially electric, for example, a hybrid vehicle (i.e., including a battery and an engine). In these aspects, vehicle **12** includes one or more batteries **20**, which may power a motor **22** and/or other components of vehicle **12**. In one aspect, battery **20** may be positioned in a rear of vehicle **12**, as shown in FIG. **1**. Alternatively, battery **20** may be positioned anywhere on vehicle **12**. Additionally, in some aspects, battery **20** may be removable, for example, to be charged away from vehicle **12**, to be easily replaced with a charged battery **20** to extend the work time of vehicle **12**, etc.
(8) Vehicle **12** may include a charger coupling **24**, for example, on a portion of vehicle **12** below or adjacent to a cab **28** or other operator environment. Charger coupling **24** may receive a mounting portion **26** of cable **16** to connect charging unit **14** to vehicle **12**. Charger coupling **24** and mounting portion **26** may form a snap-fit connection or otherwise help couple cable **16** to vehicle **12**. In one aspect, charging unit **14** may deliver direct current (DC) to battery **20**, for example, via the connection of mounting portion **26** of cable **16** to charger coupling **24**.
(9) Vehicle **12** may include one or more ground engaging elements, for example, wheels **30**, which may be driven by motor **22**. In another aspect, vehicle **12** may instead have tracks (not shown). In some aspects, vehicle **12** may include cab **28**, for example, in a central or forward portion of vehicle **12**, from which one or more operators may operate and/or control one or more aspects of vehicle **12**. As discussed below, cab **28** may be at least partially enclosed. Additionally, vehicle **12** may include one or more implements **32** (e.g., a bucket) coupled to and moveable relative to a machine frame **34**. As shown, vehicle **12** may be a wheel loader with a bucket as implement **32**. The bucket may be coupled to and movable relative to machine frame **34** via one or more hydraulic systems **36**, including one or more sets of rods and cylinders that may be operated by the movement and/or pressurization of hydraulic fluid via one or more pumps. As discussed in greater detail below, vehicle **12** includes one or more temperature control systems **104**, for example, one or more heating, ventilation, and air conditioning ("HVAC") systems, which may be powered by battery **20**.
(10) Although vehicle **12** is shown as a wheel loader including a bucket as implement **32**, this disclosure is not so limited. For example, vehicle **12** may be an excavator with a bucket, a truck with a movable truck bed, a tractor with a blade, ripper, etc., a grader with a circle and grading blade, or any other vehicle or machine with a movable or positionable implement. In these aspects, battery **20** and/or motor **22** may help propel the machine or vehicle, and also may help to control the movement and/or position of the respective implements, for example, based on operator controls.
(11) Charging unit **14** may be a portable charger assembly (i.e., movable around the worksite), or may be a permanently positioned charger assembly. As mentioned, charging unit **14** may supply direct current to battery **20** via cable(s) **16**. In one or more aspect, charging unit **14** itself may be charged or otherwise powered via one or more connections to a power grid, generators or gensets, solar panels, wind turbines or wind power sources, hydroelectric sources, other power source (e.g., a source of alternating current or direct current). Charging unit **14** may include one or more internal batteries. Charging unit **14** may include one or more outputs, for example, to couple one or more vehicles **12** to charging unit **14** via one or more cables **16**. In this aspect, charging unit **14** may provide power to the batteries **20** of more than one vehicle **12** via multiple cables **16**. In one or more aspects, charging unit **14** may be a high-powered charger that can deliver approximately 500 Kilo Watts of power.
(12) Cable **16** may include one or more conductive cables or wires (not shown), which can couple charging unit **14** to vehicle **12**. The one or more conductive cables or wires may be configured to carry a high voltage, for example, approximately 500 Kilo Watts of power, from charging unit **14** to

one or more vehicles **12**. Cable **16** may include one or more insulating layers surrounding the conductive cables or wires. Cable **16** may be fixedly coupled to an output of charging unit **14**. Alternatively, cable **16** may be removably coupled to the output of charging unit **14**. Additionally, as mentioned above, cable **16** may include mounting portion **26** to couple cable **16** to vehicle **12**.
(13) As mentioned above, user locator **18** may be a cellphone, smartphone, tablet, or other device that includes a locational detection unit (e.g., a GPS unit) and/or interacts with a geofence, a network, or other locational identifying system. Alternatively, the one or more user locators **18** may be integrated into an operator's vehicle, for example, a GPS unit in the operator's personal vehicle. In these aspects, user locator **18** may be in communication with one or more other portions of system **10**. Additionally, system **10** may initiate one or more pre-start or pre-conditioning procedures based at least in part on the location of user locator **18**. For example, as discussed in detail below, system **10** may initiate one or more pre-start or pre-conditioning procedures based at least in part on a distance of user locator **18** from vehicle **12** (e.g., ¼ mile, ½ mile, ¾ mile, 1 mile, 2 miles, 3 miles, 5 miles, etc.) Alternatively or additionally, system **10** may initiate one or more pre-start or pre-conditioning procedures based at least in part on an estimated time it will take for user (based on user locator **18**) to reach vehicle **12**. In this aspect, system **10** may initiate one or more pre-start or pre-conditioning procedures when user locator **18** is between approximately 5 minutes and approximately 30 minutes away from vehicle **12**, for example, between approximately 10 minutes and approximately 15 minutes from vehicle **12**. The timing estimate may be based at least in part on a distance from user locator **18** to vehicle **12**, may be based on a geofence (e.g., defined by a worksite or other locational features surrounding vehicle **12**), etc. The one or more pre-start or pre-conditioning procedures may be based on other conditions as well, for example, an ambient temperature, temperatures of one or more components on vehicle **12**, the type of vehicle **12**, a distance of the operator or user locator **18** from the vehicle or other location (e.g., a remote operation location), etc.
(14) As discussed in detail below and as shown in FIG. **2**, system **10** may also include a control system **100**. Control system **100** may include a controller **102**, for example, positioned on or within a portion of vehicle **12**. Controller **102** may be in communication with one or more features of vehicle **12** and/or other portions of system **10**. Controller **102** may receive inputs and send outputs, for example, in order to operate vehicle **12**, including initiating one or more pre-start or pre-conditioning procedures on vehicle **12** based on a position of one or more operators, for example, based on information received from the one or more user locators **18**. Although not shown, controller **102** may be coupled to or include one or more memory units, which may contain instructions for controller **102** to initiate the one or more pre-start or pre-conditioning procedure. Controller **102** may be a separate controller on vehicle **12** or may be integrated into a central vehicle controller (e.g., a main power or operation controller, etc.). Alternatively, controller **102** may be integrated into one or more of temperature control system(s) controller, a battery controller, a motor control module, or another dedicated control module on vehicle **12**. In one aspect, machine **10** may be an electrohydraulic motor grader, and controller **102** may also control one or more electrical switches or valves in order to control one or more hydraulic cylinders or electrical elements in order to operate machine **10**.
(15) Controller **102** may embody a single microprocessor or multiple microprocessors that may include means for performing any of the operations mentioned herein. For example, controller **102** may include a memory, a secondary storage device, a processor, such as a central processing unit or any other means for accomplishing a task consistent with the present disclosure. The memory or secondary storage device associated with controller **102** may be non-transitory computer-readable media that store data and/or software routines that may assist controller **102** in performing its functions, such as the functions of method or process **400** of FIG. **4**, as discussed below. Further, the memory or secondary storage device associated with controller **102** may also store data received from the various inputs or sensors associated with vehicle **12** and one or more other

portions of system **10** or control system **100**. Numerous commercially available microprocessors can be configured to perform the functions of controller **102**. It should be appreciated that controller **102** could readily embody a general machine controller capable of controlling numerous other machine functions. Various other known circuits may be associated with controller **102**, including signal-conditioning circuitry, communication circuitry, hydraulic or other actuation circuitry, and other appropriate circuitry. As discussed herein, controller **102** may receive various inputs (e.g., from various sensors and/or user locator **18**), and based on the various inputs, controller **102** may signal the initiation of one or more pre-start or pre-conditioning procedures and/or determine the start time of the one or more pre-start or pre-conditioning procedures.

(16) As shown in FIG. **2**, control system **100** may also include one or more user interfaces **106**, which may be positioned at one or more operator stations on vehicle **12**, for example, in cab **28**, and/or remote from vehicle **12** (e.g., at remote operation location **312** in FIG. **3**). The one or more user interfaces **106** may include one or more touch screens displays, control panels, and/or one or more sets of buttons, switches, dials, or other inputs and/or one or more displays, screens, lights, etc. to receive instructions and convey information to a user. Controller **102** and user interface **106** may be coupled (e.g., wired or wirelessly). As discussed below, controller **102** and/or user interface **106** may help control various aspects of vehicle **12**, including the one or more HVAC or temperature control systems **104**.

(17) As mentioned above, vehicle **12** includes one or more temperature control systems **104** (FIG. **2**), which may be signaled or otherwise controlled and/or in communication with controller **102**. The one or more temperature control systems **104** may help to control the temperature of one or more of battery **20**, motor **22**, cab **28**, hydraulic systems **36**, etc. The one or more temperature control system(s) **104** may include a plurality of separate temperature control systems, for example, with each temperature control system helping to control the temperature of different components or portions of vehicle **12**. Alternatively, one or more HVAC or temperature control system(s) **104** may help to heat, ventilate, and/or cool multiple components of vehicle **12**. For example, as shown in FIG. **2**, a first temperature control system may be a battery HVAC or temperature control system **104**A to help heat, ventilate, and/or cool battery **20**. In one or more aspects, battery temperature control system **104**A may include a water-based battery temperature control system, for example, to deliver, distribute, and/or pump water around one or more portions of battery **20** to help cool battery **20**. In this aspect, battery temperature control system **104**A may also include and/or control a battery cooling pump, for example, to control the delivery of water in the water-based battery temperature control system. Furthermore, in one or more aspects, battery temperature control system **104**A may include an auxiliary heater, for example, to help heat (or warm) battery **20**, for example, when vehicle **12** is in cold climates.

(18) Additionally, a second HVAC or temperature control system may be a cab HVAC or temperature control system **104**B to help heat, ventilate, and/or cool cab **28** or other operator environment, for example, on vehicle **12** (as shown in FIG. **1**) or adjacent to or near vehicle **12** (e.g., for remote operation of vehicle **12** from another position on a worksite). For example, cab temperature control system **104**B may include one or more HVAC units or other temperature control units (not shown) on vehicle **12**, for example, positioned on top of cab **28**. Cab temperature control system **104**B may include one or more fans, heater cores, air conditioning condensers, etc. to help heat, ventilate, and/or cool cab **28**.

(19) Furthermore, a third HVAC or temperature control system may be a hydraulic HVAC or temperature control system **104**C. Hydraulic temperature control system **104**C may help to control the temperature of one or more components of hydraulic system **36**, for example, one or more hydraulic motors, one or more hydraulic pumps, hydraulic fluid, etc. In these aspects, hydraulic temperature control system **104**C may include one or more fans, heater cores, air conditioning condensers, etc. to help heat, ventilate, and/or cool one or more components of hydraulic system **36**. In another aspect, hydraulic HVAC system **104**C may include a water-based temperature

control system, which may include one or more cooling pumps to control the delivery of water around one or more components of hydraulic system **36** (as discussed above with respect to battery temperature control system **104**A) and/or one or more auxiliary heaters to help heat (or warm) one or more components of hydraulic system **36**.

(20) Additionally, control system **100** may include one or more motor temperature control system(s) **108**, for example, to operate one or more fans to help ventilate and/or cool motor **22**. Moreover, motor temperature control system(s) **108** may include one or more auxiliary heaters to help heat (or warm) motor **22**. Control system **100** may also include one or more temperature sensors on or within motor **22**, which may be in communication with controller **102** as well.

(21) Although not shown, each of the one or more temperature control systems **104** and/or motor temperature control system **108** may include a control unit, for example, in communication with controller **102**. Each control unit may signal the respective one or more temperature control systems **104** and/or motor temperature control system **108** to activate, heat, ventilate, cool, or otherwise help to control the temperature of the respective element of vehicle **12**.

(22) In addition, control system **100** may include one or more sensors or other input units. Controller **102** and/or user interface **106** may be coupled to (e.g., through a wired or wireless connection) the one or more sensors or one or more input units. For example, control system **100** may include one or more temperature sensors.

(23) Control system **100** may include an ambient temperature sensor **110**. Ambient temperature sensor **110** may be positioned on an exterior portion of vehicle **12**. Alternatively, ambient temperature sensor **110** may be positioned on an exterior portion of charging unit **14**, or otherwise positioned on a worksite adjacent to or near vehicle **12**. Ambient temperature sensor **110** may send one or more signals to controller **102** indicative of an ambient temperature. In one aspect, ambient temperature sensor **110** may constantly or periodically send one or more signals to controller **102** indicative of the ambient temperature. Alternatively, ambient temperature sensor **110** may send one or more signals to controller **102** indicative of the ambient temperature upon the occurrence of one or more conditions. For example, ambient temperature sensor **110** may send one or more signals to controller **102** indicative of the ambient temperature when the temperature falls below a threshold (e.g., 10° C., 5° C., 0° C., −5° C., −10° C., −20° C., etc.) or is above a threshold (e.g., 25° C., 30° C., 35° C., 40° C., etc.). In another example, ambient temperature sensor **110** may send one or more signals to controller **102** indicative of the ambient temperature when controller **102** detects a certain position, location, distance, or other information of user locator **18** that is indicative of an operator approaching vehicle **12** or another location (e.g., a remote operating location).

(24) Control system **100** may include one or more of a battery temperature sensor **112**, a cab temperature sensor **114**, and a hydraulic temperature sensor **116**. Battery temperature sensor **112** may be positioned on or within a portion of battery **20**, and may send one or more signals to controller **102** indicative of a temperature of battery **20**. Cab temperature sensor **114** may be positioned within a portion of cab **28**, and may send one or more signals to controller **102** indicative of a temperature within cab **28**. Hydraulic temperature sensor **116** may be positioned on or within a portion of hydraulic system **36**, and may send one or more signals to controller **102** indicative of a temperature of one or more components or portions of hydraulic system **36**. As with ambient temperature sensor **110**, one or more of a battery temperature sensor **112**, a cab temperature sensor **114**, and a hydraulic temperature sensor **116** may constantly or periodically send one or more signals to controller **102** indicative of the respective temperatures. Alternatively, one or more of a battery temperature sensor **112**, a cab temperature sensor **114**, and a hydraulic temperature sensor **116** may send one or more signals to controller **102** indicative of the respective temperatures upon the occurrence of one or more conditions. For example, one or more of a battery temperature sensor **112**, a cab temperature sensor **114**, and a hydraulic temperature sensor **116** may send one or more signals to controller **102** indicative of the respective temperatures when the ambient temperature and/or the respective temperatures falls below a threshold (e.g., 10° C., 5° C.,

0° C., −5° C., −10° C., −20° C., etc.) or is above a threshold (e.g., 25° C., 30° C., 35° C., 40° C., etc.). In another example, one or more of a battery temperature sensor **112**, a cab temperature sensor **114**, and a hydraulic temperature sensor **116** may send one or more signals to controller **102** indicative of the respective temperatures when controller **102** detects a certain position, location, distance, or other information of user locator **18** that is indicative of an operator approaching vehicle **12** or another location (e.g., a remote operating location).

(25) Additionally, control system **100** may include one or more user locator, communication, or information units. For example, control system **100** may include one or more user locator units **118**, for example, coupled to or otherwise in communication (e.g., wired or wirelessly) with one or more user locators **18**. User locator unit(s) **118** may be positioned on the one or more user locators **18**, and may be in wireless communication with controller **102**. User locator unit(s) **118** may include a global positioning system (GPS) unit. Alternatively, user locator unit(s) **118** may include a geotag, for example, which may interact with and/or send one or more signals when passing through or over a geofence or other location demarcation (e.g., passing through a gate, an opening in a fence, onto a worksite, etc.). In another aspect, user locator unit(s) **118** may be positioned on vehicle **12** (i.e., in cab **28**), in which case user locator unit **118** may be in wireless communication with the one or more user locators **18** and in wired or wireless communication with controller **102**. In any of these aspects, user locator unit(s) **118** may send one or more signals to controller **102** when user locators **18** is positioned at one or more locations or one or more distances (e.g., from vehicle **12**). For example, as discussed below, user locator unit(s) **118** may send one or more signals to controller **102** when user locator **18** is within a predetermined distance of vehicle **12**, a gate to the worksite, etc. Based at least in part on the predetermined distance, controller **102** may determine an estimated arrival time for the user to vehicle **12** or to another location (e.g., a remote operation location).

(26) Furthermore, control system **100** may include a charger information unit **120**. Charger information unit **120** may be coupled to or otherwise in communication with charging unit **14**. For example, charger information unit **120** may send one or more signals to controller **102** with information about charging unit **14**. In one or more aspects, charger information unit **120** may be configured to detect when charger **14** is connected to vehicle **12** (i.e., via cable **16**), and may send one or more signals indicative of the connection to controller **102**. Additionally, in one or more aspects, charger information unit **120** may send one or more signals to controller **102** concerning the level of power delivered from charging unit **14** to vehicle **12** and battery **20**. Alternatively or additionally, charger information unit **120** may send one or more signals to controller **102** concerning the rate at which the power is delivered from charging unit **14** to vehicle **12** and battery **20**, the rate at which the power is delivered from charging unit **14** to vehicle **12** and battery **20**, the available power remaining on charging unit **14** (i.e., power stored on an internal battery of charging unit **14**), or other details of charging unit **14**.

(27) Although not shown, control system **100** may include one or more additional sensors, user locator units, information units, control units, user interfaces, etc.

(28) FIG. **3** illustrates a top view of portions of system **10**. As shown, system **10** includes vehicle **12**, charging unit **14**, which may be connected to vehicle **12** via cable **16** to charge battery **20**, and user locator **18**. As shown, vehicle **12** and charging unit **14** may be positioned on a worksite **300**. Worksite **300** may be adjacent to one or more roads **302**, **304**. Additionally, worksite **300** may include one or more entrances **306** (one shown in FIG. **3**), for example, demarcated by one or more gates. Entrance **306** may include one or more entrance sensors **308**, for example, two entrance sensors **308** on opposing sides of entrance **306**. Additionally, worksite **300** may include a geofence **310**, for example, a virtual fence or perimeter around a location. Geofence **310** may include an entirety or a portion of worksite **300**. Alternatively, geofence **310** may be based on a position of vehicle **12**, for example, a certain distance or radius from vehicle **12**. In these aspects, control system **100** may establish and/or adjust geofence **310**, for example, based on one or more

parameters.
(29) As discussed herein, one or more features of system **10** may be activated in pre-start or pre-conditioning procedures once user locator **18** is within a predetermined distance or other locational parameter from vehicle **12**. In these aspects, controller **102** and/or user locator unit **118** may detect when user locator **18** is within a predetermined distance from vehicle **12**, worksite **300**, entrance **306**, or another location, and may signal one or more HVAC or temperature control system(s) **104** to initiate the pre-start or pre-conditioning procedures. Alternatively or additionally, controller **102** and/or user locator unit **118** may detect when user locator **18** passes over or cross one or more locations or landmarks, and may signal one or more HVAC or temperature control system(s) **104** to initiate the pre-start or pre-conditioning procedures. For example, controller **102** and/or user locator unit **118** may detect (e.g., via a GPS unit) when user locator **18** turns from road **302** onto road **304**. Alternatively, controller **102** and/or user locator unit **118** may detect (e.g., via a GPS unit and/or one or more of sensors **308**) when user locator **18** enters worksite **300** via entrance **306**. It is noted that if worksite **300** has more than one entrance **306**, then controller **102** and/or user locator unit **118** may signal one or more HVAC or temperature control system(s) **104** to initiate the pre-start or pre-conditioning procedures when user locator **18** enters worksite **300** via any of the entrances **306**. Alternatively, controller **102** and/or user locator unit **118** may signal one or more HVAC or temperature control system(s) **104** to initiate the pre-start or pre-conditioning procedures only when user locator **18** enters worksite **300** via one or a subset of the entrances **306**.
(30) As mentioned above, worksite **300** may include one or more geofences **310**, for example, based on a size of worksite **300** and/or a position of vehicle **12**. When geofence **310** is based on a location of vehicle **12**, geofence **310** may be substantially circular, for example, extending in a predetermined distance or radius in 360 degrees from vehicle **12**. In one or more aspects, geofence **310** may extend in a distance of approximately 50 meters, approximately 100 meters, approximately 200 meters, approximately 500 meters, approximately 1 kilometer, approximately 5 kilometers, approximately 10 kilometers, approximately 25 kilometers, approximately 50 kilometers, approximately 100 kilometers, etc. The size of geofence **310** may depend on one or more of a size of worksite **300**, a type or size of vehicle **12**, the one or systems of vehicle **12** that are to be pre-conditioned, etc. Controller **102** and/or user locator unit **118** may signal one or more HVAC or temperature control system(s) **104** to initiate the pre-start or pre-conditioning procedures when user locator **18** is within geofence **310**. In some aspects, geofence **310** may be used for one or more functions on worksite **300**. Geofence **310** may be used to detect the position of user locator **18**, and may also be used to establish one or more boundaries for one or more vehicles on worksite, for example, limiting where the one or more vehicles can travel.
(31) Additionally, in one or more aspects, the size (e.g., a diameter) of geofence **310** may at least partially depend on one or more parameters. In these aspects, geofence **310** may be a pre-start or pre-conditioning geofence. For example, if the ambient temperature (i.e., sensed by ambient temperature sensor **110**) and/or one or more of the temperature of battery **20** (i.e., sensed by battery temperature sensor **112**), the temperature of motor **22** (i.e., sensed by a motor temperature sensor), the temperature of cab **28** (i.e., sensed by cab temperature sensor **114**), or the temperature of hydraulic system **36** (i.e., sensed by hydraulic temperature sensor **116**) is lower or higher than one or more predetermined temperatures, then the size of geofence **310** may be larger (i.e., geofence **310**A), as control system **100** may require more time to heat, cool, or ventilate one or more components of vehicle **12**. Alternatively, if the ambient temperature and/or the temperature of one or more of battery **20**, motor **22**, cab **28**, or hydraulic system **36** is more temperate, for example, within a predetermined temperature range (e.g., between approximately 0° C. and approximately 30° C., for example, between approximately 5° C. and approximately 25° C.) then geofence **310** may be smaller (i.e., geofence **310**B), as control system **100** may require less time to heat, cool, or ventilate one or more components of vehicle **12**.
(32) In one aspect, geofence **310** may include incremental sizes. For example, if the ambient

temperature and/or the temperature of one or more of battery **20**, motor **22**, cab **28**, or hydraulic system **36** is above a first threshold temperature or below a second threshold temperature, then geofence **310** may expand, for example, to geofence **310**A. Alternatively, if the ambient temperature and/or the temperature of one or more of battery **20**, motor **22**, cab **28**, or hydraulic system **36** is within a more temperate temperature range, then geofence **310** may reduce in size, for example, to geofence **310**B. Furthermore, if the ambient temperature and/or the temperature of one or more of battery **20**, motor **22**, cab **28**, or hydraulic system **36** is above a third threshold temperature (i.e., higher than the first threshold temperature) or below a fourth threshold temperature (i.e., lower than the second threshold temperature), then geofence **310** may further expand, for example, to geofence **310**C, as control system **100** may require even more time to heat, cool, or ventilate one or more components of vehicle **12**. Alternatively, the size of geofence **310** may be directly proportional to the ambient temperature and/or the temperature of one or more of battery **20**, motor **22**, cab **28**, or hydraulic system **36**, for example, continuously variable between a minimum geofence size and a maximum geofence size based on the ambient temperature and/or the temperature of one or more of battery **20**, motor **22**, cab **28**, or hydraulic system **36**.

(33) Additionally, geofence **310** may signal controller **102** to halt one or more pre-start or pre-conditioning procedures, for example, if user locator **18** is detected leaving geofence **310**. For example, as shown in FIG. **3**, user locator **18** may be within geofence **310**A or geofence **310**C while traveling on a portion of road **302**, but user locator **18** may exit geofence **310** or geofence **310**C when approaching road **304**. Exiting geofence **310**A or geofence **310**C may pause or cancel the pre-start or pre-conditioning procedures. Alternatively, in one aspect, exiting geofence **310** (e.g., geofence **310**A or **310**C) may not affect the pre-start or pre-conditioning procedures.

(34) Furthermore, in one or more aspects, the size of geofence **310** and/or the initiation of the pre-start or pre-conditioning procedures may be based on at least on one or more parameters of charging unit **14**, for example, communicated to controller **102** via charger information unit **120**. For example, if charging unit **14** is capable of delivering a greater amount of power and/or at a greater rate to battery **20**, then geofence **310** may be smaller and/or controller **102** may delay the initiation of one or more pre-start or pre-conditioning procedures. Alternatively, if charging unit **14** is capable of delivering a lesser amount of power and/or at a slower rate to battery **20**, then geofence **310** may be larger and/or controller **102** may initiate one or more pre-start or pre-conditioning procedures earlier. It is noted that the charging capabilities of charging unit **14** may also depend on the ambient temperature, a temperature of charging unit **14** (i.e., detected by a charging unit temperature sensor), and/or a temperature of cable **16** (i.e., detected by a cable temperature sensor).

(35) In one aspect, the initiation of the pre-start or pre-conditioning procedures may depend on more than one user locators **18**. For example, as shown in FIG. **3**, another user locator **318** may be indicative of another user or operator. In this aspect, user locator **318** may be in communication with controller **102**, and controller **102** may signal one or more components of vehicle **12** to initiate the pre-start or pre-conditioning procedures when one or both of user locators **18**, **318** are within a predetermined distance or other locational parameter from vehicle **12**, as discussed above. For example, controller **102** may only signal one or more components of vehicle **12** to initiate the pre-start or pre-conditioning procedures when both user locator **18** and user locator **318** have turned from road **302** onto road **304**, have both passed through entrance **306**, are both within geofence **310**, etc. Although not shown, the initiation of the pre-start or pre-conditioning procedures may further depend on more than two user locators **18**, **318**. Additionally, the initiated pre-start or pre-conditioning procedures may depend on which user locator **18**, **318** is within the predetermined distance. For example, if first user locator **18** is within geofence **310**, then control system **100** may initiate a heating or cooling of battery **20** (e.g., via battery temperature control system **104**A). Then, when second user locator **318** is within geofence **310**, then control system **100** may initiate a heating or cooling of cab **28** (e.g., via cab temperature control system **104**B).

(36) Furthermore, as mentioned above, the initiation of the pre-start or pre-conditioning procedures may be based at least in part on a predetermined distance of user locator **18** to a remote operation location, for example, a remote operation location **312** on worksite **300**. Alternatively, remote operation location **312** may be remote from worksite **300**. In these aspects, controller **102** may determine an estimated arrival time for the user to remote operation location **312**, as discussed herein.

(37) FIG. **4** is a flow diagram portraying an exemplary method **400** that may be performed by control system **100** to automatically control one or more aspects or portions of vehicle **12**. For example, in a charging mode (i.e., with vehicle **12** connected to charging unit **14** via cable **16**), control system **100** may control the initiation of one or more pre-start or pre-conditioning procedures. As mentioned above, the pre-start or pre-conditioning procedures may include one or more of warming one or more batteries **20**, motor **22**, cab **28**, and/or hydraulic system(s) **36** (i.e., in cold climates), cooling one or more batteries **20**, motor **22**, cab **28**, and/or hydraulic system(s) **36** (i.e., in hot climates), or otherwise conditioning one or more elements or portions of vehicle **12** before operation.

(38) Method **400** includes an initial step **402**, where controller **102** may determine or detect that vehicle **12** is in a charging mode, for example, connected to charging unit **14** via cable **16**. For example, as mentioned above, charger information unit **120** may be configured to detect the connection between charging unit **14** and vehicle **12**, and may send one or more signals indicative of the connection between vehicle **12** and charging unit **14**. Alternatively, control system **100** may detect the connection of mounting portion **26** to charger coupling **24** and/or detect that battery **20** is being charged.

(39) Method **400** also includes a step **404**, in which controller **102** may determine one or more parameters for initiating one or more pre-start or pre-conditioning procedures. For example, controller **102** may receive one or more signals from ambient temperature sensor **110**, battery temperature sensor **112**, cab temperature sensor **114**, hydraulic temperature sensor **116**, etc., and may determine a power and/or amount of time required to warm, cool, ventilate, or otherwise condition one or more components of vehicle **12** before vehicle **12** is ready to work. In these aspects, colder or hotter temperatures may require a greater amount of power and/or a greater amount of time to bring the various components to a ready to work temperature than more temperate temperatures. Similarly, the power supply, power delivery rate, and/or other conditions of charging unit **14** and/or cable **16** may affect the amount of time required to condition vehicle **12** to be ready to work. In these aspects, step **404** may include setting one or more of a predetermined distance of user locator **18** to vehicle **12** at which the pre-start or pre-conditioning will begin. Step **404** may include setting and/or adjusting (either incrementally or continuously) a size of geofence **310**.

(40) Next, a step **406** includes receiving one or more locational parameters for user locator **18**. In this aspect, step **406** may include controller **102** receiving locational data from user locator unit **118**, for example, GPS positional data. Alternatively, step **406** may include controller **102** and/or user locator unit **118** detecting (e.g., via a GPS unit) when user locator **18** turns from road **302** onto road **304**, detecting (e.g., via one or more of sensors **308**) when user locator **18** enters worksite **300** via entrance **306**, detecting (e.g., via a GPS unit) when user locator **18** enters or crosses over geofence **310**, etc. Additionally, step **406** may include receiving one or more locations parameters for more than one user locators, for example, user locator **18** and user locator **318**.

(41) Method **400** also includes a step **408**, in which control system **100** initiates one or more pre-start or pre-conditioning procedures. Step **408** may include warming one or more of battery **20**, motor **22**, cab **28**, and/or hydraulic system(s) **36** (i.e., in cold climates), cooling battery **20**, motor **22**, cab **28**, and/or hydraulic system(s) **36** (i.e., in hot climates), or otherwise conditioning (e.g., ventilating) one or more elements or portions of vehicle **12** before operation, as discussed above. Step **408** may include controller **102** signaling one or more temperature control system(s) **104**, for

example, one or more of battery temperature control system **104**A, cab temperature control system **104**B, hydraulic temperature control system **104**C, or motor temperature control system(s) **108**, as discussed above.

(42) Method **400** may also include an optional last step **410**, in which control system **100** may display one or more indications that vehicle **12** is ready to work, for example, that the temperature of one or more of battery **20**, motor **22**, cab **28**, and/or hydraulics system(s) **36** has reached a working temperature. For example, controller **102** may signal one or more of user locator **18** or user interface **106** (e.g., in cab **28** or remote from vehicle **12**) to display one or more indications (e.g., text messages, lights, notifications, etc.) or otherwise signal (e.g., an audible signal) that vehicle **12** is ready to work. For example, indicating that vehicle **12** is ready to work may include changing a red light (e.g., a blinking red light) on user interface **106** to a green light (e.g., a steady green light) on user interface **106**. In this aspect, vehicle **12** may be ready work when, for example, battery **20** is fully charged, heated, and/or cooled to an operational temperature. Additionally or alternatively, vehicle **12** may be ready to work when one or more of motor **22**, cab **28**, hydraulics system(s) **36**, etc. are heated, cooled, or otherwise conditioned to an operational temperature or other operational parameter.

INDUSTRIAL APPLICABILITY

(43) The disclosed aspects of system **10**, vehicle **12**, control system **100**, etc. may be used in any machine or vehicle to help initiate one or more pre-start or pre-conditioning procedures to assist in the operation of the machine or vehicle. The one or more pre-start or pre-conditioning procedures may be initiated while the machine or vehicle **12** is coupled to charging unit **14** (or other power source). As such, the pre-start or pre-conditioning procedures can occur while battery **20** is drawing power from charging unit **14**. Battery **20** will power the various components of vehicle **12** for the pre-start or pre-conditioning procedures, but any drain on the power stored on battery **20** may be replaced by charging unit **14**. As such, battery **20** may be fully charged (or approximately fully charged) when vehicle **12** is uncoupled from charging unit **14** and begins working, for example, on worksite **300**. Because battery **20** may be fully charged (or approximately fully charged), battery **20** may provide an increased operational period for vehicle **12**. In one aspect, if battery **20** provides an average operational period of approximately four to five hours, then initiating the pre-start or pre-conditioning procedures while vehicle **12** is connected to charging unit may increase the average operational period by, for example, approximately 10 minutes, approximately 15 minutes, approximately 20 minutes, approximately 30 minutes, approximately 45 minutes, approximately 1 hour, etc. In this aspect, initiating the one or more pre-start or pre-conditioning procedures while vehicle **12** is coupled to charging unit **14** may help to increase the operational period of vehicle **12** by, for example, approximately 2%, approximately 5%, approximately 10%, approximately 15%, approximately 20%, etc.

(44) Furthermore, initiating the pre-start or pre-conditioning procedures while vehicle **12** is connected to charging unit **14** and before the operator arrives to vehicle **12** may also increase the productivity for the operator. For example, initiating the pre-start or pre-conditioning procedures based on the operator's position, via one or more of the parameters discussed herein, may result in one or more of battery **20**, motor **22**, cab **28**, hydraulic system(s) **36**, etc. being heated, cooled, or ventilated to an operating temperature or otherwise conditioned for vehicle **12** to be ready to work. As such, the operator may immediately begin operating vehicle **12**, for example, when the operator arrives at vehicle **12** or arrives at another location (e.g., a remote operation location).

(45) In some aspects, for example, when vehicle **12** includes cab **28**, initiating the pre-start or pre-conditioning procedures while vehicle **12** is connected to charging unit **14** and before the operator arrives to vehicle **12** may also improve operator comfort. For example, initiating the pre-start or pre-conditioning procedures based on the operator's position, via one or more of the parameters discussed herein, may result in cab **28** being warmed, cooled, ventilated, etc. before the operator arrives. In these aspects, the operator need not operate vehicle **12** in a cold cab (when operating in

cold conditions) or in a hot cab (when operating in hot conditions).
(46) Moreover, one or more aspects of this disclosure may provide for the initiation of the pre-start or pre-conditioning procedures to be adjustable. For example, as discussed above, when the ambient temperature is more extreme (e.g., hotter or colder relative to one or more predetermined thresholds) and/or when charging unit **14** is less powerful or delivers a slower charge to vehicle **12** and battery **20**, control system **100** (e.g., via controller **102**) may adjust geofence **310** or otherwise initiate the pre-start or pre-conditioning procedures earlier. For example, in these circumstances, controller **102** may adjust geofence **310** or otherwise initiate the pre-start or pre-conditioning procedures when the operator (via operator locator **18**) is farther away from vehicle **12** (or remote operation location **312**).
(47) In some aspects, when vehicle **12** is in an extremely cold climate, control system **100** may maintain one or more components of vehicle **12** at a first temperature (or within a temperature range) while inactive (e.g., maintain battery **20** at a charging temperature, maintain cab **28** at an idle temperature, etc.). Then, control system **100** may further warm the one or more components to a second temperature warmer than the first temperature when initiating the pre-start or pre-conditioning procedures (e.g., warm battery **20** to an operating temperature, warm cab **28** to an operating temperature, etc.). Alternatively, when in an extremely hot climate, control system **100** may maintain one or more components of vehicle **12** at a third temperature (or within a temperature range) while inactive (e.g., maintain battery **20** at a third temperature or temperature range while charging, maintain cab **28** at an idle temperature, etc.). Then, control system **100** may further cool one or more components to a fourth temperature cooler than the third temperature when initiating the pre-start or pre-conditioning procedures (e.g., cool battery **20** to an operating temperature, cool cab **28** to an operating temperature, etc.). Furthermore, in some aspects, the initiation of the pre-start or pre-conditioning procedures may also depend on the position of more than one user locators **18**, **318**, for example, if vehicle **12** requires more than one operator to begin work.
(48) Various aspects of this disclosure may help to improve the efficiency and/or effectiveness of one or more vehicles **12**. Additionally, various aspects of this disclosure may help to improve the efficiency of operator time, as vehicle **12** may be operational or otherwise ready to work when the operator arrives at the vehicle or another location (e.g., a remote operation location), which may help to reduce vehicle downtime, operator costs, etc.
(49) It will be apparent to those skilled in the art that various modifications and variations can be made to the disclosed system, vehicle, and control system without departing from the scope of the disclosure. Other embodiments of the system, vehicle, and control system will be apparent to those skilled in the art from consideration of the specification and practice of the system, vehicle, and control system disclosed herein. It is intended that the specification and examples be considered as exemplary only, with a true scope of the disclosure being indicated by the following claims and their equivalents.

Claims

1. A machine charging system, comprising: a machine, wherein the machine includes: one or more batteries; a cab; an ambient temperature sensor; and a temperature control system; a charging unit configured to be removably coupled to the machine via a cable; at least one user locator; and a control system, wherein the control system includes a controller in communication with the at least one user locator, the ambient temperature sensor, and the temperature control system, wherein, when the controller detects (1) that the at least one user locator is within a predetermined distance from the machine and (2) that the machine is coupled to the charging unit, then the controller initiates one or more pre-start or pre-conditioning procedures with the temperature control system to control a temperature of one or more components of the machine, wherein the predetermined distance is determined by a geofence, and wherein the controller adjusts a size of the geofence

based at least in part on a temperature sensed by the ambient temperature sensor.
2. The system of claim 1, wherein the control system further includes a charger information unit in communication with the controller, wherein the controller adjusts the size of the geofence based at least in part on a rate at which power is delivered from the charging unit to the one or more batteries.
3. The system of claim 1, wherein the predetermined distance is determined by the at least one user locator passing one or more locations or landmarks, and wherein the at least one user locator is a cellphone, smartphone, tablet, or operator vest.
4. The system of claim 1, wherein the machine further includes a battery temperature control system, and wherein the one or more pre-start or pre-conditioning procedures include warming or cooling the one or more batteries with the battery temperature control system.
5. The system of claim 1, wherein the machine further includes one or more hydraulics systems, one or more implements movable via the one or more hydraulics systems, and a hydraulics temperature control system, and wherein the one or more pre-start or pre-conditioning procedures include warming or cooling the one or more hydraulics systems with the hydraulics temperature control system.
6. The system of claim 1, wherein the at least one user locator is two user locators, and wherein the controller initiates the one or more pre-start or pre-conditioning procedures to control the temperature of the cab when the controller detects that both of the two user locators are within the predetermined distance from the machine.
7. A method of automatically initiating one or more pre-start or pre-conditioning procedures for a machine having one or more batteries and one or more hydraulics systems, comprising: detecting that the machine is in a charging mode, wherein the charging mode includes the machine being coupled to a charging unit, and wherein the machine includes a cab; determining one or more parameters for initiating the one or more pre-start or pre-conditioning procedures for the machine; receiving one or more locational parameters for at least one user locator separate from the machine; and when the one or more location parameters for the at least one user locator are within the determined parameters, initiating the one or more pre-start or pre-conditioning procedures to control a temperature of the cab, a temperature of the one or more batteries, and a temperature of the one or more hydraulics systems while the machine is coupled to the charging unit.
8. The method of claim 7, wherein determining the one or more parameters for initiating the one or more pre-start or pre-conditioning procedures for the machine includes establishing a geofence.
9. The method of claim 8, wherein determining the one or more parameters for initiating the one or more pre-start or pre-conditioning procedures for the machine further includes receiving one or more signals indicative of an ambient temperature.
10. The method of claim 9, wherein if the ambient temperature is outside of a predetermined range, determining the one or more parameters for initiating the one or more pre-start or pre-conditioning procedures for the machine includes increasing a size of the geofence.
11. The method of claim 7, wherein receiving one or more locational parameters for the at least one user locator includes receiving one or more signals indicative of the at least one user locator passing one or more locations or landmarks, and wherein the at least one user locator is a cellphone, smartphone, tablet, or operator vest.
12. The method of claim 11, wherein the at least one user locator is two user locators, and wherein receiving one or more locational parameters for the two user locators includes receiving signals indicative of both of the two user locators passing the one or more locations or landmarks.
13. The method of claim 7, wherein the machine further includes a battery temperature control system, wherein initiating the one or more pre-start or pre-conditioning procedures includes warming or cooling the one or more batteries with the battery temperature control system, wherein the machine further includes one or more implements movable via the one or more hydraulics systems and a hydraulics temperature control system, and wherein initiating the one or more pre-

start or pre-conditioning procedures includes warming or cooling the one or more hydraulics systems with the hydraulics temperature control system.

14. The method of claim 7, further comprising a last step of displaying one or more indications that the machine is ready to work via the at least one user locator or a user interface after the temperature of cab has reached a working temperature.

15. A machine charging system, comprising: a machine, wherein the machine includes: one or more batteries; a battery temperature control system powered by the one or more batteries; a cab; a cab temperature control system powered by the one or more batteries; and an ambient temperature sensor; a charging unit configured to be removably coupled to the machine via a cable; at least one user locator; and a control system, wherein the control system includes a controller in communication with the at least one user locator, the battery temperature control system, the cab temperature control system, and the ambient temperature sensor, wherein, when the controller detects (1) that the at least one user locator is within a predetermined distance from the machine and (2) that the machine is coupled to the charging unit, then the controller initiates one or more pre-start or pre-conditioning procedures with the battery temperature control system to control a temperature of the battery and with the cab temperature control system to control a temperature of the cab, wherein the predetermined distance is determined by a geofence, wherein the ambient temperature sensor is in communication with the controller, and wherein the controller adjusts a size of the geofence based at least in part on a temperature sensed by the ambient temperature sensor.

16. The system of claim 15, wherein the at least one user locator is a cellphone, smartphone, tablet, or operator vest.

17. The system of claim 15, wherein the machine further includes one or more hydraulics systems, one or more implements movable via the one or more hydraulics systems, and a hydraulics temperature control system powered by the one or more batteries, and wherein the one or more pre-start or pre-conditioning procedures include warming or cooling the one or more hydraulics systems with the hydraulics temperature control system, and wherein the at least one user locator is a cellphone, smartphone, tablet, or operator vest.

18. The system of claim 15, wherein the at least one user locator includes at least two user locators, and wherein the controller detecting that the at least one user locator is within the predetermined distance from the machine includes receiving signals indicative of each of the at least two user locators being within the predetermined distance from the machine.

19. The system of claim 18, wherein each of the at least two user locators is one of a cellphone, smartphone, tablet, or operator vest.

20. The system of claim 15, wherein the machine further comprises a user interface in communication with the controller, wherein the controller is configured to signal the user interface to display one or more indications that the machine is ready to work after the temperature of battery and the temperature of the cab have reached respective working temperatures.