United States Patent	12387061
Kind Code	B1
Date of Patent	August 12, 2025
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Sharing an image sensor data stream with an active alignment subsystem

Abstract

Devices, systems, and methods for sharing an image sensor data stream with an active alignment subsystem are provided. An example device includes an image sensor coupled to a first processor. The first processor is coupled to a multiplexer and the image sensor. The first processor is configured to receive an image stream from the image sensor, transmit the image stream to a second processor via the multiplexer operating in a first state, and transmit the image stream to at least one test port of the data capture device via the multiplexer operating in a second state. The multiplexer is configured to connect the second processor to the first processor when operating in the first state, and connect the at least one test port to the first processor when operating in the second state. Responsive to receiving an enable signal, the multiplexer operates in the second state, else the first state.

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Appl. No.: **18/731109**

Filed: **May 31, 2024**

Publication Classification

Int. Cl.: **G06K7/015** (20060101); **G06K7/10** (20060101)

U.S. Cl.:

CPC   **G06K7/015** (20130101); **G06K7/10831** (20130101);

Field of Classification Search

References Cited

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Background/Summary

BACKGROUND

(1) An active alignment process may be performed on a data capture device, such as an indicia reader, to align one or more optical elements (e.g., lens) of the data capture device's imaging assembly after manufacture to ensure the images captured by the data capture device are in focus, or otherwise suitable for their intended purpose (e.g., decoding of an indicia in the images, object recognition of a product in the images, etc.). The active alignment process is generally a one-time process conducted after manufacture of the imaging assembly and/or data capture device. The active alignment process includes analyzing an image stream (e.g., one or more images, video) generated by the imaging assembly in real-time using an active alignment subsystem. Based on the image stream, adjustments to the position and/or other aspects of the optical element are made until the image stream being captured is of a suitable quality (e.g., in-focus images). Once the active alignment process is complete, the optical element may be permanently fixed in place, and the data capture device may be ready for its intended purpose and generally will not require additional active alignment.

(2) The intended operation of the data capture device, such as an indicia reader, generally includes on-device operations such as generating an image stream via an image sensor, receiving the image stream at a first processor (e.g., a processor controlling the imaging assembly and/or other components of the indicia reader), and transmitting the image stream from the first processor to a second processor, such as a machine vision processor used to decode indicia and recognize objects in the images of the image stream. The image stream is transmitted via a limited number of input/output ports of the first processor and associated conductive paths (e.g., traces on a printed circuit board).

(3) One or more permanent test ports used for active alignment are generally created along the one or more conductive paths between the limited number of output ports of the first processor and the input ports of the second processor carrying the image stream during intended operation of the indicia reader. The active alignment system receives the image stream via the test ports to perform active alignment. Unfortunately, the existence of the test ports in the conductive paths of the image stream may degrade or otherwise negatively impact the quality of the image stream during the intended operation of the indicia reader. For example, the test ports may cause transmission line reflections that corrupt or otherwise interfere with the quality of the image stream. Moreover, as the test ports should be positioned along the image stream conductive paths for the active alignment

system to access the image stream, the potential locations for the test port(s) are limited, and the test port(s) may end up being in a hard to reach or otherwise inaccessible area respective to the active alignment subsystem (e.g., probes of the active alignment system). Further, using upgraded, more costly processors with additional unused output ports to carry the data stream for the one-time alignment process to avoid the aforementioned drawbacks, would only increases the cost of the data capture device for a process that occurs but once during the lifetime of the data capture device.

(4) As such, devices, systems, and methods which can share the image sensor image stream of the data capture device with the active alignment subsystem without causing a degradation of the image stream during normal operation of the data capture device, and/or without requiring an upgraded processor with unused output ports, may reduce or eliminate the deleterious effects otherwise caused by the location of the test ports.

SUMMARY

(5) In an embodiment, the present disclosure discloses a data capture device for sharing an image sensor data stream with an active alignment subsystem. The data capture device may include: (i) an image sensor coupled to a first processor; (ii) the first processor coupled to a multiplexer and the image sensor, the first processor configured to: (a) receive an image stream from the image sensor, (b) transmit the image stream from at least one output port of the first processor to a respective at least one input port of a second processor via the multiplexer operating in a first state, and (c) transmit the image stream from the at least one output port of the first processor to a respective at least one test port of the data capture device via the multiplexer operating in a second state; and (iii) the multiplexer coupled to the first processor, the second processor, and the at least one test port, the multiplexer configured to: (a) connect the at least one input port of the second processor to, and disconnect the at least one test port from, the respective at least one output port of the first processor when operating in the first state, and (b) connect the at least one test port to, and disconnect the at least one input port of the second processor from, the respective at least one output port of the first processor when operating in the second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state.

(6) In a variation of the embodiment, the first processor may be configured to control an imaging assembly of the data capture device including the image sensor; and the second processor may be configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

(7) In another variation of the embodiment, the at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

(8) In yet another variation of the embodiment, responsive to receiving the enable signal at an enable port of the first processor, the first processor may be further configured to adjust one or more parameters of the image stream transmitted from the at least one output port of the first processor to the at least one input port of the second processor.

(9) In still yet another variation of the embodiment, the one or more parameters include one or more of a frame rate, exposure, or gain.

(10) In a variation of the embodiment, the data capture device may further include an optical element of an imaging assembly including the image sensor, the optical element having a position that is adjustable, wherein an output of the at least one test port is directed to an active alignment subsystem configured to adjust the position of the optical element based at least in part upon receiving the image stream via the at least one test port.

(11) In another embodiment, the present disclosure discloses a data capture device for sharing an image sensor data stream with an active alignment subsystem. The data capture device may include: (i) an image sensor coupled to a multiplexer, the image sensor configured to provide an image stream from at least one output port of the image sensor to at least one test port via the multiplexer operating in a second state; (ii) a first processor coupled to a second processor and the

multiplexer, the first processor configured to: (a) receive the image stream via at least one input port of the first processor from at least one output port of the image sensor via the multiplexer operating in a first state, and (b) transmit the image stream from the first processor to the second processor; and (iii) the multiplexer coupled to the image sensor, the first processor, and the at least one test port, the multiplexer configured to: (a) connect the at least one input port of the first processor to, and disconnect the at least one test port from, the respective at least one output port of the image sensor when operating in the first state, and (b) connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output port of the image sensor when operating in the second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state.

(12) In yet another embodiment, the present disclosure discloses a system for sharing an image sensor data stream with an active alignment subsystem. The system may include: (i) an image sensor coupled to a first processor; (ii) the first processor coupled to a multiplexer and the image sensor; (iii) the multiplexer coupled to the first processor, a second processor, and at least one test port, the multiplexer configured to: (a) connect at least one input port of the second processor to, and disconnect the at least one test port from, a respective at least one output port of the first processor when operating in a first state, and (b) connect the at least one test port to, and disconnect the at least one input port of the second processor from, the respective at least one output port of the first processor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; (iv) one or more processors; and (v) a memory storing instructions that, when executed by the one or more processors, causes the system to: (a) transmit an image stream from the image sensor to the first processor, (b) responsive to the multiplexer receiving an enable signal, provide the image stream from the at least one output port of the first processor to the at least one test port via the multiplexer operating in the second state, and (c) responsive to the multiplexer not receiving an enable signal, provide the image stream from the at least one output port of the first processor to the at least one input port of the second processor via the multiplexer operating in the first state.

(13) In still yet another embodiment, the present disclosure discloses a system for sharing an image sensor data stream with an active alignment subsystem. The system may include: (i) an image sensor coupled to a multiplexer, the image sensor configured to provide an image stream from at least one output port of the image sensor to at least one test port via a multiplexer operating in a second state; (ii) a first processor coupled to a second processor and the multiplexer; (iii) the multiplexer coupled to the image sensor, the first processor, and at least one test port, the multiplexer configured to: (a) connect at least one input port of the first processor to, and disconnect the at least one test port from, a respective at least one output port of the image sensor when operating in a first state, and (b) connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output port of the image sensor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; (iv) one or more processors; and (v) a memory storing instructions that, when executed by the one or more processors, causes the system to: (a) responsive to the multiplexer receiving the enable signal, provide the image stream from the at least one output port of the image sensor to the at least one test port via the multiplexer operating in the second state, and (b) responsive to the multiplexer not receiving the enable signal, (i) provide the image stream from the at least one output port of the image sensor to the at least one input port of the first processor via the multiplexer operating in the first state, and (ii) provide the image stream from the first processor to the second processor.

(14) In another embodiment, the disclosure discloses a method for sharing an image sensor data

stream with an active alignment subsystem. The method may include: (i) transmitting an image stream from an image sensor to at least one input port of a first processor of a data capture device including: (a) the image sensor, (b) a first processor coupled to a multiplexer and the image sensor, and (c) the multiplexer coupled to the first processor, a second processor, and at least one test port, the multiplexer configured to: (i) connect at least one input port of the second processor to, and disconnect the at least one test port from, a respective at least one output port of the first processor when operating in a first state, and (ii) connect the at least one test port to, and disconnect the at least one input port of the second processor from, the respective at least one output port of the first processor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; (ii) responsive to the multiplexer receiving the enable signal, providing the image stream from the at least one output port of the first processor to the at least one test port via the multiplexer operating in the second state; and (iii) responsive to the multiplexer not receiving the enable signal, providing the image stream from the at least one output port of the first processor to the at least one input port of the second processor via the multiplexer operating in the first state.

(15) In yet another embodiment, the disclosure discloses a method for sharing an image sensor data stream with an active alignment subsystem. The method may include: (i) transmitting an image stream from an image sensor to a multiplexer of a data capture device including: (a) the image sensor coupled to the multiplexer, (b) a first processor coupled to a second processor and the multiplexer, and (c) the multiplexer coupled to the image sensor, the first processor, and at least one test port, the multiplexer configured to: (i) connect at least one input port of the first processor to, and disconnect the at least one test port from, a respective at least one output port of the image sensor when operating in a first state, and (ii) connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output port of the image sensor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; (ii) responsive to the multiplexer receiving the enable signal, providing the image stream from at least one output port of the image sensor to the at least one test port via the multiplexer operating in the second state; and (iii) responsive to the multiplexer not receiving the enable signal, (a) providing the image stream from the at least one output port of the image sensor to the at least one input port of the first processor via the multiplexer operating in the first state, and (b) providing the image stream from the first processor to the second processor.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) The accompanying figures, where like reference numerals refer to identical or functionally similar elements throughout the separate views, together with the detailed description below, are incorporated in and form part of the specification, and serve to further illustrate embodiments of concepts that include the claimed invention, and explain various principles and advantages of those embodiments.

(2) FIG. **1**A is a perspective view of an example data capture device, in accordance with embodiments disclosed herein.

(3) FIG. **1**B is a perspective view of another example data capture device, in accordance with embodiments disclosed herein.

(4) FIG. **2**A is a block diagram of an example traditional data capture device, in accordance with embodiments disclosed herein.

(5) FIG. **2**B illustrates a block diagram of an example data capture device for sharing an image

sensor data stream with an active alignment subsystem, in accordance with embodiments disclosed herein.

(6) FIG. **2**C illustrates a block diagram of an example data capture device for sharing an image sensor data stream with an active alignment subsystem, in accordance with embodiments disclosed herein.

(7) FIG. **3**A depicts a block diagram of an example system **300** for sharing an image sensor data stream with an active alignment subsystem, in accordance with embodiments disclosed herein.

(8) FIG. **3**B depicts a block diagram of an example system **300** for sharing an image sensor data stream with an active alignment subsystem, in accordance with embodiments disclosed herein.

(9) FIG. **4**A illustrates a flow diagram of an example method **400** for sharing an image sensor data stream with an active alignment subsystem, in accordance with embodiments disclosed herein.

(10) FIG. **4**B illustrates a flow diagram of an example method **400** for sharing an image sensor data stream with an active alignment subsystem, in accordance with embodiments disclosed herein.

(11) Skilled artisans will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of embodiments of the present invention.

(12) The apparatus and method components have been represented where appropriate by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the embodiments of the present invention so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein.

DETAILED DESCRIPTION

(13) As previously described, locating active alignment test ports along one or more conductive paths transmitting the image stream (also referred to at times as a data stream) may result in the degradation of the image stream during intended operation of the data capture device. Therefore, it is an objective of the present disclosure to provide devices, systems, and methods capable of sharing an image sensor data stream with an active alignment subassembly without degradation of the data stream, and without requiring an upgraded and/or more costly processor to provide additional outputs used exclusively for active alignment.

(14) More particularly, devices, systems, and methods are disclosed that include a multiplexer to provide a first output lane having first conductive path(s) to carry the data stream during the intended operation of the device when the multiplexer operates in a first state, and also provides a different output lane having second conductive paths(s) separate from the first conductive paths to carry the data stream during active alignment of the data capture device when the multiplexer operates in a second state. Absent receiving an enable signal via an enable port of the multiplexer, the multiplexer may operate in a first state connecting the first processor to the second processor, thereby creating a portion of the conductive path of the data stream from the image sensor to a first processor, and from the first processor (e.g., device controller) to the second processor (e.g., machine vision processor) via the multiplexer. In response to receiving the enable signal, the multiplexer may operate in the second state connecting the first processor to the test ports, thereby creating a portion of the conductive path of the data stream from the image sensor to the first processor, and from the first processor through the multiplexer to the test ports, where the active alignment system may receive the data stream for active alignment. Creating separate conductive paths for the data stream during intended use of the data capture device and during active alignment is technically advantageous as it alleviates the need for test ports along the conductive path of the data stream during intended operation of the data capture device. Such a configuration eliminates the deleterious effects caused by test ports on the data stream during normal operation of the data capture device, improving the overall performance of the data capture device. Moreover, the cost of using a multiplexer to create separate conductive paths for both intended operation and active

alignment is a fraction of the cost compared to using an upgraded processor with additional data ports in the data capture device.

(15) Turning to the Figures, FIGS. **1**A and **1**B each illustrate example data capture devices configured to generate image sensor data streams and suitable for active alignment. FIG. **1**A is a perspective view of a bioptic indicia reader **100** data capture device. The bioptic indicia reader **100** may be configured to capture an image stream of objects passed across the field of view of its imaging assembly, and to perform operations using the data stream such as decoding a barcode on the object and/or perform object recognition of the object. FIG. **1**B illustrates an example handheld indicia reader **120** data capture device which may be configured to similarly capture a data stream of its field of view, e.g., for indicia decoding or object recognition. While it will be appreciated that devices, systems, and methods disclosed may include, and/or be used in connection with, the data capture devices **100**, **120** described above, this should not be considered limiting, and it should be understood that other form factors of indicia readers, and/or other data capture devices, may correspond to, encapsulate, or otherwise be associated with, the disclosed techniques.

(16) FIG. **2**A illustrates a block diagram of an example traditional data capture device **200**, according to embodiments. The data capture **200** device may include test ports **202**A, **202**B, a first processor **204**, a second processor **206**, and an image sensor **208**. The image sensor **208** may be configured to capture the image stream, and may be part of an imaging assembly that includes an optical component (e.g., a variable focus lens) that undergoes adjustment in position during the active alignment process. The first processor **204** may be configured to control the imaging assembly of the data capture device **200** and/or overall operation of the data capture device **200**. The second processor **206** may be configured to perform machine vision operations on the image stream, and does not control the imaging assembly.

(17) An active alignment subsystem may perform the active alignment process on the data capture device **200**. The active alignment process may include adjusting the position the optical element so that the imaging assembly captures in-focus images during its intended operation. The active alignment process may include analyzing the image stream generated by the image sensor while linear actuators adjust the position of the lens of the optical assembly. For example, probes of the active alignment system may connect to the test port of the data capture device allowing the active alignment system to receive the image stream for analysis. Analysis of the image stream may occur in real-time, may be performed by the active alignment system (e.g., via an active alignment program analyzing the quality of the image stream), may be performed by a human controlling the active alignment system (e.g., displaying the image stream on a display for analysis by the human), and/or in any other suitable manner. Once the imaging assembly is sufficiently focused or otherwise aligned (e.g., via the actuators), the optical element may be fixed in placed (e.g., via a curing process). It should be understood that although an active alignment subsystem is described as adjusting the position of the optical element, the disclosed systems and methods may be used in conjunction with other alignment systems, such as a push focus system, a screw focus system, and/or other suitable alignment system that may use image data to adjust or otherwise focus an imaging assembly and/or optical element.

(18) Creating test ports **202**A, **202**B for active alignment along conductive paths between the first processor **204** and the second processor **206** may cause degeneration of, or otherwise negatively impact, the data steam during the intended operation of the data capture device **200**. For example, the portions **210**A, **210**B (referred to as transmission stubs) of the conductive paths between the test ports **202**A, **202**B and the second processor **206** respectively create signal issues, such as transmission line reflections, that can corrupt the image stream traveling along the conductive paths. Additionally, as the placement of the test ports **210**A, **210**B are along existing conductive paths, the test ports **210**A, **210**B may end up being located in a location inaccessible to the active alignment system.

(19) FIG. **2**B illustrates a block diagram of an example data capture device **220** for sharing an

image sensor data stream with an active alignment subsystem, according to embodiments. The data capture device **220** may include an image sensor **228**, and multiplexer **230** coupled to test ports **222**A, **222**B, a first processor **224**, and a second processor **226**. It will be understood that the example data capture device **220** may include additional, fewer, and/or alternate components.

(20) As used herein, the term "port," such as an input port and/or output port, may refer to a single port or multiple ports. For example, although two test ports **222**A, **222**B are depicted in FIG. **2**A, this is for ease of illustration only and the number of test ports may be greater than, equal to, or less than two test ports **222**A, **222**B. Moreover, referring to a port as an output port that outputs data may refer the direction of the data through the port according to the associated description, and is not meant to limit the functionality the port, or the direction of the data, as such. For example, a port described as and/or illustrated as an output port may also be capable of receiving inputs and operating as an input port. Similarly, the transmission of data described and/or illustrated as being from a first component to a second component is not meant to convey that the data is not capable of transmission from the first component to another component that is not the second component, or that the data is not capable of transmission from the second component to the first component. Furthermore, the terms "coupled," "communicatively coupled," "connects," "connected," and the like may be used interchangeably herein, e.g., to convey an electrical or other communicable connection between components. Such a connection may be a direct connection (e.g., a single conductive path directly connecting the two processors) and/or indirect connection (e.g., a conductive path connecting the two processors that runs through a multiplexer located between the two processors).

(21) The processors **224**, **226** may include one or more processors such as a microprocessor (µP), a microcontroller, a central processing unit (CPU), a graphics processing unit (GPU), and/or any suitable type of processor. The processors **224**, **226** may include one or more logical processors (e.g., virtual execution unit(s) having one or more threads) and/or physical processors (e.g., hardware execution units having one or more cores), and may include multitasking and/or parallel processing. In at least some embodiments, the first processor **224** may be configured to control an imaging assembly (not shown) of the data capture device **220** including the image sensor **228**, and/or control other components of the data capture device **220**. In at least some embodiments, the second processor **226** may be configured to perform one or more machine vision operations on the image stream, and may not control the imaging assembly. The processors **224**, **226** may include input ports and output ports, at least one of which may include a Mobile Industry Processor Interface (MIPI) port, although additional and/or other types of ports may be included, such as low voltage differential signaling (LVDS), scalable low voltage signaling (SLVS), and/or high-speed pixel interface (HiSPI) ports.

(22) The processors **224**, **226** may interact with a memory (e.g., a memory local to the data capture device **220**, remote from the data capture device **220**, and/or otherwise communicatively coupled to the data capture device **220**) to obtain, for example, machine-readable instructions stored in the memory corresponding to, for example, the operations represented by the flowcharts of this disclosure, such as the flowcharts of FIGS. **4**A and/or **4**B. The processors **224**, **226** may interact with the memory to obtain, or store, data and/or instructions related to the image sensor **228**, the multiplexer **230**, an active alignment system, and/or any other suitable component. In particular, the instructions stored in the memory, when executed by one or more of the processors **224**, **226**, may cause the data capture device **220** to capture an image stream, and provide the image stream the second processor **226** for analysis. Additionally, or alternatively, machine-readable instructions corresponding to the example operations described herein may be stored on one or more removable media (e.g., a compact disc, a digital versatile disc, removable flash memory, etc.) that may be coupled to the data capture device **200** to provide access to the machine-readable instructions stored thereon.

(23) The image sensor **228** may be and/or include a charge-coupled device (CCD) sensor, a

complementary metal-oxide semiconductor (CMOS) sensor, a one-dimensional array of addressable image sensors, a two-dimensional array of addressable image sensors, a monochrome sensor, a color sensor, and/or any other suitable image sensor. Depending on the implementation, the image sensor **228** may include a color sensor such as a vision camera in addition to and/or as an alternative to the monochrome sensor. The data capture device **220** may include an imaging assembly comprising the image sensor **228**, and an optical element having a position that is adjustable. The active alignment subsystem and/or other suitable component may be configured to adjust the position of the optical element based at least in part upon receiving the image stream via the test ports **222**A, **222**B.

(24) The multiplexer **230** may be an integrated circuit, and/or include other components, configured to receive an input signal, and when operating in a first state provides the input signal to a first output of the multiplexer **230**, and when operating in a second state provides the input signal to a second output of the multiplexer **230** distinct from the first output. This configuration provides separate paths for the input signal to be output depending on the state of the multiplexer **230**. The multiplexer **230** may receive each of the inputs and/or outputs via one or more ports. The multiplexer **230** may be configured to operate in the first state absent receiving an enable signal at an enable port of the multiplexer **230**, and operate in the second state in response to receiving the enable signal. The multiplexer **230** may receive the enable signal from the active alignment system, the first processor **224**, the second processor **226**, and/or any other suitable component and/or device.

(25) The image sensor **228** of the data capture device **220** may generate an image stream, and transmit the image stream via one or more output ports of the image sensor **228** to one or more input ports of the first processor **224**. The number of ports used to transmit the data stream by the components of the data capture device **220**, such as input/output ports of the image sensor **228**, the first processor **224**, the second processor **226**, the test ports **222**A, **222**B, and/or the multiplexer **230** may be based upon the characteristics of the image stream (e.g., size, bandwidth, transmission rate), characteristic of the components of the data capture device **220** (e.g., clock rate, number of ports), characteristics of the data capture device **220** (e.g., power requirements), and/or any other suitable considerations. Moreover, the number of ports used to transmit the image stream may not be the same for all components of the data capture device **220**. For example, the image sensor **228** may use two low-bandwidth ports to provide the image stream to the first processor **224**, and the first processor **224** may use one high-bandwidth port to provide the data stream to the second processor **226**.

(26) The first processor **224** may transmit the image stream from at least one output port of the first processor **224**, though the multiplexer **230**. Depending on the state of the multiplexer **230**, the image stream may be output by the multiplexer **230** to at least one input port of a second processor when the multiplexer **230** operates in a first state, or to the test ports **222**A, **222**B when the multiplexer **230** operates in a second state. Using an output path for active alignment only provides the technical advantage of mitigating the deleterious effect like signal reflection that may occur when a single output path is shared for both active alignment and intended operation of the data capture device **220**.

(27) The multiplexer **230** may operate in the first state absent of receiving the enable signal, and in the first state may be configured to connect at least one input port of the second processor **226** to, and disconnect the at least one test port **222**A, **222**B from, the respective at least one output port of the first processor **224**. The dotted line **232**A may generally illustrate the path of the data stream from the image sensor **228**, to the first processor **224**, and through the multiplexer **230** operating in a first state, to the second processor **226**. The first state of the multiplexer **230** may be associated with the data capture device during its intended operation, for example where the second processor **226** receives the image stream for indicia decoding, object recognition, etc.

(28) Responsive to receiving the enable signal via the enable port of the multiplexer **230**, the

multiplexer **230** may operate in the second state, and in the second state may be configured to connect the at least one test port **222**A, **222**B to, and disconnect the at least one input port of the second processor **226** from, the respective at least one output port of the first processor **224**. The dotted line **232**B may generally illustrate the path of the data stream from the image sensor **228**, to the first processor **224**, and through the multiplexer **230** operating in the second state, to the at least one test port **222**A, **222**B. The second state of the multiplexer **230** may be associated with the active alignment process whereby the active alignment subsystem may receive the image stream via the test ports **222**A, **222**B, e.g., to use the image stream to align the imaging assembly of the data capture device.

(29) In at least some embodiments, the first processor **224** may receive the enable signal via an enable port of the first processor **224**. Responsive to receiving the enable signal, the first processor **224** may be configured to adjust one or more parameters of the image stream transmitted from the first processor **224** to the at least one input port of the second processor. The parameters may include the frame rate, the exposure, the gain, and/or any other suitable parameter of the image stream. The first processor **224** may adjust the parameters when receiving the enable signal as part of, or in association with, the active alignment process, and/or for any other suitable purpose. For example, the first processor **224** may adjust parameters of the image stream in real-time during the active alignment process, wherein the adjusted parameters improve the ability of the active alignment system to perform the active alignment, such as improving the speed of the alignment process by increasing the brightness of an otherwise dark image stream used to perform the active alignment.

(30) FIG. **2**C depicts a block diagram of an example data capture device **240** for sharing an image sensor data stream with an active alignment subsystem, according to embodiments. The data capture device **240** may be an alternate embodiment of the data capture device **220**, namely an embodiment where rather than having the multiplexer **230** coupled between the first processor **224**, the second processor **226** and the test ports **222**A, **222**B, the multiplexer **230** is coupled between the image sensor **228**, the first processor **224**, and the second processor **226**. It will be understood that the example data capture device **240** may include additional, fewer, and/or alternate components.

(31) The multiplexer **230** of the data capture device **240** may operate in the first state absent receiving the enable signal, and in the first state be configured to connect the at least one input port of the first processor **224** to, and disconnect the test ports **222**A, **222**B from, at least one output port of the image sensor **228**. The dotted line **242**A may generally illustrate the path of the data stream from the image sensor **228**, through the multiplexer **230** operating in a first state to the first processor **224**, and to the second processor **226**. The first state of the multiplexer **230** may be associated with the data capture device during its intended operation, for example where the second processor **226** receives the image stream for indicia decoding, object recognition, etc.

(32) Responsive to receiving the enable signal via the enable port of the multiplexer **230**, the multiplexer **230** of the data capture device **240** may operate in the second state, and in the second state be configured to connect the test ports **222**A, **222**B to, and disconnect the at least one input port of the first processor **224** from, the at least one output port of the image sensor **228**. The dotted line **242**B may generally illustrate the path of the data stream from the image sensor **228**, through the multiplexer **230** operating in the second state to the test ports **222**A, **222**B. The second state of the multiplexer **230** may be associated with the active alignment process whereby the active alignment subsystem may receive the image stream via the test port **222**A, **222**B, and use the image stream for active alignment of the imaging assembly of the data capture device **240**.

(33) The first processor **224** of the data capture device **240** is not in the communicative path between the image sensor **228** and the test ports **222**A, **222**B, as is the case with the data capture device **220**. As a result, the first processor **224** of the data capture device **240** may not be configured to receive the enable signal, and/or may not be configured to adjust one or more

parameters of the image stream responsive to receiving the enable signal. Accordingly, the data capture device **220** may provide advantages respective to its ability to adjust parameters of the image stream via the first processor **224** for active alignment purposes, which may not be possible with the data capture device **240**.

(34) FIG. **3**A depicts a block diagram of an example system **300** for sharing an image sensor data stream with an active alignment subsystem **310**. The system **300** may include the active alignment subsystem **310**, a data capture device **320**, and a host **340**. It will be understood that the example system **300** may include additional, fewer, and/or alternate components.

(35) In at least some embodiments, the data capture device **320** (e.g., data capture device **220**) may include an imaging assembly **322**, a first processor **330** (e.g., the first processor **224**), a memory **332**, a multiplexer **334** (e.g., the multiplexer **230**), a second processor **336** (e.g., the second processor **226**), and a test port **338** (e.g., the test ports **222**A, **222**B). The memory **332** may be communicatively coupled to the first processor **330**, and store instructions to be executed by the first processor **330**. In other embodiments, the memory may be accessible by other components of the system **300** (e.g., the second processor **336**, the active alignment subsystem **310**, the host **340**), and/or store instructions executable by other such components.

(36) The imaging assembly **322** may include an image sensor **324** (e.g., the image sensor **228**) and an optical element **326**. The optical element **326** may include, for example, one or more lenses for focusing light onto the image sensor **324**. In at least some embodiments, the optical element **326** may have an adjustable position, and the active alignment subsystem **310** may be configured to adjust the position of the optical element **326** based at least in part upon receiving the image stream via the test port **338** (e.g., during active alignment).

(37) The host **340** may be a computing device communicatively coupled (e.g., via a network, a data bus, and/or other suitable communicative coupling) to the active alignment subsystem **310** and/or the data capture device **320**. In one example, the host **340** may be, and/or include, a server or other computing device controlling and/or otherwise associated with the active alignment subsystem **310**. In one example, the host **340** may be a point of sale system that receives one or more images of the image stream captured by the image sensor **324**, such as receiving images of a product captured during customer checkout wherein the host **340** is configured to analyze the images to decode an indicia on the product, perform product recognition, etc.

(38) Similar to the data capture device **220**, in the embodiment of FIG. **3**A the image sensor **324** (via the imaging assembly **322**) is coupled to the first processor **330**; (ii) the first processor **330** is coupled to the multiplexer **334**; and (iii) the multiplexer is **334** is coupled to the second processor **336** and the test port **338**. The first processor **330** may be configured to receive an image stream from the image sensor **324**, for example the image stream output by the image sensor **324** via one or more output ports that is received by the first processor **330** via one or more input ports. The first processor **330** may be configured to transmit the image stream from at least one output port to: (i) a respective at least one input port of the second processor **336** via the multiplexer **334** operating in a first state; and (ii) a respective at least one test port **338** of the data capture device via the multiplexer operating in a second state.

(39) The multiplexer **334** may receive an enable signal from a controller. The controller providing the enable signal to the multiplexer **334** may be, and/or include, the active alignment subsystem **310**, the first processor **330**, the host **340**, and/or other suitable component. In one example, the host **340** controls the active alignment subsystem **310**, and during active alignment of the imaging assembly **322**, the host may provide the enable signal to the multiplexer **334** directly (e.g., via a data bus, a network, etc.), and/or indirectly such as via a command sent to the active alignment subsystem **310** that causes the active alignment subsystem **310** to provide the enable signal to the multiplexer **334**. In one example, the active alignment subsystem may provide the enable signal to the multiplexer **334** during active alignment of the imaging assembly **322**. In one example, the first processor **330** may be configured to provide the enable signal, e.g., based upon a user of the data

capture device **320** selecting an active alignment process via a user interface of the data capture device **320**. The multiplexer **334** may receive the enable signal in any suitable manner by any suitable component.

(40) Responsive to receiving an enable signal from a controller via the enable port, the multiplexer **334** may operate in the second state wherein the multiplexer **334** connects the test port **338** to a respective output port of the first processor **330**. Operating in the second state may include the multiplexer **334** disconnecting the input port of the second processor **336** from the respective output port of the first processor **330**. Accordingly, in the second state the image stream captured by the image sensor **324** is provided to the test port **338** via the first processor **330** and the multiplexer **334**.

(41) The active alignment subsystem **310** may be communicatively coupled to the test port **338**, e.g., via a wired connection (e.g., probes), a wireless connect, and/or any other suitable direct and/or indirect coupling. While the multiplexer is operating in the second state, the active alignment subsystem **310** may receive the image stream via the test port **338**, and use the image stream for active alignment of the imaging assembly **322**. For example, based upon one or more images of the image stream, the active alignment may cause the position of the optical element **326** to be adjusted until the image stream is of a suitable quality, e.g., of a quality that objects appearing in the image stream are able to be recognized and/or decoded.

(42) It at least some embodiments, the first processor **330** may be configured to receive the enable signal (e.g., during the same time period the multiplexer **334** is receiving the enable signal) via an enable port of the first processor **330**. Responsive to receiving the enable signal, the first processor **330** may be configured to adjust one or more parameters of the image stream received from the image sensor **324**, and transmit the adjusted image stream via the output port of the first processor **330** to the test port **338** via the multiplexer **334** operating in the second state. For example, the first processor **330** may adjust the frame rate, the exposure, the gain, the brightness, and/or any other suitable parameter of the image stream. Such adjustments may be beneficial during the active alignment process, for example to allow the active alignment subsystem **310** to more quickly align the optical element **326** based upon the adjusted image stream.

(43) In one example of the active alignment process via the system **300**, the active alignment subsystem **310** is located at the manufacturing facility of the data capture device **320**. Once the data capture device **320** is manufactured, the imaging assembly **322** may require alignment so that when the data capture device **320** is deployed for its intended use (e.g., as an indicia reader at checkout), the images captured by the imaging assembly **322** are in-focus and/or otherwise suitable for their intended purpose.

(44) To perform the active alignment, a probe of the active alignment subsystem **310** may be coupled to the test port **338**. In embodiments where the data capture device **320** includes more than one test port **338**, the active alignment subsystem **310** may use multiple probes to couple to the multiple test ports **338**. In the example, the first processor **330** may control operation of the data capture device **320**, and the memory **332** may include an active alignment program configured for active alignment that is executed by the first processor **330**. For example, the first processor **330** may automatically execute the active alignment program when the data capture device **320** is powered after manufacture and/or until the active alignment process is complete.

(45) Upon powering on the data capture device **320**, the first processor **330** may execute the active alignment program causing the image sensor **324** to capture an image stream of the field of view of the imaging assembly **322**. The host **340** may control the active alignment subsystem **310**. During active alignment, the first processor **330** (e.g., the active alignment program) and/or host **340** controlling the active alignment process may cause alignment patterns to be displayed on a display within the field of view of the data capture device **320**. The alignment images may include patterns that the active alignment subsystem **310** receives in the image stream and uses to perform active alignment. For example, the image stream may include shapes and alphanumeric characters, and

the host **340** and/or the active alignment subsystem **310** may analyze the image stream to determine whether the shapes and alphanumeric characters appear in focus (e.g., are recognizable). In such an example, the alignment patterns may appear to be out of focus due to the initial placement of the optical element **326** during manufacture. Adjustments to the optical element **326** may be made until the alignment patterns appear in focus.

(46) The active alignment subsystem **310**, the host **340**, and/or other suitable component may cause the position of the optical element **326** to be adjusted, e.g., in real-time while the image stream of the alignment patterns are being provided. The position of the optical element **326** may be adjusted one or more times via mechanical actuators coupled to the optical element **326**, and/or in any other suitable manner. Adjusting the position of the optical element **326** may include adjusting the optical element **326** in one or more directions inside of the imaging assembly **322**, such adjustments in the leftward and rightward directions along an x-axis, upward and downward directions along a y-axis, forward and backward directions along a z-axis, and/or in any other direction, or any other suitable adjustment. It will be understood that the foregoing example is for ease of illustration only, as any suitable active alignment process may be performed. For example, the optical element **326** may be aligned based upon the quality or other characteristics of image stream, without the use of alignment patterns.

(47) In at least some embodiments, the first processor **330** may adjust one or more parameters of the image stream during active alignment responsive to receiving the enable signal, e.g., to aid in the active alignment process. For example, the host **340**, the active alignment subsystem **310**, a human, and/or the data capture device **320** may determine the image stream comprises images which have an inadequate level of brightness to adequately detect alignment patterns to perform active alignment. In response, the first processor **330** may adjust the level of brightness of the image stream before transmitting the image stream to the test port **338** via the multiplexer **334** operating in the second state, to improve detection of the alignment patterns and the active alignment process.

(48) Once the optical element **326** is suitably aligned, the optical element **326** may be fixed in position, for example using a curing process. Upon completion of the active alignment process, the controller (e.g., the host **340**, the active alignment subsystem **310**, the first processor **330**) may cease to provide the enable signal to the multiplexer **334**. In response, the multiplexer **334** may connect the input port of the second processor **336** to the respective at least one output port of the first processor **330**, to operate in the first state. The first state may also include disconnecting the test port **338** from the output port of the first processor **330**. The active alignment subsystem **310** may also be decoupled from the data capture device **320** upon completion of the active alignment process, e.g., the probes of the active alignment subsystem **310** connected to the test port **338** during active alignment may be removed from the test port **338**.

(49) In the second state, the image stream captured by the image sensor **324** may be provided to the second processor **336** via the first processor **330** and multiplexer **334** operating in the first state. In at least some embodiments, the data capture device **320** may be an indicia reader (e.g. indica reader **100**, **120**) used to capture an image stream comprising one or more images of a product, and is able to operate for its intended use while the multiplexer **334** operates in the first state. The second processor **336** may be configured to perform machine vision operations, such as indicia decoding, object recognition, etc. In such an embodiment, during intended operation the data capture device **320** may generate a payload based upon performing machine vision operations on the data stream, and provide the payload to the host **340** (e.g., a point of sale device).

(50) FIG. **3**B depicts the system **350**. The system **350** may be an alternate embodiment of the system **300**, wherein instead of the multiplexer **334** being coupled between the first processor **330** and the second processor **336** as in the system **300**, the multiplexer **334** is coupled between the image sensor **324** (via the imaging assembly **322**) and the first processor **330**, as similarly illustrated in FIG. **2**C. Accordingly, in response to receiving the enable signal from the controller

(e.g., the host **340**, active alignment subsystem **310**, first processor **330**, etc.), the system **350** may provide the image stream from the at least one output port of the image sensor **324** to the test port **338** via the multiplexer operating in the second state.

(51) Responsive to the multiplexer **334** not receiving the enable signal, the system **350** may provide the image stream from the at least one output port of the image sensor **324** to the at least one input port of the first processor **330** via the multiplexer **334** operating in the first state, and further provide the image stream from the first processor **330** to the second processor **336**.

(52) FIG. **4**A illustrates a flow diagram of an example method **400** for sharing an image sensor data stream with an active alignment subsystem. The method **400** may be performed, for example, by the data capture device **220** and/or the system **300**. The method **400** may include transmitting an image stream from an image sensor to at least one input port of a first processor of a data capture device (block **410**).

(53) The data capture device may include (i) the image sensor (e.g., the image sensor **228**, **324**), (ii) a first processor (e.g., the first processor **224**, **330**) coupled to a multiplexer (e.g., the multiplexer **230**, **334**) and the image sensor, and (iii) the multiplexer coupled to the first processor, a second processor (e.g., the second processor **226**, **336**), and at least one test port (e.g. the test port **222**A, **222**B, **338**). The multiplexer may be configured to: (a) connect at least one input port of the second processor to, and disconnect the at least one test port from, a respective at least one output port of the first processor when operating in a first state, and (b) connect the at least one test port to, and disconnect the at least one input port of the second processor from, the respective at least one output port of the first processor when operating in a second state. Responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer may operate in the second state, else the multiplexer may operate in the first state.

(54) The method **400** may include, responsive to the multiplexer receiving the enable signal, providing the image stream from the at least one output port of the first processor to the at least one test port via the multiplexer operating in the second state (block **412**). The at least one output port of the first processor may include includes at least one Mobile Industry Processor Interface (MIPI) port.

(55) In at least some embodiments, the method **400** may include, responsive to receiving the enable signal at an enable port of the first processor, adjusting, by the first processor, one or more parameters of the image stream transmitted from the at least one output port of the first processor to the at least one test port (block **414**). The one or more parameters may include one or more of a frame rate, exposure, gain, and/or any other suitable parameter of the image stream.

(56) In at least some embodiments of the method **400**, the data capture device may include (i) an imaging assembly including the image sensor, and (ii) an optical element having a position that is adjustable, and an output of the at least one test port may be directed to an active alignment subsystem configured to adjust the position of the optical element. In such an embodiment, the method **400** may include: providing, via the at least one test port, the image stream to the active alignment subsystem, and receiving, from the active alignment subsystem, an adjustment to the position of the optical element based at least in part upon receiving the image stream via the at least one test port (block **416**).

(57) The method **400** may include, responsive to the multiplexer not receiving the enable signal, providing the image stream from the at least one output port of the first processor to the at least one input port of the second processor via the multiplexer operating in the first state (block **418** In at least some embodiments of the method **400**, the first processor may be configured to control an imaging assembly of the data capture device including the image sensor, and the second processor may be configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

(58) It should be understood that not all blocks of the example flowchart of FIG. **4**A are required to be performed. The example flowchart may include additional, less, or alternate functionality,

including that discussed elsewhere herein.

(59) FIG. **4**B illustrates a flow diagram of an example method **450** for sharing an image sensor data stream with an active alignment subsystem. The method **450** may be performed, for example, by the data capture device **240** and/or the system **350**.

(60) The method **450** may include transmitting an image stream from an image sensor to a multiplexer of a data capture device (block **452**). The data capture device may include (i) the image sensor coupled to the multiplexer; (ii) a first processor coupled to a second processor and the multiplexer; and (iii) the multiplexer coupled to the image sensor, the first processor, and at least one test port. In at least some embodiments of the method **450**, the first processor may be configured to control an imaging assembly of the data capture device including the image sensor, and the second processor may be configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

(61) The multiplexer may be configured to: (a) connect at least one input port of the first processor to, and disconnect the at least one test port from, a respective at least one output port of the image sensor when operating in a first state, and (b) connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output port of the image sensor when operating in a second state. Responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer may operate in the second state, else the multiplexer may operate in the first state.

(62) The method **450** may include, responsive to the multiplexer receiving the enable signal, providing the image stream from at least one output port of the image sensor to the at least one test port via the multiplexer operating in the second state (block **454**).

(63) In at least some embodiments of the method **450**, the data capture device may include (i) an imaging assembly including the image sensor, and (ii) an optical element having a position that is adjustable, and an output of the at least one test port may be directed to an active alignment subsystem configured to adjust the position of the optical element. In such an embodiment, the method **450** may include: providing, via the at least one test port, the image stream to the active alignment subsystem, and receiving, from the active alignment subsystem, an adjustment to the position of the optical element based at least in part upon receiving the image stream via the at least one test port (block **456**).

(64) The method **450** may include, responsive to the multiplexer not receiving the enable signal, (i) providing the image stream from the at least one output port of the image sensor to the at least one input port of the first processor via the multiplexer operating in the first state, and (ii) providing the image stream from the first processor to the second processor (block **458**). At least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

(65) It should be understood that not all blocks of the example flowchart of FIG. **4**B are required to be performed. The example flowchart may include additional, less, or alternate functionality, including that discussed elsewhere herein.

(66) It will be understood that the foregoing represents one potential implementation, and that other implementations may be envisioned. For example, in some implementations, a bi-optic barcode scanner may be used as the imaging device.

(67) In the foregoing specification, specific embodiments have been described. However, one of ordinary skill in the art appreciates that various modifications and changes can be made without departing from the scope of the invention as set forth in the claims below. Accordingly, the specification and figures are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of present teachings. Additionally, the described embodiments/examples/implementations should not be interpreted as mutually exclusive, and should instead be understood as potentially combinable if such combinations are permissive in any way. In other words, any feature disclosed in any of the aforementioned embodiments/examples/implementations may be included in any of the other aforementioned

embodiments/examples/implementations.

(68) The benefits, advantages, solutions to problems, and any element(s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential features or elements of any or all the claims. The claimed invention is defined solely by the appended claims including any amendments made during the pendency of this application and all equivalents of those claims as issued.

(69) Moreover in this document, relational terms such as first and second, top and bottom, and the like may be used solely to distinguish one entity or action from another entity or action without necessarily requiring or implying any actual such relationship or order between such entities or actions. The terms "comprises," "comprising," "has", "having," "includes", "including," "contains", "containing" or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises, has, includes, contains a list of elements does not include only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element proceeded by "comprises . . . a", "has . . . a", "includes . . . a", "contains . . . a" does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises, has, includes, contains the element. The terms "a" and "an" are defined as one or more unless explicitly stated otherwise herein. The terms "substantially", "essentially", "approximately", "about" or any other version thereof, are defined as being close to as understood by one of ordinary skill in the art, and in one non-limiting embodiment the term is defined to be within 10%, in another embodiment within 5%, in another embodiment within 1% and in another embodiment within 0.5%. The term "coupled" as used herein is defined as connected, although not necessarily directly and not necessarily mechanically. A device or structure that is "configured" in a certain way is configured in at least that way, but may also be configured in ways that are not listed.

(70) The Abstract of the Disclosure is provided to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims. In addition, in the foregoing Detailed Description, it can be seen that various features are grouped together in various embodiments for the purpose of streamlining the disclosure. This method of disclosure is not to be interpreted as reflecting an intention that the claimed embodiments require more features than are expressly recited in each claim. Rather, as the following claims reflect, inventive subject matter may lie in less than all features of a single disclosed embodiment. Thus, the following claims are hereby incorporated into the Detailed Description, with each claim standing on its own as a separately claimed subject matter.

Claims

1. A data capture device for sharing an image sensor data stream with an active alignment subsystem, the data capture device comprising: an image sensor coupled to a first processor; the first processor coupled to a multiplexer and the image sensor, the first processor configured to: receive an image stream from the image sensor, transmit the image stream from at least one output port of the first processor to a respective at least one input port of a second processor via the multiplexer operating in a first state, and transmit the image stream from the at least one output port of the first processor to a respective at least one test port of the data capture device via the multiplexer operating in a second state; and the multiplexer coupled to the first processor, the second processor, and the at least one test port, the multiplexer configured to: connect the at least one input port of the second processor to, and disconnect the at least one test port from, the respective at least one output port of the first processor when operating in the first state, and connect the at least one test port to, and disconnect the at least one input port of the second

processor from, the respective at least one output port of the first processor when operating in the second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state.

2. The data capture device of claim 1, wherein: the first processor is configured to control an imaging assembly of the data capture device including the image sensor; and the second processor is configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

3. The data capture device of claim 1, wherein: the at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

4. The data capture device of claim 1, wherein: responsive to receiving the enable signal at an enable port of the first processor, the first processor is further configured to adjust one or more parameters of the image stream transmitted from the at least one output port of the first processor to the at least one test port.

5. The data capture device of claim 4, wherein: the one or more parameters include one or more of: frame rate, exposure, or gain.

6. The data capture device of claim 1, further comprising: an optical element of an imaging assembly including the image sensor, the optical element having a position that is adjustable, wherein an output of the at least one test port is directed to an active alignment subsystem configured to adjust the position of the optical element based at least in part upon receiving the image stream via the at least one test port.

7. A data capture device for sharing an image sensor data stream with an active alignment subsystem, the data capture device comprising: an image sensor coupled to a multiplexer, the image sensor configured to provide an image stream from at least one output port of the image sensor to at least one test port via the multiplexer operating in a second state; a first processor coupled to a second processor and the multiplexer, the first processor configured to: receive the image stream via at least one input port of the first processor from at least one output port of the image sensor via the multiplexer operating in a first state, and transmit the image stream from the first processor to the second processor; and the multiplexer coupled to the image sensor, the first processor, and the at least one test port, the multiplexer configured to: connect the at least one input port of the first processor to, and disconnect the at least one test port from, the respective at least one output port of the image sensor when operating in the first state, and connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output port of the image sensor when operating in the second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state.

8. The data capture device of claim 7, wherein: the first processor is configured to control an imaging assembly of the data capture device including the image sensor; and the second processor is configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

9. The data capture device of claim 7, wherein: at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

10. The data capture device of claim 7, further comprising: an optical element of an imaging assembly including the image sensor, the optical element having a position that is adjustable, wherein an output of the at least one test port is directed to an active alignment subsystem configured to adjust the position of the optical element based at least in part upon receiving the image stream via the at least one test port.

11. A system for sharing an image sensor data stream with an active alignment subsystem, the system comprising: an image sensor coupled to a first processor; the first processor coupled to a multiplexer and the image sensor; the multiplexer coupled to the first processor, a second processor, and at least one test port, the multiplexer configured to: connect at least one input port of

the second processor to, and disconnect the at least one test port from, a respective at least one output port of the first processor when operating in a first state, and connect the at least one test port to, and disconnect the at least one input port of the second processor from, the respective at least one output port of the first processor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; one or more processors; and a memory storing instructions that, when executed by the one or more processors, causes the system to: transmit an image stream from the image sensor to the first processor, responsive to the multiplexer receiving an enable signal, provide the image stream from the at least one output port of the first processor to the at least one test port via the multiplexer operating in the second state, and responsive to the multiplexer not receiving an enable signal, provide the image stream from the at least one output port of the first processor to the at least one input port of the second processor via the multiplexer operating in the first state.

12. The system of claim 11, wherein: the first processor is configured to control an imaging assembly including the image sensor; and the second processor is configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

13. The system of claim 11, wherein: the at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

14. The system of claim 11, further comprising instruction that, when executed by the first processor, causes the first processor to: responsive to receiving the enable signal at an enable port of the first processor, adjust one or more parameters of the image stream transmitted from the at least one output port of the first processor to the at least one test port.

15. The system of claim 14, wherein: the one or more parameters include one or more of a frame rate, exposure, or gain.

16. The system of claim 11, further comprising: an optical element of an imaging assembly including the image sensor, the optical element having a position that is adjustable; and an active alignment subsystem coupled to the at least one test port and configured to adjust the position of the optical element based at least in part upon receiving the image stream via the at least one test port.

17. A system for sharing an image sensor data stream with an active alignment subsystem, the system comprising: an image sensor coupled to a multiplexer, the image sensor configured to provide an image stream from at least one output port of the image sensor to at least one test port via a multiplexer operating in a second state; a first processor coupled to a second processor and the multiplexer; the multiplexer coupled to the image sensor, the first processor, and at least one test port, the multiplexer configured to: connect at least one input port of the first processor to, and disconnect the at least one test port from, a respective at least one output port of the image sensor when operating in a first state, and connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output port of the image sensor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; one or more processors; and a memory storing instructions that, when executed by the one or more processors, causes the system to: responsive to the multiplexer receiving the enable signal, provide the image stream from the at least one output port of the image sensor to the at least one test port via the multiplexer operating in the second state, and responsive to the multiplexer not receiving the enable signal, provide the image stream from the at least one output port of the image sensor to the at least one input port of the first processor via the multiplexer operating in the first state, and provide the image stream from the first processor to the second processor.

18. The system of claim 17, wherein: the first processor is configured to control an imaging assembly including the image sensor; and the second processor is configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

19. The system of claim 17, wherein: at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

20. The system of claim 17, further comprising: an optical element of an imaging assembly including the image sensor, the optical element having a position that is adjustable; and an active alignment subsystem coupled to the at least one test port and configured to adjust the position of the optical element based at least in part upon receiving the image stream via the at least one test port.

21. A method for sharing an image sensor data stream with an active alignment subsystem, the method comprising: transmitting an image stream from an image sensor to at least one input port of a first processor of a data capture device including: the image sensor, a first processor coupled to a multiplexer and the image sensor, and the multiplexer coupled to the first processor, a second processor, and at least one test port, the multiplexer configured to: connect at least one input port of the second processor to, and disconnect the at least one test port from, a respective at least one output port of the first processor when operating in a first state, and connect the at least one test port to, and disconnect the at least one input port of the second processor from, the respective at least one output port of the first processor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; responsive to the multiplexer receiving the enable signal, providing the image stream from the at least one output port of the first processor to the at least one test port via the multiplexer operating in the second state; and responsive to the multiplexer not receiving the enable signal, providing the image stream from the at least one output port of the first processor to the at least one input port of the second processor via the multiplexer operating in the first state.

22. The method of claim 21, wherein: the first processor is configured to control an imaging assembly of the data capture device including the image sensor; and the second processor is configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

23. The method of claim 21, wherein: the at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

24. The method of claim 21, further comprising: responsive to receiving the enable signal at an enable port of the first processor, adjusting, by the first processor, one or more parameters of the image stream transmitted from the at least one output port of the first processor to the at least one test port.

25. The method of claim 24, wherein: the one or more parameters include one or more of a frame rate, exposure, or gain.

26. The method of claim 24, wherein: the data capture device includes an imaging assembly including the image sensor and an optical element having a position that is adjustable, an output of the at least one test port is directed to an active alignment subsystem configured to adjust the position of the optical element; and the method further comprises: providing, via the at least one test port, the image stream to the active alignment subsystem, and receiving, from the active alignment subsystem, an adjustment to the position of the optical element based at least in part upon receiving the image stream via the at least one test port.

27. A method for sharing an image sensor data stream with an active alignment subsystem, the method comprising: transmitting an image stream from an image sensor to a multiplexer of a data capture device including: the image sensor coupled to the multiplexer, a first processor coupled to a second processor and the multiplexer, and the multiplexer coupled to the image sensor, the first processor, and at least one test port, the multiplexer configured to: connect at least one input port of the first processor to, and disconnect the at least one test port from, a respective at least one output port of the image sensor when operating in a first state, and connect the at least one test port to, and disconnect the at least one input port of the first processor from, the respective at least one output

port of the image sensor when operating in a second state, wherein responsive to receiving an enable signal via an enable port of the multiplexer, the multiplexer operates in the second state, else the multiplexer operates in the first state; responsive to the multiplexer receiving the enable signal, providing the image stream from at least one output port of the image sensor to the at least one test port via the multiplexer operating in the second state; and responsive to the multiplexer not receiving the enable signal, providing the image stream from the at least one output port of the image sensor to the at least one input port of the first processor via the multiplexer operating in the first state, and providing the image stream from the first processor to the second processor.

28. The method of claim 27, wherein: the first processor is configured to control an imaging assembly of the data capture device including the image sensor; and the second processor is configured to perform one or more machine vision operations on the image stream, and does not control the imaging assembly.

29. The method of claim 27, wherein: at least one output port of the first processor includes at least one Mobile Industry Processor Interface (MIPI) port.

30. The method of claim 27, wherein: the data capture device includes an imaging assembly including the image sensor and an optical element having a position that is adjustable, an output of the at least one test port is directed to an active alignment subsystem configured to adjust the position of the optical element; and the method further comprises: providing, via the at least one test port, the image stream to the active alignment subsystem, and receiving, from the active alignment subsystem, an adjustment to the position of the optical element based at least in part upon receiving the image stream via the at least one test port.