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AGRICULTURAL OPERATION EVALUATION SYSTEM AND METHOD

Abstract

An agricultural operation evaluation system for an agricultural work vehicle includes an offboard device configured to collect offboard feedback associated with the agricultural operation and location information; and a controller. The controller is configured to receive the offboard feedback and the location information for the offboard feedback from the offboard device; determine at least one offboard input parameter from the offboard feedback; receive machine data including at least one onboard input parameter and location information for the at least one onboard input parameter; correlate the at least one offboard input parameter and the at least one onboard input parameter based on the location information for the at least one offboard input parameter and the location information for the at least one onboard input parameter; and determine one or more vehicle adjustments based on the correlated at least one offboard input parameter and at least one onboard input parameter.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATION(S) [0001] This application is a continuation of U.S. patent application Ser. No. 18/175,187, filed Feb. 27, 2023, now allowed, which is incorporated herein in its entirety. STATEMENT OF FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT [0002] Not applicable.

FIELD OF THE DISCLOSURE

[0003] This disclosure generally relates to work vehicles, and more specifically to agricultural operation evaluation systems and methods for harvesters and other types of agricultural work vehicles.

BACKGROUND OF THE DISCLOSURE

[0004] There are a wide variety of different types of agricultural machines, forestry machines, and/or construction machines. As examples, some agricultural machines include harvesters, such as combine harvesters, sugar cane harvesters, cotton harvesters, self-propelled forage harvesters, and windrowers. Harvest operations may involve various types of systems and management mechanisms in order to improve overall performance and production.

SUMMARY OF THE DISCLOSURE

[0005] The disclosure provides agricultural operation evaluation systems and methods.

[0006] In one aspect, an agricultural operation evaluation system for an agricultural work vehicle is provided. The system includes an offboard device configured to collect offboard feedback associated with the agricultural operation and location information for the offboard feedback; and a controller having a processor and memory architecture configured to: receive the offboard feedback and the location information for the offboard feedback from the offboard device; determine at least one offboard input parameter from the offboard feedback; receive machine data including at least one onboard input parameter and location information for the at least one onboard input parameter; correlate the at least one offboard input parameter and the at least one onboard input parameter based on the location information for the at least one offboard input parameter and the location information for the at least one onboard input parameter; and determine one or more agricultural work vehicle adjustments based on the correlated at least one offboard input parameter and at least one onboard input parameter.

[0007] In the agricultural operation evaluation system, the at least one offboard input parameter may be an offboard qualitative input parameter.

[0008] In the agricultural operation evaluation system, the at least one offboard input parameter may be an offboard quantitative input parameter.

[0009] In the agricultural operation evaluation system, the at least one onboard input parameter may be an onboard qualitative input parameter.

[0010] In the agricultural operation evaluation system, the at least one onboard input parameter may be an onboard quantitative input parameter.

[0011] In the agricultural operation evaluation system, the at least one offboard input parameter may be an offboard qualitative input parameter and the at least one onboard input parameter is an onboard qualitative input parameter.

[0012] In the agricultural operation evaluation system, the at least one offboard input parameter

may be an offboard quantitative input parameter and the at least one onboard input parameter is an onboard qualitative input parameter.

[0013] In the agricultural operation evaluation system, the at least one offboard input parameter may be an offboard qualitative input parameter and the at least one onboard input parameter is an onboard quantitative input parameter.

[0014] In the agricultural operation evaluation system, the at least one offboard input parameter may be an offboard quantitative input parameter and the at least one onboard input parameter is an onboard quantitative input parameter.

[0015] In the agricultural operation evaluation system, the offboard device may configured to collect the offboard feedback as an image and the controller is configured to extract the at least one offboard input parameter from the image.

[0016] In the agricultural operation evaluation system, the controller may be configured to extract the at least one offboard input parameter from the image as an offboard quantitative input parameter.

[0017] In the agricultural operation evaluation system, the controller is configured to extract the at least one offboard input parameter from the image as an offboard qualitative input parameter.

[0018] In a further aspect, a method is provided, for evaluating an agricultural operation of an agricultural work vehicle. The method may include collecting, with an offboard device, offboard feedback associated with the agricultural operation and location information for the offboard feedback; receiving, with a controller, the offboard feedback and the location information for the offboard feedback from the offboard device; determining, with a controller, at least one offboard input parameter from the offboard feedback; receiving, with a controller, machine data including at least one onboard input parameter and location information for the least one onboard input parameter; correlating, with a controller, the at least one offboard input parameter and the at least one onboard input parameter based on the location information for the at least one offboard input parameter and the location information for the at least one onboard input parameter; and determining, with a controller, one or more agricultural work vehicle adjustments based on the correlated at least one offboard input parameter and at least one onboard input parameter.

[0019] In the method, the at least one offboard input parameter may be an offboard qualitative input parameter.

[0020] In the method, the at least one offboard input parameter may be an offboard quantitative input parameter.

[0021] In the method, the at least one offboard input parameter may be an offboard qualitative input parameter and the at least one onboard input parameter is an onboard qualitative input parameter.

[0022] In the method, the at least one offboard input parameter may be an offboard quantitative input parameter and the at least one onboard input parameter is an onboard qualitative input parameter.

[0023] In the method, the at least one offboard input parameter may be an offboard qualitative input parameter and the at least one onboard input parameter is an onboard quantitative input parameter.

[0024] In the method, the at least one offboard input parameter may be an offboard quantitative input parameter and the at least one onboard input parameter is an onboard quantitative input parameter.

[0025] In the method, the collecting the offboard feedback may include collecting the offboard feedback as an image, and the step of determining the at least one offboard input parameter from the offboard feedback may include includes extracting the at least one offboard input parameter from the image.

[0026] The details of one or more embodiments are set forth in the accompanying drawings and the

description below. Other features and advantages will become apparent from the description, the drawings, and the claims.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] FIG. 1 is a partial pictorial, partial schematic representation of an agricultural evaluation system that may be implemented with an agricultural harvester in accordance with an example embodiment;

[0028] FIG. 2 is a functional schematic representation of some implementation aspects of the agricultural operation evaluation system of FIG. 1 in accordance with an example embodiment;

[0029] FIG. 3 is a visual representation of a display interface that may be used in the agricultural operation evaluation system of FIG. 1 in accordance with an example embodiment; and

[0030] FIG. 4 is a flow chart of one implementation of an agricultural operation evaluation method in accordance with an example embodiment.

[0031] Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

[0032] The following describes one or more example embodiments of the disclosed agricultural operation evaluation system and method, as shown in the accompanying figures of the drawings described briefly above. Various modifications to the example embodiments may be contemplated by one of skill in the art. Discussion herein may sometimes focus on the example application in an agricultural harvester, but the disclosed system and method are applicable to other types of work vehicles and/or other types of work environments.

[0033] As noted, there are a wide variety of different types of agricultural machines, forestry machines, and/or construction machines. As examples, some agricultural machines include harvesters, such as combine harvesters, sugar cane harvesters, cotton harvesters, self-propelled forage harvesters, and windrowers. Additional types of agricultural work vehicles may include planters and sprayers. Agricultural operations may involve various types of systems and management mechanisms in order to improve overall performance and production.

[0034] Operation of the agricultural work vehicle and/or overall harvest and other types of agricultural operation management may be challenging, given the high number of factors may impact such operation. Automation is a benefit, but many of the factors are difficult to capture and/or address in an automated system. Reliance upon the judgement of an operator is still useful and conventional systems may not be able to adequately incorporate operator feedback.

[0035] According to examples discussed herein, an agricultural operation evaluation system and method may incorporate qualitative and quantitative operator or offboard feedback. Such feedback may be correlated with machine or onboard data based on location, which enables machine and agricultural insights to be drawn. In response, the system and method may generate “adjustments” for the agricultural vehicle, which may include modifying operator settings, machine calibration, and/or displays.

[0036] With respect to the system and method, the offboard feedback and the onboard machine data may be evaluated as input parameters representing characteristics of the vehicle or the agricultural operation. In addition to “offboard” or “onboard,” referencing the source of the input parameters, the input parameters may be considered “quantitative” or “qualitative” based on the nature of the input parameter and/or feedback. The term “qualitative input parameter” (or metric) may refer to a parameter that is, at least in part, based on the judgement of the operator. Such parameters may be expressed as categories, such as “acceptable,” “good,” “bad,” “long,” “short,” “high,” “low,” “moderate,” and the like as ranges or qualifications to express such judgement. During processing, the qualitative input parameter may be at least partially quantified into a metric to enable further

evaluation with other parameters. The term “quantitative input parameter” (or metric) may refer to an exact or estimated numerical value representing one or more physical characteristics.

[0037] Generally, qualitative input parameters rely at least partially on the subjective judgement of the operator, while quantitative input parameters are more objective and/or absolute.

[0038] As used herein, the term “operator” may refer to many individuals and/or groups involved in an agricultural operation. Generally, the operator may be operators within the work vehicles, operators outside of the work vehicle at the work site, operators at the control center, remote or portal operators, service technician operators, etc. At times, the operator may be considered the person collecting feedback outside or offboard of the vehicle, e.g., via an offboard device or other mechanism instead of equipment forming part of the vehicle. The term “offboard” is used herein, particularly in reference to an offboard device. Generally, such offboard devices are discussed in greater detail below. However, the offboard devices typically refer to personal or more general devices associated with an operator that may communicate and/or interact with the work vehicle but that otherwise is separate from the work vehicle (even if being held by the operator within or on the work vehicle).

[0039] Accordingly, in the discussion below, feedback originating from an offboard device may be considered with respect to an “offboard input parameter” and information originating from the work vehicle may be considered with respect to an “onboard input parameter.” As such, when additionally categorized with qualitative and quantitative characteristics discussed above, the systems and methods discussed herein may consider combinations or two or more offboard qualitative input parameters, onboard qualitative input parameters, offboard quantitative input parameters, and/or onboard quantitative input parameters.

[0040] Reference is made to FIG. 1, which is a partial pictorial, partial schematic, illustration of an agricultural operation evaluation system **100** that may be implemented with a self-propelled agricultural harvester **102**, one or more offboard devices **104**, and a control center **106** associated with a work site (e.g., a field or harvest location, in the depicted example). In some examples, the control center **106** may be omitted.

[0041] The elements within the work site may wirelessly communicate with one another in any suitable manner, including directly (e.g., via Bluetooth®, radio frequency signals, or the like) or over network via communications interfaces discussed in greater detail below. Thus, the communication components discussed below may include a Bluetooth® transceiver, a radio transceiver, a cellular transceiver, an LTE transceiver, and/or a Wi-Fi transceiver. For example, such communications may utilize one or more of various communication techniques or mechanisms, including radio frequency, Wi-Fi, cellular, telematics, and/or any other suitable platforms.

[0042] In the illustrated example, the harvester **102** is a combine harvester. Although combine harvesters are provided as examples throughout the present disclosure, it will be appreciated that the present description is also applicable to other types of harvesters, such as cotton harvesters, sugarcane harvesters, self-propelled forage harvesters, windrowers, or other agricultural work machines. Consequently, the present disclosure is intended to encompass the various types of harvesters described and is, thus, not limited to combine harvesters. Moreover, the present disclosure is directed to other types of work machines, such as agricultural seeders and sprayers, construction equipment, forestry equipment, and turf management equipment where generation of a predictive map may be applicable. Consequently, the present disclosure is intended to encompass these various types of harvesters and other work machines and is, thus, not limited to combine harvesters. Additional details about the harvester **102** will be discussed below after a brief introduction of the offboard device **104** and the control center **106**.

[0043] Briefly, the harvester **102** may interact with an offboard device **104** and a control center **106**. Generally, the offboard device **104** functions as a personal or general device that enables an operator to provide qualitative and/or quantitative feedback separate from the harvester **102**; and the control center **106** may operate as a “backend” system or server that facilitates harvesting and/or

harvest monitoring operations. Although not depicted, the control center **106** may also include or interact with one or more unmanned aerial devices that may be manually piloted, autonomously piloted, or semi-autonomously piloted over a harvest site. Such aerial devices may function to collect location information and images of the harvest site as feedback and/or context information for use by the harvest operation evaluation system **100**.

[0044] Prior to describing how the harvester **102** implements aspects of the harvest operation evaluation system **100**, a brief description of some of the items on the harvester **102** will be provided.

[0045] As shown in FIG. **1**, the harvester **102** illustratively includes a frame **110** that supports the various components and elements discussed herein, including an operator compartment **112**, which may have a variety of different operator interface mechanisms, for controlling the harvester **102**. In some examples, the harvester **102** may include one or more machine display interfaces (or other types of human-machine interfaces) **114** arranged within the operator compartment **112**.

[0046] Generally, the display interface **114** enables an operator to interface with the various aspects of the harvest operation evaluation system **100** (e.g., one or more of other systems and components of the harvester **102**, the offboard device **104**, and/or the control center **106**). In one example, the display interface **114** includes at least an input device and a display, either as separate devices or combined. The input device of the display interface **114** is any device capable of receiving user input, including, but not limited to, a keyboard, a microphone, a touchscreen layer associated with the display, or other device to receive data and/or commands from the user. The display of the display interface **114** may include any technology for displaying information, including, but not limited to, a liquid crystal display (LCD), light emitting diode (LED), organic light emitting diode (OLED), plasma, or a cathode ray tube (CRT). In some embodiments, the display interface **114** may include output devices in addition to the display, including speakers and haptic actuators.

[0047] In one example, the agricultural operation evaluation system **100** and/or harvester **102** may include a controller **116** that implements the various functions discussed herein. The controller **116** may be considered a vehicle controller and/or a dedicated system controller or sub-controller and/or distributed at least partially offboard the harvester **102** (e.g., including at least partially at the control center **106** and/or the offboard device **104**). In one example, the controller **116** may be implemented with processing architecture such as a processor and memory. For example, the processor may implement the functions described herein based on programs, instructions, and data stored in memory.

[0048] As such, the controller **116** may be configured as one or more computing devices with associated processor devices and memory architectures, as a hard-wired computing circuit (or circuits), as a programmable circuit, as a hydraulic, electrical or electro-hydraulic controller, or otherwise. The controller **116** may be configured to execute various computational and control functionality with respect to the harvester **102** (or other machinery). In some embodiments, the controller **116** may be configured to receive input signals in various formats (e.g., as hydraulic signals, voltage signals, current signals, and so on), and to output command signals in various formats (e.g., as hydraulic signals, voltage signals, current signals, mechanical movements, and so on). For example, the controller **116** may be in electronic or hydraulic communication with various actuators, sensors, and other devices within (or outside of) the harvester **102**, including any devices described below. Although not shown or described in detail herein, the harvester **102** may include any number of additional or alternative systems, subsystems, and elements. Operation of the controller **116** within the context of the agricultural operation evaluation system **100** is discussed in greater detail below.

[0049] The harvester **102** includes front-end equipment, such as a header **120**, and a cutter generally indicated at **122**. The harvester **102** also includes a feeder house **124**, a feed accelerator **126**, and a thresher **128**. The feeder house **124** and the feed accelerator **126** form part of a material handling subsystem **130**. Header **120** is pivotally coupled to a frame **110** of the harvester **102** along

pivot axis. One or more actuators **134** drive movement of header **120** about axis. Additionally, a vertical position of header **120** (the header height) above ground over which the header **120** travels is controllable by actuating actuator **134**. While not shown in FIG. **1**, the harvester **102** may also include one or more actuators that operate to apply a tilt angle, a roll angle, or both to the header **120** or portions of header **120**.

[0050] The thresher **128** includes a threshing rotor **136** and a set of concaves **138**. Further, the harvester **102** also includes a separator **140**. The harvester **102** also includes a cleaning subsystem or cleaning shoe (collectively referred to as cleaning subsystem) **142** that includes a cleaning fan **144**, chaffer **146**, and sieve **148**. The material handling subsystem **130** also includes discharge beater **150**, tailings elevator **152**, clean grain elevator **154**, unloading auger **156**, and spout **158**. The clean grain elevator **154** moves clean grain into clean grain tank **160**. The harvester also includes a residue subsystem **162** that may include a chopper **164** and a spreader **166**. The harvester **102** also includes a propulsion subsystem **168** with an engine **170** that drives ground engaging components **172**, such as wheels or tracks.

[0051] In operation and by way of overview, as the harvester **102** moves through a field, header **120** (and an associated reel **176**) engages the crop to be harvested and gathers the crop toward cutter **122** with actuator commands for height, tilt angle, and roll angle. Actuator commands may be monitored and adjusted to achieve the most appropriate settings.

[0052] After crops are cut by cutter **122**, the severed crop material is moved through a conveyor in feeder house **124** toward feed accelerator **126**, which accelerates the crop material into thresher **128**. The crop material is threshed by threshing rotor **136** rotating the crop against concaves **138**. The threshed crop material is moved by a separator rotor in separator **140** where a portion of the residue is moved by discharge beater **150** toward the residue subsystem **162**. The portion of residue transferred to the residue subsystem **162** is chopped by residue chopper **164** and spread on the field by spreader **166**. In other configurations, the residue is released from the harvester **102** in a windrow. In other examples, the residue subsystem **162** can include weed seed eliminators (not shown) such as seed baggers or other seed collectors, or seed crushers or other seed destroyers.

[0053] The grain falls to cleaning subsystem **142**. The chaffer **146** separates some larger pieces of material from the grain, and sieve **148** separates some of finer pieces of material from the clean grain. Clean grain falls to an auger that moves the grain to an inlet end of clean grain elevator **154**, and the clean grain elevator **154** moves the clean grain upwards, depositing the clean grain in clean grain tank **160**. Residue is removed from the cleaning subsystem **142** by airflow generated by cleaning fan **144**. Cleaning fan **144** directs air along an airflow path upwardly through the sieves **148** and chaffers **146**. The airflow carries residue rearwardly in the harvester **102** toward the residue subsystem **162**.

[0054] The tailings elevator **152** returns tailings to thresher **128** where the tailings are re-threshed. Alternatively, the tailings also may be passed to a separate re-threshing mechanism by a further elevator or transport device in which the tailings may be re-threshed as well.

[0055] One or more various subsystems **142**, **162**, **168** may include, or otherwise be associated with, one or more monitoring and/or actuation subsystems **180a-180c** that facilitate operation (e.g., maneuvering, propulsion, etc.) of the harvester **102** and/or the harvesting functions carried out by the harvester **102**. Generally, monitoring and/or actuation subsystems **180a-180c** may be implemented by the controller **116**, one or more sensors (e.g., sensors **190a-190e**), and/or one or more actuators, aspects of which are discussed below. In one example, the monitoring and/or actuation subsystems **180a-180c** may include a machine automation subsystem **180a**, a header loss subsystem **180b**, and a grain loss subsystem **180c**.

[0056] Generally, in one example, the machine automation subsystem **180a** may be implemented by the controller **116** in order to generate autonomous or semi-autonomous commands to various actuators and other systems or subsystems of the harvester **102** for propulsion, maneuvering, and overall operation of the harvester **102**. In one example, the header loss subsystem **180b** is a

monitoring and actuation subsystem that considers the grain loss at the header **120** and associated adjustments to the header (e.g., position and spacing) to facilitate a reduction in loss. The grain loss subsystem **180c** is a monitoring and actuation subsystem that considers the grain loss at various portions of the harvester **102** and associated adjustments to facilitate a reduction in loss. As examples, the grain loss subsystem **180c** may monitor and/or actuate aspects of the separation process (e.g., at the sieves **148**, the cleaning subsystem **142**, the thresher **128**, and the like) and stages downstream.

[0057] The view of FIG. **1** also shows that, in one example, the harvester **102** includes various sensors **190a-190e**, including a location sensor **190a**; a ground speed sensor **190b**; an image sensor **190c**; and/or various harvest sensors **190d**, **190e** (only two of which are depicted as examples), each of which may be coupled to provide information to the controller **116**. The location sensor **190a** may be considered any one or more location and/or position sensors, such as a GPS receiver, a LORAN system, a dead reckoning system, a cellular triangulation system, inertial measurement units (IMU), or other positioning system, to enable determination the location and/or position of the harvester **102**. The ground speed sensor **190b** senses the travel speed of the harvester **102** over the ground in any suitable manner, including using aspects of the location sensor **190a**. The image sensor **190c** may include any suitable type of optical sensors (e.g., cameras), infrared sensors, and radar or LIDAR systems that may be used to capture images of the surrounding environment and selected areas of the harvester **102**.

[0058] The harvest sensors **190d**, **190e** generally represent the array of sensors that capture information about the harvesting operation of the harvester **102**. Such sensors **190d**, **190e** may include one or more separator loss sensors, a clean grain camera, and one or more cleaning loss sensors. As examples, a separator loss sensor provides a signal indicative of grain loss in the separators **140**; the clean grain camera provides an image of the clean grain in various locations, including the clean grain tank **160**; and the clean grain elevator **154** and the cleaning loss sensor provides an indication of the grain lost in the cleaning subsystem **142**. Additional sensors **190d**, **190e** may include the following: a header height sensor that senses a height of header **120**; a residue setting sensor that is configured to sense whether the harvester **102** is configured to chop the residue, produce a windrow, etc.; residue performance sensor for the sensing of spread width or distribution or chopping quality or windrow quality; a cleaning shoe fan speed sensor to sense the speed of cleaning fan **144**; a concave clearance sensor that senses clearance between the threshing rotor **136** and concaves **138**; a threshing rotor speed sensor that senses a rotor speed of rotor **136**; a chaffer clearance sensor that senses the size of openings in chaffer **146**; a sieve clearance sensor that senses the size of openings in sieve **148**; a material other than grain (MOG) moisture sensor that senses a moisture level of the MOG passing through the harvester **102**; one or more machine setting sensors configured to sense various configurable settings of the harvester **102**; a machine orientation sensor that senses the orientation of the harvester **102**; and crop property sensors that sense a variety of different types of crop properties, such as crop type, crop moisture, and other crop properties. Crop property sensors may also be configured to sense characteristics of the severed crop material as the crop material is being processed by the harvester **102**. For example, in some instances, the crop property sensors may sense grain quality such as broken grain, MOG levels; grain constituents such as starches and protein; and grain feed rate as the grain travels through the feeder house **124**, clean grain elevator **154**, or elsewhere in the harvester **102**. The crop property sensors may also sense the feed rate of biomass through feeder house **124**, through the separator **140** or elsewhere in the harvester **102**. The crop property sensors may further sense the feed rate as a mass flow rate of grain through elevator **154** or through other portions of the harvester **102** or provide other output signals indicative of other sensed variables. Crop property sensors may include one or more yield sensors that sense crop yield being harvested by the harvester.

[0059] Reference is made to FIG. **2**, which is a more detailed, functional block diagram of the

agricultural operation evaluation system **100**. The configuration of FIG. 2 is just one example of the agricultural operation evaluation system **100** and example embodiments according to the disclosure herein may be provided in other configurations. As introduced above, the agricultural operation evaluation system **100** includes aspects of the offboard device **104**, the control center **106**, the harvester onboard sensors **190**, the harvester display interface **114**, the harvester controller **116**, and one or more of the subsystems **162**, **180a-180c**, as examples.

[0060] As introduced above, the offboard device **104** may be embodied as a personal computing device (e.g., personal computer, tablet, smartphone, etc.) and accessories (e.g., aerial vehicles, such as drones, and other mechanisms for positioning sensors that may collect information) associated with the operator or other cooperating user. Generally, the offboard device **104** may include the features typical of such devices, including a processor **230a**, memory **230b**, and a communications interface **230c** that couples various system components including the memory **230b** to the processor **230a**, as well as components outside of the offboard device **104** (e.g., the harvester **102** and/or the control center **106**). As above, the processor **230a** may include any suitable processing component to execute instructions stored in memory **230b**. As also discussed above, communication interface **230c** functions to enable wireless communication, including directly (e.g., via Bluetooth®, radio frequency signals, or the like) or over a network. Thus, the communication interface **230c** may include a Bluetooth® transceiver, a radio transceiver, a cellular transceiver, an LTE transceiver, and/or a Wi-Fi transceiver. For example, such communications may utilize one or more of various communication techniques or mechanisms, including radio frequency, Wi-Fi, cellular, telematics, and/or any other suitable platforms.

[0061] Among other functions, the processor **220a**, memory **220b**, and communication interface **220c** may support a display interface **222**, an image device **224**, and a location sensor **226**, as well as functional aspects typical of such devices. In one example, the display interface **222** may provide a platform for an operator to interact with system **100** (e.g., in a manner similar to the display interface **114** discussed above). Similarly, the image device **224** is a camera or other type of sensor that may capture images (e.g., in a manner similar to the image sensor **190c** discussed above); and the location sensor **226** is a device that may be used to determine the location of the offboard device **104** (e.g., in a manner similar to the location sensor **190a** discussed above).

[0062] In one example, the primary purpose of the offboard device **104** is to receive offboard feedback from the operator and provide the offboard feedback to the controller **116** of the harvester **102**, discussed in greater detail below. Reference is briefly made to FIG. 3, which is a visual representation of a display interface **222** for receiving such feedback.

[0063] In the display interface **222** of FIG. 3, two feedback areas **260**, **270** are provided. For example, in feedback area **260**, an operator may provide qualitative feedback regarding grain quality on a scale **262** at a particular location **264** (representatively labeled “location1” in FIG. 3), e.g., by visually and/or manually inspecting the grain. In this example, the operator may also take an image **266** (representatively labeled “image1” in FIG. 3) of the grain in order to provide supporting or independent feedback. In feedback area **270**, an operator may provide quantitative feedback regarding residue with a chop measurement **272** at a particular location **274** (representatively labeled “location2” in FIG. 3), e.g., by visually and/or manually inspecting the residue. Also in this example, the operator may take an image **276** (representatively labeled “image2” in FIG. 3) of the residue in order to provide supporting or independent feedback. In some examples, the images **266**, may be further processed (e.g., at the device **104**, on the harvester **102**, at the control center **106**, and/or combinations thereof) to provide alternative or additional feedback, particularly qualitative and/or quantitative feedback. Other types of symbology and feedback may be provided. As described below, such feedback is sent to the controller **116** for further consideration.

[0064] Returning to FIG. 2, the control center **106** may also provide feedback and/or context information for the agricultural operation evaluation system **100**. Generally, the control center **106**

may be supported by a processor **230a**, memory **230b**, and a communications interface **230c** similar to those discussed with reference to the offboard device **104**. In one example, the control center **106** may provide maps and additional harvest and/or harvester information, which may be stored in database **232**. Such maps may include previous harvest details and other historical information, including information from other operators. As noted, the control center **106** may operate as a “backend” system or server that facilitates operation within a harvest site or a group of harvest sites. As further noted above, the control center may also interact with unmanned aerial devices in order to provide additional offboard feedback.

[0065] In the depicted example, implementation of the agricultural operation evaluation system **100** with the controller **116** may be considered to be organized as one or more functional units or modules **242**, **244**, **246**, **248** (e.g., software, hardware, or combinations thereof). As an example, each of the modules **242**, **244**, **246**, **248** may be implemented with processing architecture such as a processor **240a**, memory **240b**, and communications interface **240c**, as generally discussed above. For example, the controller **116** may implement the modules **242**, **244**, **246**, **248** with the processor **240a** based on programs or instructions stored in memory **240b**. In the depicted embodiment, the controller **116** of the agricultural operation evaluation system **100** includes a feedback module **242**, a qualitative module **244**, a quantitative module **246**, and a harvest (or other type of agricultural operation) job module **248**. The view of FIG. 2 depicts one exemplary organization, and other embodiments may perform similar functions with alternative organization or implementation. Additional details about operation of these modules **242**, **244**, **246**, **248** will be provided below.

[0066] As introduced above, the agricultural operation evaluation system **100** may receive data from one or more data sources. As examples, and as discussed in greater detail below, such data sources may include onboard sensors **190**, the offboard device **104**, and the control center **106**, as well as user inputs and/or other systems. Such data may include various forms of feedback and the location associated with the feedback. As also discussed below, the controller **116** uses this data to generate commands and other types of information associated with the harvester **102** and/or the harvester functions in order to render an evaluation of a harvest job and to take steps to improve present and future harvest (or other) operations. The data flows and organization depicted in FIG. 2 are merely examples, and other mechanisms for performing similar functions may be provided, certain functions may be omitted, and additional functions may be added. Aspects of FIG. 1 may be referenced below in the discussion of FIG. 2.

[0067] The feedback module **242** is configured to receive the various input parameters from the onboard sensors **190**, the control center **106**, and/or the offboard device **104**. For example, the feedback module **242** may receive feedback (images and other information) from the offboard device **104**; the maps and additional background or context information as further feedback from the control center **106**; and/or the harvester, harvest, and/or other type of agricultural information as machine data collected by the various sensors **190** on or offboard the harvester **102**. In some examples, certain functions of the feedback module **242** discussed below may be performed by the respective data source.

[0068] Generally, the feedback module **242** may format the feedback and/or machine data as necessary or desired. As noted, the feedback and machine data from the sources may include location information in the form of GPS coordinates, as examples, which may be used to correlate such data as discussed below.

[0069] In some examples, the feedback module **242** may further process the image in order to extract additional feedback and/or one or more input parameters. For example, the feedback module **242** may perform image recognition on the image in order to determine a qualitative parameter associated with the image (e.g., whether or not a number of recognized objects of interest are “good” or “bad”) and/or a quantitative parameter associated with the image (e.g., the number of recognized objects of interest). For example, the feedback module **242** may abstract one or more objects from the work environment captured within the image and such object symbology

enables recognition and understanding of any relevant information, including grain and/or residue characteristics. In various examples, the image processing may occur on the offboard device **104**, at the control center **106**, and/or at the harvester **102**.

[0070] The feedback module **242** provides the feedback from the offboard device **104** and the machine data from the harvester **102**, including the associated location data, as well as any additional feedback and/or context information to at least one of the qualitative module **244** and/or the quantitative module **246**. In one example, the feedback module **242** may characterize the type of feedback and/or machine data (e.g., quantitative or qualitative) and provide the feedback and/or machine data to the qualitative module **244** and the quantitative module **246** accordingly. In a further example, the feedback module **242** may generally provide feedback and/or machine data to the qualitative module **244** and the quantitative module **246** for characterization by each module **244**, **246**.

[0071] As introduced above, the qualitative module **244** receives the feedback and the machine data and extracts or generates one or more qualitative input parameters (or metrics). The qualitative input parameter represents a value that may be further evaluated with other types of input parameters, including other qualitative input parameters and the quantitative input parameters. Depending on the source, the qualitative input parameters may be considered offboard or onboard.

[0072] The quantitative module **246** receives the feedback and the machine data and extracts or generates one or more quantitative input parameters (or metrics). The quantitative input parameter represents a value that may be further evaluated with other types of input parameters, including other quantitative input parameters and the qualitative input parameters. Depending on the source, the quantitative input parameters may be considered offboard or onboard.

[0073] The harvest job module **248** receives the qualitative input parameters from the qualitative module **244** and the quantitative input parameters from the quantitative module **246**. The harvest job module **248** evaluates the qualitative input parameters and the quantitative input parameters in various combinations in order to generate appropriate machine commands in response to the input parameters. Generally, such commands may improve performance for subsequent or continued harvest operations.

[0074] As noted above, the feedback and/or machine data received by the feedback module **242** may be associated with a location; and as such, the input parameters generated by the qualitative and quantitative modules **244**, **246** may also be associated with respective locations, which are provided to the harvest job module **248**. In one example, the harvest job module **248** may corollate, combine, and/or evaluate input parameters according to location in order to generate harvest insights and associated commands.

[0075] The harvest job module **248** may evaluate the combination of quantitative input parameters and the qualitative input parameters in any suitable manner, including evaluation of two or more quantitative input parameters, two or more qualitative input parameters, and a combination of one or more quantitative input parameters with one or more qualitative input parameters. The harvest job module **248** may evaluate the input parameters with one or more algorithms and/or models that define relationships between two more parameters. In some examples, the harvest job module **248** may be implemented using a neural network or other type of machine learning model. For example, a machine learning model may be trained with training data entries in order to output connections between the parameters.

[0076] As noted, the harvest job module **248** may generate commands based on two or more quantitative input parameters. As a brief example, based on data from the onboard sensors **190**, the quantitative module **246** may extract grain loss data collected at a particular location as a quantitative input parameter. Further, based on data collected at the offboard device **104** (e.g., an image and/or an operator manual entry of grain count), the quantitative module **246** may extract grain count data at the particular location as a further quantitative input parameter. The combination of the grain loss data and grain count data at the same location may be considered by

the harvest job module **248** in order to increase the confidence in either type of data and/or provide further insights about the grain loss and/or grain count, which in turn may be used to generate commands that calibrate and/or adjust the sensors and/or actuators of grain loss subsystem **180c** on the harvester **102**. Additional examples of onboard quantitative input parameters that may be considered with particular offboard quantitative input parameters include yield sensor information (i.e., onboard) with scaled carts, elevator feedback, and the like (i.e., offboard); moisture sensor information (i.e., onboard) with scaled carts, elevator feedback, and the like (i.e., offboard); grain quality sensor information (e.g., broken, damaged, MOG content) (i.e., onboard) with scaled carts, elevator feedback, and the like (i.e., offboard); residue distribution from onboard sensors (i.e., onboard) with residue distribution from external sensors or sources (i.e., offboard); and cut quality sensor information (i.e., onboard) with drone or aerial sensor information (i.e., offboard).

Moreover, additional systems and subsystems that may benefit from this type of evaluation may include adjustments for the display of various types of information on the display interface **114**; adjustments to the machine automation subsystem **180a**, the header loss subsystem **180b**, and/or the grain loss subsystem **180c**; and/or adjustments to the residue subsystem **162**, as examples.

[0077] As noted, the harvest job module **248** may generate commands based on at least one quantitative input parameter and at least one qualitative input parameter. As a brief example, based on data from the onboard sensors **190**, the quantitative module **246** may extract grain loss data collected at a particular location as a quantitative input parameter. Further, based on data collected at the offboard device **104** (e.g., an image and/or an operator evaluation about the nature of grain loss (e.g., good, bad, high, low, or the like)), the qualitative module **244** may extract grain loss data at the particular location as a qualitative input parameter. The combination of the grain loss data from the onboard sensors **190** and grain loss data from the offboard device **104** at the same location may be considered by the harvest job module **248** in order to increase the confidence in either type of data and/or provide further insights about the grain loss and/or grain count, which in turn may be used to generate commands that calibrate and/or adjust the grain loss subsystem **180c** on the harvester **102**. In particular, such information may be used to calibrate the grain loss display preferences onboard the harvester **102** (e.g., on the display interface **114**) and/or determine operator threshold and targets for harvest operations. Additional examples of onboard quantitative input parameters that may be considered with particular offboard qualitative input parameters include grain quality sensor information (e.g., broken, damaged, MOG content, etc.) (i.e., onboard) with qualitative operator feedback (i.e., offboard); residue spread sensor information (i.e., onboard) with qualitative operator feedback (i.e., offboard); cut quality sensor information (i.e., onboard) with qualitative operator feedback (i.e., offboard); windrow quality sensor information (i.e., onboard) with qualitative operator feedback (i.e., offboard); header height performance or variation sensor information (i.e., onboard) with qualitative operator feedback (i.e., offboard) (e.g., in order to adjust sensitivities, float pressures, and the like); and feed rate sensor information (i.e., onboard) with qualitative operator feedback (i.e., offboard) (e.g., based on acceleration/deceleration rates).

[0078] As a further example on a combination of qualitative and quantitative input parameters, based on data from the onboard sensors **190**, the qualitative module **244** may extract residue performance data collected at a particular location as a quantitative input parameter. Such residue performance data may include machine evaluations of chop quality (e.g., under-processed, over-processed, good, bad, or the like) and/or residue spread (e.g., good, bad, poor, acceptable, or the like). Further, based on data collected at the offboard device **104** (e.g., an image and/or an operator evaluation of residue material), the quantitative module **246** may extract residue performance data at the particular location as a quantitative input parameter. Such residue performance data from the offboard device **104** may include sensor data (e.g., from the offboard device **104**) about an actual measurement of chop length and/or an actual measurement of residue spread. The combination of different types of residue performance data at the same location may be considered by the harvest job module **248** in order to increase the confidence in either type of data and/or provide further

insights about the residue performance, which in turn may be used to generate commands that calibrate and/or adjust the residue subsystem **162** on the harvester **102**. In particular, such information may be used to calibrate the residue management display preferences onboard the harvester **102** (e.g., on the display interface **114**) and/or determine operator threshold and targets for harvest operations. Similar operations by the harvest operation evaluation system **100** may be performed on grain loss and/or grain quality parameters. Additional examples of onboard qualitative input parameters that may be considered with particular offboard quantitative input parameters include residue chop quality sensor information (i.e., onboard) with physical measurement information (i.e., offboard); residue spread sensor information (i.e., onboard) with drone measurement information (i.e., offboard); and/or grain quality and/or loss sensor information (i.e., onboard) with grain quality and/or loss sensor information (i.e., offboard). Moreover, additional systems and subsystems that may benefit from this type of evaluation may include adjustments in the form of modification in the display of various types of information on the display interface **114**; adjustments to the machine automation subsystem **180a**, the header loss subsystem **180b**, and/or the grain loss subsystem **180c**; and/or adjustments to the residue subsystem **162**, as examples.

[0079] As noted, the harvest job module **248** may generate commands based on two or more qualitative input parameters. As a brief example, based on data from the onboard sensors **190**, the qualitative module **244** may extract residue performance quality (e.g., chop quality, such as under-processed, over-processed, good, bad, or the like; and/or residue spread, such as good, bad, poor, acceptable, or the like) collected at a particular location as a qualitative input parameter. Further, based on data collected at the offboard device **104** (e.g., an image evaluation and/or an operator manual entry of similar quality characteristics regarding chop quality and/or residue spread), the qualitative module **244** may extract residue performance data at the particular location as a further qualitative input parameter. The combination of this data at the same location may be considered by the harvest job module **248** in order to increase the confidence in either type of data and/or provide further insights about the performance of the residue subsystem **162**, which in turn may be used to generate commands that calibrate and/or adjust the residue subsystem **162** on the harvester **102**. Such information may be used to calibrate residue display preferences onboard the harvester **102** (e.g., on the display interface **114**) and/or determine operator threshold and targets for harvest operations. Such metric combinations may also be used to evaluate grain quality, as a further example. Additional examples of onboard qualitative input parameters that may be considered with offboard qualitative input parameters include residue spread sensor information (i.e., onboard) with drone or operator qualitative feedback (i.e., offboard); grain quality and/or loss sensor information (i.e., onboard) with drone or operator qualitative feedback regarding grain quality and/or loss (i.e., offboard); and/or grain loss sensor information (i.e., onboard) with drone or operator qualitative feedback regarding grain loss information (i.e., offboard).

[0080] Moreover, the harvest job module **248** may consider more than one type of quantitative input parameters with one or more types of qualitative input parameters (and vice versa). As a further example, based on data from the onboard sensors **190**, the quantitative module **246** may extract grain loss data collected at a particular location as a quantitative input parameter. Further, based on data collected at the offboard device **104** (e.g., an image and/or an operator manual entry of grain count), the quantitative module **246** may extract grain count data at the particular location as a further quantitative input parameter. Based on data collected at the offboard device **104** (e.g., an image and/or an operator evaluation of grain loss), the qualitative module **244** may extract grain loss data at the particular location as a qualitative input parameter. In effect, this combination of two quantitative input parameters and one qualitative input parameter may be used to generate commands to more appropriately calibrate the grain loss subsystem **180c**, to adjust grain loss system display preferences of the display interface **114** on the harvester **102**, and to determine harvest thresholds and targets. Generally, any combination of two or more offboard quantitative

feedback, offboard qualitative feedback, onboard quantitative feedback, and onboard qualitative feedback may be collected, considered, and acted upon by the harvest operation evaluation system **100**.

[0081] In effect, the harvest job module **248** may generate commands for a number of systems and/or components of harvester **102**, including, as depicted, the display interface **114**, the machine automation subsystem **180a**, the header loss subsystem **180b**, the grain loss subsystem **180c**, and/or the residue subsystems **162**. In some examples, the harvest job module **248** may additionally provide commands and/or other inputs to the control center **106** and/or the offboard device **104**. For example, the harvest job module **248** may provide updates to the maps stored in database **232**; and/or the harvest job module **248** may provide display commands to the display interface **222**.

[0082] Referring now also to FIG. **4**, as well with continuing reference to FIGS. **1-3**, a flowchart illustrates a method **400** that may be performed by the agricultural operation evaluation system **100** in accordance with the present disclosure. As can be appreciated in light of the disclosure, the order of operation within the method **400** is not limited to the sequential execution as illustrated in FIG. **4**, but may be performed in one or more varying orders as applicable and in accordance with the present disclosure. Further one or more steps may be omitted and/or additional steps added.

[0083] In a first step **402**, the agricultural operation evaluation system **100** may collect machine data as input parameters, e.g., from one or more onboard sensors **190**. In some examples, the agricultural operation evaluation system **100** may further receive data as input parameters from the control center **106**, e.g., in the forms of maps and/or other context data. As introduced above, such input parameters may be qualitative input parameters and/or quantitative input parameters.

[0084] In a further step **404**, the agricultural operation evaluation system **100** may receive offboard feedback, e.g., from one or more offboard devices **104**. Such feedback may include images.

[0085] In step **406**, the agricultural operation evaluation system **100** may process any images in order to extract any additional feedback or input parameters. In some examples, the agricultural operation evaluation system **100** may correlate the input parameters from the images with associated input parameters from the offboard feedback. As introduced above and discussed below, such images may be processed in order to extract qualitative input parameters and/or quantitative input parameters.

[0086] In step **408**, the agricultural operation evaluation system **100** evaluates the offboard feedback and machine data and characterizes and/or determines the nature as qualitative or quantitative. Qualitative input parameters are considered with respect to step **410** in which the agricultural operation evaluation system **100** extracts input parameters from the qualitative feedback as either onboard or offboard qualitative input parameters (depending on the source); and quantitative input parameters are considered with respect to step **412** in which the agricultural operation evaluation system **100** extracts input parameters from the quantitative feedback as either onboard or offboard quantitative input parameters (depending on the source).

[0087] In step **414**, the agricultural operation evaluation system **100** considers the input parameters; and in one example, correlates the harvester or machine input parameters with the feedback input parameters based on location (e.g., GPS).

[0088] In step **416**, the agricultural operation evaluation system **100** generates harvester or crop insights based on the correlated feedback and harvester input parameters; and in step **418**, the agricultural operation evaluation system **100** generates insights for the display to the operator and/or harvester subsystem adjustments based on the harvester or crop insights from **416**.

[0089] In step **420**, the agricultural operation evaluation system **100** applies the adjustments to the harvester subsystems and/or to the harvester display interface **114** for consideration by the operator of the operator insights.

[0090] Accordingly, the systems and methods discussed above provide a mechanism for incorporating qualitative and quantitative operator feedback with machine data in order to determine and implement machine and harvest insights.

[0091] As will be appreciated by one skilled in the art, certain aspects of the disclosed subject matter may be embodied as a method, system (e.g., a work vehicle control or power system included in a work vehicle), or computer program product. Accordingly, certain embodiments may be implemented entirely as hardware, entirely as software (including firmware, resident software, micro-code, etc.) or as a combination of software and hardware (and other) aspects. Furthermore, certain embodiments may take the form of a computer program product on a computer-usable storage medium having computer-usable program code embodied in the medium.

[0092] A computer readable signal medium may include a propagated data signal with computer readable program code embodied therein, for example, in baseband or as part of a carrier wave. Such a propagated signal may take any of a variety of forms, including, but not limited to, electromagnetic, optical, or any suitable combination thereof. A computer readable signal medium may be non-transitory and may be any computer readable medium that is not a computer readable storage medium and that may communicate, propagate, or transport a program for use by or in connection with an instruction execution system, apparatus, or device.

[0093] Embodiments of the present disclosure may be described herein in terms of functional and/or logical block components and various processing steps. It should be appreciated that such block components may be realized by any number of hardware, software, and/or firmware components configured to perform the specified functions. For example, an embodiment of the present disclosure may employ various integrated circuit components, e.g., memory elements, digital signal processing elements, logic elements, look-up tables, or the like, which may carry out a variety of functions under the control of one or more microprocessors or other control devices. In addition, those skilled in the art will appreciate that embodiments of the present disclosure may be practiced in conjunction with any number of systems, and that the work vehicles and the control systems and methods described herein are merely exemplary embodiments of the present disclosure.

[0094] For the sake of brevity, conventional techniques related to work vehicle and engine operation, control, and other functional aspects of the systems (and the individual operating components of the systems) may not be described in detail herein. Furthermore, the connecting lines shown in the various figures contained herein are intended to represent example functional relationships and/or physical couplings between the various elements. It should be noted that many alternative or additional functional relationships or physical connections may be present in an embodiment of the present disclosure.

[0095] Any flowchart and block diagrams in the figures, or similar discussion above, can illustrate the architecture, functionality, and operation of possible implementations of systems, methods and computer program products according to various embodiments of the present disclosure. In this regard, each block in the flowchart or block diagrams can represent a module, segment, or portion of code, which comprises one or more executable instructions for implementing the specified logical function(s). It should also be noted that, in some alternative implementations, the functions noted in the block (or otherwise described herein) can occur out of the order noted in the figures. For example, two blocks shown in succession (or two operations described in succession) can, in fact, be executed substantially concurrently, or the blocks (or operations) can sometimes be executed in the reverse order, depending upon the functionality involved. It will also be noted that each block of any block diagram and/or flowchart illustration, and combinations of blocks in any block diagrams and/or flowchart illustrations, can be implemented by special purpose hardware-based systems that perform the specified functions or acts, or combinations of special purpose hardware and computer instructions.

[0096] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the disclosure. As used herein, the singular forms “a”, “an” and “the” are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms “comprises” and/or “comprising,” when used

in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

[0097] As used herein, unless otherwise limited or modified, lists with elements that are separated by conjunctive terms (e.g., “and”) and that are also preceded by the phrase “one or more of” or “at least one of” indicate configurations or arrangements that potentially include individual elements of the list, or any combination thereof. For example, “at least one of A, B, and C” or “one or more of A, B, and C” indicates the possibilities of only A, only B, only C, or any combination of two or more of A, B, and C (e.g., A and B; B and C; A and C; or A, B, and C).

[0098] The description of the present disclosure has been presented for purposes of illustration and description, but it is not intended to be exhaustive or limited to the disclosure in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the disclosure. Explicitly referenced embodiments herein were chosen and described in order to best explain the principles of the disclosure and their practical application, and to enable others of ordinary skill in the art to understand the disclosure and recognize many alternatives, modifications, and variations on the described example(s). Accordingly, various embodiments and implementations other than those explicitly described are within the scope of the following claims.

Claims

1-20. (canceled)

21. An agricultural operation evaluation system for an agricultural work vehicle having an operational subsystem, the system comprising: an offboard device configured to collect offboard feedback associated with the agricultural operation and location information for the offboard feedback; and a controller having a processor and memory architecture configured to: receive the offboard feedback and the location information for the offboard feedback from the offboard device; determine an offboard input parameter from the offboard feedback; receive machine data including an onboard input parameter and location information for the onboard input parameter; correlate the offboard input parameter and the onboard input parameter based on the location information for the offboard input parameter and the location information for the onboard input parameter; determine an adjustment command for the operational subsystem based on the correlated offboard input parameter and onboard input parameter; and adjust the operational subsystem according to the determined adjustment command.

22. The agricultural operation evaluation system of claim 21, wherein the offboard input parameter is an offboard qualitative input parameter.

23. The agricultural operation evaluation system of claim 21, wherein the offboard input parameter is an offboard quantitative input parameter.

24. The agricultural operation evaluation system of claim 21, wherein the onboard input parameter is an onboard qualitative input parameter.

25. The agricultural operation evaluation system of claim 21, wherein the onboard input parameter is an onboard quantitative input parameter.

26. The agricultural operation evaluation system of claim 21, wherein the offboard input parameter is an offboard qualitative input parameter and the onboard input parameter is an onboard qualitative input parameter.

27. The agricultural operation evaluation system of claim 21, wherein the offboard input parameter is an offboard quantitative input parameter and the onboard input parameter is an onboard qualitative input parameter.

28. The agricultural operation evaluation system of claim 21, wherein the offboard input parameter is an offboard qualitative input parameter and the onboard input parameter is an onboard

quantitative input parameter.

29. The agricultural operation evaluation system of claim 21, wherein the offboard input parameter is an offboard quantitative input parameter and the onboard input parameter is an onboard quantitative input parameter.

30. The agricultural operation evaluation system of claim 21, wherein the offboard device is configured to collect the offboard feedback as an image and the controller is configured to extract the offboard input parameter from the image.

31. The agricultural operation of claim 30, wherein the controller is configured to extract the offboard input parameter from the image as an offboard quantitative input parameter.

32. The agricultural operation of claim 30, wherein the controller is configured to extract the offboard input parameter from the image as an offboard qualitative input parameter.

33. A method for evaluating an agricultural operation of an agricultural work vehicle having an operational subsystem, the method comprising: collecting, with an offboard device, offboard feedback associated with the agricultural operation and location information for the offboard feedback; receiving, with a controller, the offboard feedback and the location information for the offboard feedback from the offboard device; determining, with the controller, an offboard input parameter from the offboard feedback; receiving, with the controller, machine data including an onboard input parameter and location information for the onboard input parameter; correlating, with the controller, the offboard input parameter and the onboard input parameter based on the location information for offboard input parameter and the location information for the onboard input parameter; determining, with the controller, an adjustment command for the operational subsystem based on the correlated offboard input parameter and onboard input parameter; and adjusting, with the controller, the operational subsystem according to the determined adjustment command.

34. The method of claim 33, wherein the offboard input parameter is an offboard qualitative input parameter.

35. The method of claim 33, wherein the offboard input parameter is an offboard quantitative input parameter.

36. The method of claim 33, wherein the offboard input parameter is an offboard qualitative input parameter and the onboard input parameter is an onboard qualitative input parameter.

37. The method of claim 33, wherein the offboard input parameter is an offboard quantitative input parameter and the onboard input parameter is an onboard qualitative input parameter.

38. The method of claim 33, wherein the offboard input parameter is an offboard qualitative input parameter and the onboard input parameter is an onboard quantitative input parameter.

39. The method of claim 33, wherein the offboard input parameter is an offboard quantitative input parameter and the onboard input parameter is an onboard quantitative input parameter.

40. The method of claim 33, wherein the collecting the offboard feedback includes collecting the offboard feedback as an image, and the determining the offboard input parameter from the offboard feedback includes extracting the offboard input parameter from the image.
