FARMING DATA COLLECTION AND EXCHANGE SYSTEM

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. patent application Ser. No. 16/775,480, filed Jan. 29, 2020, which is a divisional of U.S. patent application Ser. No. 15/794,463, filed Oct. 26, 2017, which is a continuation of U.S. patent application Ser. No. 15/338,152, filed Oct. 28, 2016, which is a continuation of U.S. patent application Ser. No. 14/434,621, filed Apr. 9, 2015, which is a U.S. national stage entry of PCT/US2014/056818, filed Sep. 22, 2014, which claims priority to U.S. Provisional Application No. 61/881,320, filed Sep. 23, 2013, and U.S. Provisional Application No. 61/881,326, filed Sep. 23, 2013, all of which are incorporated herein by reference in their entirety.

TECHNICAL FIELD

[0002] The present invention relates generally to automated systems and methods for capturing, processing and sharing farming data, and more particularly to systems and methods for capturing farming operation data in real time using passive data collection devices attached to farming equipment while the farming equipment is used to perform the farming operations, and then processing and sharing the farming operation data via an online farming data exchange system or server.

BACKGROUND ART

[0003] Contemporary farming machines, such as tractors and planters, include computer systems and controllers capable of permitting farmers and farming business to exercise extremely precise control over almost every aspect of a farming operation, such as fertilizing, planting, spraying or harvesting crops in a field. In a technique known as precision farming, the computer systems and related technology available today permits farming businesses to program the farming equipment to carry out farming operations almost entirely under automated control of software programs that can automatically activate and deactivate the machines, and even particular sections, row units, nozzles or blades on the implement at precisely the right time and place in order to optimize inputs such as seed, pesticide and fertilizer, and thereby achieve greater yields. During the course of performing farming operations, the computer systems and technology onboard the farming vehicles and farming implements typically transmit, receive and respond to electronic messages containing an enormous amount of very detailed operational data that describes almost every aspect of the farming operation. For example, if the farming vehicle and the farming implement used during a farming operation are a tractor and a sprayer, respectively, then the tractor and the sprayer will use the onboard computer systems and computer network to exchange and respond to a large number of messages that include critical operating parameters for the sprayer, such as, among other things, the sprayer's on/off status, working width, x-offset (i.e., driving direction), y-offset, target rate, application rate, master valve on/off status, total volume of spray applied, total area sprayed, total distance driven and total time used. It would be extremely useful to capture, store, analyze and share these operating parameters. A farmer could use this information, for example, to determine and compare what resources were used, where, and with what settings, and a seed company could study and use the information to improve seed product yields.

[0004] However, the conventional precision farming techniques, computer systems and related technology has heretofore failed to provide farming businesses and other interested parties with an easy-to-use, unobtrusive, secure and reliable way to capture, store, share and profit from what is fast becoming a massive amount of very detailed, and enormously valuable, farming operation data generated by these automated farming techniques, machines and computer systems. Thus, critically important farming operation data, such as how much seed, fertilizer, water, and pesticide were used on a particular field, how often the field was treated with a particular chemical, which parts of the field were left untreated for some reason, what were the weather conditions during the farming operation, what kind of equipment was used to perform the farming operation, which settings were activated during the farming operation, and which field was treated during the farming operation often goes uncollected and, therefore, remains unavailable for study and analysis to the farmers and other interested parties in the agricultural industry.

[0005] Being able to precisely identify and describe the particular field where a farming operation takes place, and determining which parts of that field were treated and which parts were left untreated for one reason or another is an extremely important function for farming businesses, farming insurance companies, seed manufactures and government entities. The Farms Services Agency (FSA) of the USDA is currently in the process of developing and implementing a common land unit (CLU) data layer (or database) to provide farm agency programs with a mapping of all of the farm fields in the United States, or at least all of those farm fields involved, or likely to be involved, in FSA programs. The FSA defines a common land unit (CLU) as a unit of agricultural land associated with United States Department of Agriculture (USDA) farm programs and that has a permanent, contiguous boundary, a common land cover and land management, a common owner and a common producer. CLU boundaries are usually delineated by relatively permanent features such as fence lines, roads, and/or waterways. The official CLU data layer is intended to provide an accurate description of the locations, shapes and sizes of the fields where farming operations are taking place.

[0006] Unfortunately, there are a number of problems and disadvantages associated with CLUs as currently implemented by the FSA. Chief among these problems is the fact that CLUs are mainly created by the tedious process of manual inspections conducted on the land, or viewing satellite-generated images of the land and drawing boundaries on maps that match landmarks and demarcations (such as fence lines, roads and/or waterways) as observed by the humans viewing the satellite images. Both of these methods for creating CLUs are labor-intensive and error-prone, and typically result in extremely inaccurate and unreliable CLU boundaries. Another problem associated with the CLU data layer is that the process of manually drawing boundaries around landmarks to create the CLUs does not account for sections of farming land that, for one reason or another, are not currently being used for farming operations. In other words, CLUs merely describe field perimeters, and fail to account for, or even identify, potentially large sections of