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Chinstrap camera device

Abstract

A chinstrap camera device may include a body having an inner pad member and an outer chin safety cover. The inner pad member may be coupled to the outer chin safety cover, and the inner pad member may include a body cavity that is configured to receive a portion of a chin of a user. One or more flexible straps may be coupled to the body. A helmet fastener may be coupled to one or more of the flexible straps, and each helmet fastener may be configured to be coupled to a helmet. A camera and a radio module may be coupled to the body. The radio module may be in electronic communication with the camera, and the radio module may be configured to transmit image data recorded by the camera. Optionally, the device may include a helmet that may be configured to be worn on the head of a user.

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Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS (1) This application claims priority to and the benefit of the filing date of U.S. Provisional Application No. 63/582,257, filed on Sep. 13, 2023, entitled “CHINSTRAP CAMERA DEVICE”, which is hereby incorporated by reference in its entirety.

FIELD OF THE INVENTION
(1) The present invention relates to the field of systems and devices for helmet and other headwear chin straps, including those typically employed in sports and safety helmets. More specifically, it

relates to a chinstrap device incorporating advanced technologies, including electronics, sensors, and video capture technology, which may be used to capture in-game performance metrics of athletes and facilitate communication with a peripheral device.

BACKGROUND

(2) The present technological landscape within the domain of helmet chinstraps is primarily concerned with enhancing wearer safety, particularly in the context of mitigating head injuries. However, certain deficiencies persist within the existing technology, particularly relating to functional limitations, video capture capabilities, and the integration of biometric technology, all of which would enable the comprehensive collection of wearer health and performance data.

(3) Previous endeavors to address these issues, such as in the realm of sports, have involved the integration of sensors and video capture technology into helmets for the purpose of capturing in-game video footage from the player's perspective. Yet, the inherently physical nature of contact sports has rendered these solutions increasingly impractical. These prior attempts have met with limited success, largely due to the stringent requisites governing helmet replacements, strict manufacturing standards, and various other factors. Firstly, the weight and bulkiness of integrated sensors and cameras have imposed discomfort upon players, thereby impeding their mobility and peak performance. Secondly, the prohibitively high costs associated with these solutions have posed adoption challenges, particularly for teams and educational institutions constrained by budgetary limitations. Furthermore, efforts to employ specialized external mounting devices for attaching external camera systems to helmets have proven ineffective and unsafe, given their external attachment and inadequate integration into players' equipment.

(4) Within the realm of sports, there exists a noticeable deficiency in access to real-time data and information concerning the performance and health status of athletes during both games and practice sessions. This absence of immediate information poses significant challenges for coaches and trainers in their efforts to evaluate player techniques and enact necessary adjustments aimed at enhancing performance. Moreover, it presents hurdles for medical personnel tasked with the identification and diagnosis of injuries in a timely manner.

(5) Additionally, there is a conspicuous absence of mechanisms enabling players to generate and subsequently assert ownership over in-game content centered on their performance. This limitation deprives players of a level of control and ownership over the entertainment they generate. Consequently, players are predominantly confined to sharing third-party generated content with their fanbase. This practice not only exposes them to potential liabilities but also complicates the task of garnering support and fostering engagement from their fanbase.

(6) Therefore, a need exists for novel devices which enable the comprehensive collection of wearer health and performance data and which do not suffer from the drawbacks of the above-mentioned devices and methods.

BRIEF SUMMARY OF THE INVENTION

(7) A chinstrap camera device is provided. In some embodiments, the device may include a body having an inner pad member and an outer chin safety cover. The inner pad member may be coupled to the outer chin safety cover, and the inner pad member may include a body cavity that is configured to receive a portion of a chin of a user. One or more flexible straps may be coupled to the body. A helmet fastener may be coupled to one or more of the flexible straps, and each helmet fastener may be configured to be coupled to a helmet. A camera and a radio module may be coupled to the body. The radio module may be in electronic communication with the camera, and the radio module may be configured to transmit image data recorded by the camera.

(8) In further embodiments, the device may include a helmet that may be configured to be worn on the head of a user, such as a football helmet or other head protecting helmet that typically may utilize a chinstrap to help secure the helmet to the user's head, and the helmet fasteners may be configured to secure the flexible straps to the helmet.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

(1) Some embodiments of the present invention are illustrated as an example and are not limited by the figures of the accompanying drawings, in which like references may indicate similar elements and in which:

(2) FIG. **1** depicts a front perspective view of an example of a chinstrap camera device according to various embodiments described herein.

(3) FIG. **2** illustrates a partial exploded, front perspective view of an example of a chinstrap camera device according to various embodiments described herein.

(4) FIG. **3** shows a rear elevation view of an example of a chinstrap camera device according to various embodiments described herein.

(5) FIG. **4** depicts a perspective view of an example of a chinstrap camera device having its body coupled to a helmet according to various embodiments described herein.

(6) FIG. **5** illustrates a sectional elevation view of an example of a chinstrap camera device positioned on the chin of a user according to various embodiments described herein.

(7) FIG. **6** shows a block diagram of some example electronic component of an example of a chinstrap camera device according to various embodiments described herein.

(8) FIG. **7** depicts a schematic diagram of an example of a chinstrap camera device in electronic communication with external electronic devices according to various embodiments described herein.

DETAILED DESCRIPTION OF THE INVENTION

(9) The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention. As used herein, the term “and/or” includes any and all combinations of one or more of the associated listed items. As used herein, the singular forms “a,” “an,” and “the” are intended to include the plural forms as well as the singular forms, 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, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, steps, operations, elements, components, and/or groups thereof.

(10) Unless otherwise defined, all terms (including technical and scientific terms) used herein have the same meaning as commonly understood by one having ordinary skill in the art to which this invention belongs. It will be further understood that terms, such as those defined in commonly used dictionaries, should be interpreted as having a meaning that is consistent with their meaning in the context of the relevant art and the present disclosure and will not be interpreted in an idealized or overly formal sense unless expressly so defined herein.

(11) In describing the invention, it will be understood that a number of techniques and steps are disclosed. Each of these has individual benefit and each can also be used in conjunction with one or more, or in some cases all, of the other disclosed techniques. Accordingly, for the sake of clarity, this description will refrain from repeating every possible combination of the individual steps in an unnecessary fashion. Nevertheless, the specification and claims should be read with the understanding that such combinations are entirely within the scope of the invention and the claims.

(12) For purposes of description herein, the terms “upper,” “lower,” “left,” “right,” “rear,” “front,” “side,” “vertical,” “horizontal,” and derivatives thereof shall relate to the invention as oriented in FIG. **1**. However, one will understand that the invention may assume various alternative orientations and step sequences, except where expressly specified to the contrary. Therefore, the specific devices and processes illustrated in the attached drawings, and described in the following specification, are simply exemplary embodiments of the inventive concepts defined in the appended claims. Hence, specific dimensions and other physical characteristics relating to the

embodiments disclosed herein are not to be considered as limiting, unless the claims expressly state otherwise.

(13) Although the terms “first,” “second,” etc. are used herein to describe various elements, these elements should not be limited by these terms. These terms are only used to distinguish one element from another element. For example, the first element may be designated as the second element, and the second element may be likewise designated as the first element without departing from the scope of the invention.

(14) As used in this application, the term “about” or “approximately” refers to a range of values within plus or minus 20% of the specified number. Additionally, as used in this application, the term “substantially” means that the actual value is within about 10% of the actual desired value, more preferably within about 5% of the actual desired value and even more preferably within about 1% of the actual desired value of any variable, element or limit set forth herein.

(15) A new chinstrap camera device is discussed herein. In the following description, for purposes of explanation, numerous specific details are set forth in order to provide a thorough understanding of the present invention. It will be evident, however, to one skilled in the art that the present invention may be practiced without these specific details.

(16) The present disclosure is to be considered as an exemplification of the invention and is not intended to limit the invention to the specific embodiments illustrated by the figures or description below.

(17) The present invention will now be described by example and through referencing the appended figures representing preferred and alternative embodiments. FIG. **1** illustrates an example of a chinstrap camera device (“the device”) **100** according to various embodiments. In some embodiments, the device **100** may comprise a body **11** having an inner pad member **12** that may be coupled to an outer chin safety cover **13**. The inner pad member **12** may comprise a body cavity **14** that may be configured to receive a portion of a chin **201** of a user **200**. One or more flexible straps **15**, **16**, **17**, **18**, may be coupled to the body **11**. A helmet fastener **19**, **20**, **21**, **22**, may be coupled to one or more of the flexible straps **15**, **16**, **17**, **18**, and the helmet fastener **19**, **20**, **21**, **22**, may be configured to be coupled to a helmet **300** that may be worn by the user **200**. The one or more flexible straps **15**, **16**, **17**, **18**, may be configured to extend around a portion of a head **202** of the user **200** to secure the portion of the user's chin **201** within the body cavity **14**. A camera **61** and a radio module **53** may be coupled to the body **11**, and the radio module **53** may be in electronic communication with the camera **61**. The module **53** may be configured to transmit image data recorded by the camera **61**.

(18) In some embodiments, the device **100** may comprise a body **11** having an inner pad member **12** that may be coupled to an outer chin safety cover **13**. The inner pad member **12** may comprise a body cavity **14** that may be configured to receive a portion of a chin **201** of a user **200**. The outer chin safety cover **13** may be coupled to the inner pad member **12** so that the body cavity **14** and outer chin safety cover **13** may be generally positioned on opposing sides of the inner pad member **12** with the outer chin safety cover **13** generally facing away from the chin **201** of a user **200**.

(19) An inner pad member **12** may be configured in any shape and size. In preferred embodiments, an inner pad member **12** may comprise a concave body cavity **14** that may be formed into or depressed into the inner pad member **12**. Generally, a body cavity **14** may be sized and shaped to receive or fit over all or portions of the chin **201** of a user **200**. In preferred embodiments, the inner pad member **12** may be made from or may comprise a cushioning material which may provide shock absorption functions, effectively reducing the impact forces directed towards the critical electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) that are coupled to the body **11**. In preferred embodiments, the inner pad member **12** may be made from or may comprise a cushioning material that may comprise expanded polypropylene (EPP) or expanded polystyrene (EPS) foam materials. In further embodiments, a cushioning material may be made from or may comprise a resilient material, such as silicone foams, rubber foams, silicone rubber, urethane foams

including plastic foams, neoprene foam, latex foam rubber, polyurethane foam rubber, or elastomer materials such as elastic plastics, elastic silicone, elastic rubbers, or any other suitable elastomer or resilient material including combinations of materials. Optionally, a body cavity **14** and/or inner pad member **12** may be covered or otherwise include a material, which is preferably impervious to water, such as rubber or flexible plastic, which may be used to further provide comfort to a user **200** and to protect the cushioning material from sweat, cleaning agents, and other contaminants.
(20) Preferably, the device **100** may comprise strategically placed cushioning material, such as foam padding, that serves to provide additional cushioning in proximity to the electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**), thereby affording comprehensive protection for both the user **200** and the electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) against potential damage. Furthermore, protective measures are extended to safeguard sensitive electronic components, optionally within an integrated camera module through a combination of the aforementioned impact-resistant materials and specialized coatings.
(21) An outer chin safety cover **13** may be configured in any shape and size. In preferred embodiments, outer chin safety cover **13** may be configured to cover all or a portion of the inner pad member **12** that is opposingly positioned to the body cavity **14**. In some embodiments, an outer chin safety cover **13** may comprise a central region **13**A which may cover all or the majority of the portion of the inner pad member **12** that forms the body cavity **14** so that when worn by a user **200** the central region **13**A which may extend over all or the majority of the user's chin **201**.
(22) In preferred embodiments, the outer chin safety cover **13** may be made from or may comprise a substantially rigid material which may include resilient and lightweight materials commonly utilized in helmet constructions. These substantially rigid materials encompass impact-resistant plastics, including but not limited to polycarbonate, Acrylonitrile Butadiene Styrene (ABS), thermoplastic polyurethane (TPU), a composite of TPU and polycarbonate (PC), polypropylene (PP) and polyvinyl chloride (PVC), polycarbonate, nylon, Poly(methyl methacrylate) (PMMA) also known as acrylic, melamine, hard rubbers, fiberglass, carbon fiber, resins, such as epoxy resin, or any other material including combinations of materials that are substantially rigid and suitable for use in impact sports, such as football, baseball, etc., and that may form a formidable and shock-absorbing outer layer, engineered to withstand the rigors of gameplay.
(23) The device **100** preferably may comprise one or more flexible straps **15**, **16**, **17**, **18**, may be coupled to the body **11**. A helmet fastener **19**, **20**, **21**, **22**, may be coupled to one or more, and more preferably to each, of the flexible straps **15**, **16**, **17**, **18**, and the helmet fastener **19**, **20**, **21**, **22**, may be configured to be coupled to a helmet **300** that may be worn by the user **200**. Once the flexible straps **15**, **16**, **17**, **18**, are coupled to a helmet **300**, the flexible straps **15**, **16**, **17**, **18**, and body **11** may function as a chin strap assembly that may be used to secure the helmet **300** to the head **202** of the user **200**. Generally, the one or more flexible straps **15**, **16**, **17**, **18**, may be configured to extend around a portion of a head **202** of the user **200**, such as a portion of their cheeks, to secure the portion of the user's chin **201** within the body cavity **14**.
(24) Flexible straps **15**, **16**, **17**, **18**, may be configured in any shape and size. In preferred embodiments, flexible straps **15**, **16**, **17**, **18**, may be elongated in shape. In some embodiments, flexible straps **15**, **16**, **17**, **18**, may comprise a length of flexible material such nylon cord and webbing, polypropylene cord and webbing, polyester cord and webbing, various types of flexible plastics such as polyvinyl chloride, natural or synthetic rubber, neoprene foam rubber, synthetic fabrics such as polyester, nylon, rayon, acetate, spandex, lastex, and Kevlar, and natural fabrics such as coir, cotton, hemp, jute, canvas, flax, leather, linen, ramie, wool, silk, or any other suitable flexible natural or synthetic material including combinations of materials.
(25) Any coupling method, fastener, or device may be used to couple a flexible strap **15**, **16**, **17**, **18**, to the body **11**. In some embodiments, a flexible strap **15**, **16**, **17**, **18**, may be coupled to the body **11** by being coupled to the inner pad member **12** and/or to the outer chin safety cover **13**. Optionally, a flexible strap **15**, **16**, **17**, **18**, may be coupled to the body **11** in a generally non-

removable manner, such as by being molded together, via heat welding, via rivet fasteners, via non-removable adhesives, etc. In preferred embodiments, a flexible strap **15**, **16**, **17**, **18**, may be coupled to the body **11** so that the flexible strap **15**, **16**, **17**, **18**, may be removable and replaceable. For example, the body **11** may comprise one or more strap apertures **23**, **24**, that a flexible strap **15**, **16**, **17**, **18**, may be removably insertable into.

(26) The device **100** may comprise one or more helmet fasteners **19**, **20**, **21**, **22**, that may be configured to be coupled to a helmet **300**. A helmet fastener **19**, **20**, **21**, **22**, may comprise any fastener, device, or method that may be used to couple a flexible strap **15**, **16**, **17**, **18**, to a helmet **300**.

(27) In preferred embodiments, a helmet fastener **19**, **20**, **21**, **22**, may comprise a snap fastener **25**, **26**, **27**, **28**, such as a male or female snap fastener. A snap fastener is also commonly called a snap button, press button, press stud, press fastener, dome fastener, popper, snap and tich (or tich button). A male snap fastener and a female snap fastener may comprise a pair of interlocking discs, made out of a metal or plastic, commonly used in place of traditional buttons to fasten clothing and for similar purposes. A circular lip of a male snap fastener fits into a groove on the top of a female snap fastener, holding them fast until a certain amount of force is applied. Different types of snap fasteners can be attached to fabric or leather by riveting with a punch and die set specific to the type of rivet snaps used (striking the punch with a hammer to splay the tail), sewing, or plying with special snap pliers. Typically, helmets **300** have one or more male-type snap fasteners **301** that may be removably coupled to female-type fasteners, such as those found on chin straps. In preferred embodiments, a helmet fastener **19**, **20**, **21**, **22**, may comprise a female snap fastener **25**, **26**, **27**, **28**, that may be removably coupled to a male-type snap fastener **301** of a helmet **300**, e.g., a football helmet.

(28) In further preferred embodiments, a helmet fastener **19**, **20**, **21**, **22**, may comprise a helmet buckle that includes a snap fastener **25**, **26**, **27**, **28**. A helmet buckle type of helmet fastener **19**, **20**, **21**, **22**, may comprise a strap coupling and adjustment type of hardware that may include one or more fastener apertures **41**, **42**, **43**, **44**, that may be formed into a plate **31**, **32**, **33**, **34**, with a snap fastener **25**, **26**, **27**, **28**, coupled to the plate **31**, **32**, **33**, **34**. A flexible strap **15**, **16**, **17**, **18**, may be coupled to the helmet buckle type of helmet fastener **19**, **20**, **21**, **22**, by inserting a portion of the flexible strap **15**, **16**, **17**, **18**, into and through the fastener apertures **41**, **42**, **43**, **44**, and the snap fastener **25**, **26**, **27**, **28**, of the helmet buckle type of helmet fastener **19**, **20**, **21**, **22**, may be coupled to a snap fastener **301** of a helmet **300**.

(29) In some embodiments and in the present example, the device **100** can be a digital device that, in terms of hardware architecture, may comprise one or more of a processor **51**, input/output (I/O) interfaces **52**, a radio module **53**, a data store **54**, a memory **55**, camera **61**, accelerometer **62**, microphone **63**, control input **64**, power source **65**, charging port **66**, and physiological sensor **67**. It should be appreciated by those of ordinary skill in the art that FIG. **6** depicts the device **100** in an oversimplified manner, and a practical embodiment may include additional components or elements and suitably configured processing logic to support known or conventional operating features that are not described in detail herein. Optionally, one or more electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) may be integrated into a control unit **50**.

(30) The electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) are communicatively coupled via a local interface **58**, and the local interface **58** may provide electronic communication between one or more electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**). A local interface **58** can be, for example but not limited to, one or more buses, circuit boards, wiring harnesses, or other wired connections or wireless connections, as is known in the art. The local interface **58** can have additional elements, which are omitted for simplicity, such as controllers, buffers (caches), drivers, repeaters, and receivers, among many others, to enable communications. Further, the local interface **58** may include address, control, and/or data connections to enable appropriate communications among the aforementioned components.

(31) The device **100** may include one or more processors **51** which may be a hardware device for executing software instructions. A processor **51** can be any custom made or commercially available processor, a central processing unit (CPU), an auxiliary processor among several processors, a semiconductor-based microprocessor (in the form of a microchip or chip set), or generally any device for executing software instructions. When the device **100** is in operation, a processor **51** is configured to execute software stored within the memory **55**, to communicate data to and from the memory **55**, and to generally control operations of the device **100** pursuant to the software instructions. In an exemplary embodiment, a processor **51** may include a mobile optimized processor, such as optimized for power consumption and mobile applications.
(32) The device **100** may include one or more I/O interfaces **52** that can be used by a user **200** to provide user input and display system output data, such as operational status, from the device **100**. I/O interfaces **52** can include, for example, buttons, knobs, switches, LED indicator lights, LED display, LCD display, a serial port, a parallel port, a small computer system interface (SCSI), an infrared (IR) interface, a radio frequency (RF) interface, a universal serial bus (USB) interface, and the like.
(33) A radio module **53** enables wireless communication to one or more electronic devices **400**, networks **105**, etc., so that the radio module **53** may transmit data recorded by the camera **61**, accelerometer **62**, microphone **63**, physiological sensor **67**, processor **51**, or other electronic component. Generally, a radio module **53** may enable the device **100** to transfer data and information between one or more access points **103**, electronic devices **400**, and servers **500** over a data network **105**. For example, a radio module **53** may enable the device **100** to transfer data and information directly to an electronic device **400** via Bluetooth, WiFi, or other type of network connection **104**, such as by using a companion application running on a mobile phone, laptop, or other type of electronic device **400**. As another example, a radio module **53** may enable the device **100** to transfer data and information directly to one or more access points **103** via a 3/4/5G cellular, Bluetooth, WiFi, or other type of network connection **104**, which may then be accessed using a companion application running on a mobile phone, laptop, or other type of electronic device **400**. Electronic devices **400** and servers **500** may send data to and receive data from the data network **105** through a network connection **104** with an access point **103**. A data store **508** accessible by the server **500** may contain one or more databases. Electronic devices **400** may include mobile devices, such as laptops, tablet computers, personal digital assistants, smart phones, smart televisions, and the like, that are equipped with a wireless network interface capable of sending data to one or more servers **500** with access to one or more data stores **508** over a network **105**, such as a wireless local area network (WLAN). Additionally, electronic devices **400** may include fixed devices, such as desktops, workstations, and the like, that are equipped with a wireless or wired network interface capable of sending data to one or more servers **500** with access to one or more data stores **508** over a wireless or wired local area network **105**.
(34) In preferred embodiments, a radio module **53** may operate via WiFi and/or Bluetooth communication standards. In further embodiments, a radio module **53** may comprise a radio that may operate on a cellular band and may communicate with or receive a Subscriber Identity Module (SIM) card or other wireless network identifier. Any number of suitable wireless data communication protocols, techniques, or methodologies can be supported by a radio module **53**, including, without limitation: RF; IrDA (infrared); Bluetooth; ZigBee (and other variants of the IEEE 802.15 protocol); IEEE 802.11 (any variation); IEEE 802.16 (WiMAX or any other variation); Direct Sequence Spread Spectrum; Near-Field Communication (NFC); Frequency Hopping Spread Spectrum; Long Term Evolution (LTE); cellular/wireless/cordless telecommunication protocols (e.g. 3G/4G/5G, etc.); wireless home network communication protocols; paging network protocols; magnetic induction; satellite data communication protocols; wireless hospital or health care facility network protocols such as those operating in the WMTS bands; GPRS; proprietary wireless data communication protocols such as variants of Wireless

USB; and any other protocols for wireless communication. In further embodiments, a radio module **53** may enable wired network communication and may include, for example, an Ethernet card or adapter (e.g., 10BaseT, Fast Ethernet, Gigabit Ethernet, 10 GbE) or a wireless local area network (WLAN) card or adapter (e.g., 802.11a/b/g/n). The radio module **53** may include address, control, and/or data connections to enable appropriate communications on the network.

(35) An optional data store **54** may be used to store data. The data store **54** may include any of volatile memory elements (e.g., random access memory (RAM, such as DRAM, SRAM, SDRAM, and the like)), nonvolatile memory elements (e.g., ROM, hard drive, tape, CDROM, and the like), and combinations thereof. Moreover, the data store **54** may incorporate electronic, magnetic, optical, and/or other types of storage media.

(36) A memory **55** may include any of volatile memory elements (e.g., random access memory (RAM, such as DRAM, SRAM, SDRAM, etc.)), nonvolatile memory elements (e.g., ROM, hard drive, etc.), and combinations thereof. Moreover, the memory **55** may incorporate electronic, magnetic, optical, and/or other types of storage media. Note that the memory **55** may have a distributed architecture, where various components are situated remotely from one another, but can be accessed by the processor **51**. The software in memory **55** can include one or more software programs, each of which includes an ordered listing of executable instructions for implementing logical functions. In the example of FIG. **6**, the optional software in the memory system **55** includes a suitable operating system (O/S) **56** and program(s) **57**. The operating system **56** essentially controls the execution of input/output interface **52** and other element functions, and provides scheduling, input-output control, file and data management, memory management, and communication control and related services. The operating system **56** may be, for example, LINUX (or another UNIX variant), Android (available from Google), Symbian OS, Microsoft Windows CE, Microsoft Windows 7 Mobile, iOS (available from Apple, Inc.), webOS (available from Hewlett Packard), Blackberry OS (Available from Research in Motion), and the like. The programs **57** may include various applications, add-ons, etc. configured to provide end user functionality of the device **100**. In a typical example, one or more of the programs **57** may comprise instructions for controlling the functions of camera **61**, accelerometer **62**, microphone **63**, control input **64**, etc.

(37) Further, many embodiments are described in terms of sequences of actions to be performed by, for example, elements of a computing device. It will be recognized that various actions described herein can be performed by specific circuits (e.g., application specific integrated circuits (ASICs)), by program instructions being executed by one or more processors, or by a combination of both. Additionally, these sequence of actions described herein can be considered to be embodied entirely within any form of computer readable storage medium having stored therein a corresponding set of computer instructions that upon execution would cause an associated processor to perform the functionality described herein. Thus, the various aspects of the invention may be embodied in a number of different forms, all of which have been contemplated to be within the scope of the claimed subject matter. In addition, for each of the embodiments described herein, the corresponding form of any such embodiments may be described herein as, for example, “logic configured to” perform the described action.

(38) The device **100** may also include a main memory, such as a random access memory (RAM) or other dynamic storage device (e.g., dynamic RAM (DRAM), static RAM (SRAM), and synchronous DRAM (SDRAM)), coupled to the bus for storing information and instructions to be executed by the processor **51**. In addition, the main memory may be used for storing temporary variables or other intermediate information during the execution of instructions by the processor **51**. The device **100** may further include a read only memory (ROM) or other static storage device (e.g., programmable ROM (PROM), erasable PROM (EPROM), and electrically erasable PROM (EEPROM)) coupled to the bus for storing static information and instructions for the processor **51**.

(39) A camera **61** may be configured to record still image data and/or video image data of the environment around the device **100** and preferably of the environment generally located in front of

the outer chin safety cover **13** that is visible to a user **200** that is wearing the inner pad member **12** on their chin **201**. In preferred embodiments, a camera **61** may comprise a digital camera that encodes images and videos digitally on a charge-coupled device (CCD) image sensor or on a complementary metal-oxide-semiconductor (CMOS) image sensor and stores them for later reproduction. In other embodiments, a camera **61** may comprise any type of camera which includes an optical system, typically using a lens with a variable diaphragm to focus light or other electromagnetic radiation, such as infrared radiation for thermal imaging, onto an image pickup device or image sensor.

(40) In preferred embodiments, a camera **61** may be seamlessly integrated into the body **11**, guaranteeing a secure and ergonomic fit, such as by being coupled to the outer chin safety cover **13**. Internally, the components of the camera **61** may be coated with one or more protective materials, meticulously chosen to safeguard against dust, humidity, and corrosive elements. These protective measures substantially augment the durability and reliability of the camera's **61** performance, ensuring the continued functionality and protection of electronic components during demanding gameplay and inadvertent impacts.

(41) Generally, a camera **61** may be coupled to the body **11** and configured to capture still image data and/or video image data of the player's (user's **200**) field of vision without hindering visibility. It preferably utilizes state-of-the-art high-resolution imaging technology to meticulously capture crisp and detailed video footage while executing image re-rendering processes intended to eliminate obstructions to its field of vision, including, but not limited to, face masks. To fortify the resilience of the camera **61** lens, an additional layer of impact-resistant material, such as tempered glass or polycarbonate, may be utilized in the camera window of the camera **61**. This protective covering serves to shield the lens from scratches, impacts, and potential damage while preserving optimal image clarity.

(42) Furthermore, the camera **61** preferably may comprise water-resistant or waterproof attributes, thereby affording it protection against environmental elements like rain or sweat. Stringent sealing and gasket mechanisms are effectively deployed to repel the intrusion of water or moisture into the housing, thereby preserving the camera's **61** reliability and longevity, even when subjected to adverse conditions.

(43) The mounting mechanism within the body **11**, responsible for securing the camera **61** to the body **11**, undergoes reinforcement to withstand the considerable forces encountered during gameplay. Careful management of wiring and cables connecting the camera **61** to the power source **65**, control input **64**, and wireless communication module or radio module **53** may be achieved within the outer chin safety cover **13**. An adeptly designed cable routing system for local interface **58** ensures a tidy and secure arrangement, thereby minimizing the risk of accidental disconnection or damage. Additionally, supplementary support structures and materials are judiciously implemented to guarantee the camera's **61** steadfast fixation throughout physical activities.

(44) In preferred embodiments, the radio module **53** may be configured to transmit image data, e.g., still and/or video image data recorded by the camera **61**. In further preferred embodiments, the radio module **53** may be configured to transmit image data recorded by the camera **61** in real-time (real-time meaning that an event that is recorded by the camera **61** may be transmitted by the radio module **53** almost immediately after it happens). Furthermore, the radio module **53** may enable the device **100** to communicate with a companion mobile app and/or external electronic device **400** which may provide an interface for managing camera **61** operations of the device **100** and viewing live or recorded video image footage.

(45) In some embodiments, the device **100** may comprise an accelerometer **62** which may be coupled to the body **11**. An accelerometer **62** may be configured to provide acceleration data about the device **100**, such as acceleration of motion data of the body **11**, to a processing unit **21**. An accelerometer **62** may comprise any type of accelerometer including capacitive accelerometers, piezoelectric accelerometers, piezoresistive accelerometers, hall effect accelerometers,

magnetoresistive accelerometers, heat transfer accelerometers, micro-electro mechanical system (MEMS) accelerometers, NANO technology accelerometers, or any other suitable device that is able to measure acceleration and to electrically communicate acceleration data.
(46) In some embodiments, an accelerometer **62** may be in electronic communication with a camera **61**, radio module **53**, and/or a processor **51** so that acceleration of motion data of the body **11** recorded by the accelerometer **62** may activate the camera **61** to record image data that may be transmitted by a radio module **53**. Optionally, an accelerometer **62** may be in electronic communication with a camera **61** and/or a processor **51** so that the accelerometer **62** may function as an automatic triggering mechanism that activates camera **61** recording based on specific events, such as impact or motion. This enables real-time streaming of the captured image data, e.g., video footage, to electronic devices **400** or platforms, providing instant access to the live video feed with programming to maintain stability and image quality during intense physical contact. In further embodiments, the accelerometer **62** may be configured to measure and record acceleration of motion data of the body **11**, and the radio module **53** may be configured to transmit the acceleration of motion data of the body **11**.
(47) In some embodiments, the device **100** may comprise a microphone **63** which may be coupled to the body **11**. A microphone **63** may be configured to pick up or record audio information from the environment around the device **100**. In preferred embodiments, a microphone **63** may comprise any acoustic-to-electric transducer or sensor that converts sound in air into an electrical signal. In further embodiments, a microphone **63** may comprise any type of microphone such as electromagnetic induction microphones (dynamic microphones), capacitance change microphones (condenser microphones), and piezoelectricity microphones (piezoelectric microphones) to produce an electrical signal from air pressure variations.
(48) In some embodiments, a microphone **63** may be in electronic communication with a camera **61**, a radio module **53**, and/or a processor **51** so that the camera **61** may be activated to record image data through voice command from a user **200**. In further embodiments, the radio module **53** may be configured to transmit sound data recorded by the microphone **63** in real-time.
(49) In some embodiments, the device **100** may comprise one or more control inputs **64** that a user **200** may interact with, such as push button or depressible button type switches, turnable control knobs, a key pad, slide type switches, rocker type switches, toggle switches, rotary switches, electromechanical relays, solid state relays, touch sensitive interfaces, and combinations thereof whether they are normally open, normally closed, momentary contact, latching contact, single pole, multi-pole, single throw, or multi-throw, touch screen graphical user interfaces (GUI), or any other suitable input that may be used to modulate electricity between components or to otherwise control functions of the device **100**. In preferred embodiments, a control input **64** may comprise a camera toggle switch that is operable to activate and deactivate the camera **61**. In further embodiments, Preferably, the device **100** may include control inputs **64** that may be configured as user interface buttons and indicators which allow the user **200** to control various camera **61** functions, including starting or stopping recording, adjusting settings, and initiating streaming (transmission of image data via a radio module **53**).
(50) In some embodiments, the device **100** may comprise a power source **65** which may be coupled to the body **11** and which may provide electrical power to any component that may require electrical power. A power source **65** may comprise a battery, such as a lithium-ion battery, nickel cadmium battery, alkaline battery, or any other suitable type of battery, a fuel cell, a capacitor, a super capacitor, or any other type of electricity storing and/or releasing device. In preferred embodiments, a power source **65** may comprise a rechargeable battery, such as a lithium-ion battery, nickel cadmium (NiCd) battery, nickel-metal hydride (NiMH) battery, etc. In further embodiments, a power source **65** may comprise a power cord, kinetic or piezo electric battery charging device, a solar cell or photovoltaic cell, and/or inductive charging or wireless power receiver. In further embodiments, a power source **65** may comprise a power charging and

distribution module which may be configured to control the recharging of the power source **65**, discharging of the power source **65**, and/or distribution of power to one or more components of the device **100** that may require electrical power.
(51) In preferred embodiments, the power source **65** may comprise a rechargeable lithium-ion battery that may be crafted from plastic or polymer materials specially engineered to insulate and shield the battery cells, and may be seamlessly integrated into the outer chin safety cover **13** to provide power to the camera **61**. The power source **65** is thoughtfully designed with a capacity intended to deliver ample power for extended periods of gameplay. Furthermore, the power source **65** is meticulously engineered to exhibit water-resistant or waterproof attributes, thereby affording them protection against environmental elements like rain or sweat.
(52) In some embodiments, the device **100** may comprise a charging port **66** that may be in electronic communication with the power source **65** and which may be configured to mate with a complementary external plug member which may be configured to supply electrical power to the power source **65**. Once the charging port **66** is mated with a complementary external plug member, electrical power may be communicated from the external plug member, through the charging port **66**, and to the power source **65** thereby allowing the power source **65** to be charged or recharged by the external plug member. In preferred embodiments, a charging port **66** may comprise a USB connector such as a female micro-USB or female mini-USB. In other embodiments, a charging port **66** may comprise a male or female Type A USB plug, a Type B USB plug, a Mini-A USB plug, a Mini-B USB plug, a Micro-A USB plug, a Micro-B USB plug, a Micro-B USB 3.0 plug, a ExtMicro USB plug, a Lightning plug, a 30-pin dock connector, a Pop-Port connector, a Thunderbolt plug, a Firewire plug, a Portable Digital Media Interface (PDMI) plug, a coaxial power connector plug, a barrel connector plug, a concentric barrel connector plug, a tip connector plug, or any other plug, connector, or receptacle capable of enabling electrical communication.
(53) In some embodiments, the device **100** may comprise a physiological sensor **67** which may be coupled to the body **11**. In preferred embodiments, and as shown in FIG. **3**, a physiological sensor **67** may be coupled to the inner pad member **12** within the body cavity **14** so that the physiological sensor **67** may contact or be positioned proximate to the chin **201** of the user **200** when the chin **201** is positioned in the body cavity **14**. A physiological sensor **67** may be configured to record physiological parameters, such as heart rate, blood pressure, body temperature, etc., of a user **200**. In preferred embodiments, a physiological sensor **67** may comprise a pulse oximeter, or Pulse Ox, which is an electronic device that measures the saturation of oxygen carried in a user's **200** red blood cells, and the physiological sensor **67** may be configured to provide pulse oximetry data (data describing oxygen saturation of a user's **200** blood and optionally pulse data) to a processing unit **21**. A pulse oximeter physiological sensor **67** may comprise any type of device or sensor that is configured to provide pulse oximetry data including an optical pulse oximetry sensor (standard pulse oximeter passes two wavelengths of light through tissue to a photodetector), a reflectance pulse oximetry sensor (places the photodetector on the same surface as the illumination and does not require a thin section of the person's body and therefore may be used almost anywhere on the body, such as the forehead, chin, chest, or feet), etc.
(54) In some embodiments, a physiological sensor **67** may be in electronic communication with a camera **61**, radio module **53**, and/or a processor **51** so that pulse oximetry data recorded by the physiological sensor **67** may be transmitted by a radio module **53**. This enables real-time streaming of the pulse oximetry data to electronic devices **400** or platforms, providing instant access to physiological data of a user **200** that is wearing the device **100**.
(55) In some embodiments, the device **100** may comprise one or more removable covers, such as a first removable cover **37** and a second removable cover **38**, that may be removably coupled to the body **11** and which may be configured to govern access to one or more electrical components that are coupled to the body **11**. In some embodiments, one or more removable covers, such as a first removable cover **37** and a second removable cover **38**, may be coupled to the outer chin safety

cover **13**. In further embodiments, one or more removable covers, such as a first removable cover **37** and a second removable cover **38**, may be coupled to the outer chin safety cover **13** and/or to the inner pad member **12**. Any suitable removable coupling method may be used to couple a removable cover **37**, **38**, to the body **11**. For example, a removable cover **37**, **38**, may be removably coupled to the body **11** by being press fit or snap fit together, via snap fasteners, via threaded fasteners, via a slide to lock connection method, etc.

(56) Removable covers **37**, **38**, may be configured in any size and shape. In preferred embodiments, removable covers **37**, **38**, may comprise substantially rigid materials, such as which may be used to form outer chin safety cover **13**, that may include impact-resistant materials, including but not limited to Thermoplastic Polyurethane (TPU), Polycarbonate (PC), and rubberized coatings. Optionally, removable covers **37**, **38**, may comprise cushioning materials, such as which may be used to form inner pad member **12**. Substantially rigid materials and/or cushioning materials of removable covers **37**, **38**, may effectively shield one or more electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) from impact forces and the rigors of gameplay, thereby preserving its integrity and functionality.

(57) In some embodiments, one or more electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) of the device **100** may be integrated into the left and right sides of the outer chin safety cover **13** so that the one or more electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) may be separated by the central region **13**A and body cavity **14** of the body **11**. These electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) may be safeguarded by a first removable cover **37** and/or a second removable cover **38**, and once removable cover(s) **37**, **38**, are removed or opened from the body **11**, one or more of the electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) may be accessed.

(58) It should be understood that electronic components (**51**, **52**, **53**, **54**, **55**, **61**, **62**, **63**, **64**, **65**, **66**, **67**) may be coupled to any element of the device **100** and more preferably coupled to an outer chin safety cover **13** and/or an inner pad member **12**. In preferred embodiments, the device **100** may comprise a first removable cover **37**, optionally coupled to the body **11** by being coupled to the left side of the outer chin safety cover **13** (e.g., coupled to the outer chin safety cover **13** left of the central region **13**A), and the power source **65** may be positioned between the body **11** and the first removable cover **37**. In further embodiments, a radio module **53** may be positioned between the body **11** and the first removable cover **37**. In some embodiments, a first removable cover **37** may be dedicated to safeguarding a power source **65**, such as a lithium-ion battery unit, and the radio module **53**. Optionally, a power source **65** and a radio module **53** may be integrated together and may be collectively referred to as “a power module.”

(59) In preferred embodiments, the device **100** may comprise a second removable cover **38**, optionally coupled to the body **11** by being coupled to the right side of the outer chin safety cover **13** (e.g., coupled to the outer chin safety cover **13** right of the central region **13**A), and all or portions of the camera **61** may be positioned between the body **11** and the second removable cover **38** so that the second removable cover **38** covers at least a portion of the camera **61**. In some embodiments, a second removable cover **38** may comprise a camera window **39** which may comprise an opening or aperture which may be positioned over the lens of the camera **61**. In further embodiments, a second removable cover **38** may comprise a camera window **39** which may comprise a clear or transparent material, such as clear plastic, which may be positioned over the lens of the camera **61**.

(60) In further embodiments, a microphone **63** may be positioned between the body **11** and the second removable cover **38**. In some embodiments, a second removable cover **38** may comprise a microphone window **40** which may comprise an opening or aperture which may be positioned over the microphone **63** to aid in the ability of the microphone **63** to pick up sound. In some embodiments, a second removable cover **38** may be dedicated to safeguarding a power source **65**, such as a lithium-ion battery unit, and the radio module **53**. Optionally, processor **51**, I/O interfaces

52, radio module **53**, data store **54**, memory **55**, camera **61**, and microphone **63** may be integrated together and may be collectively referred to as “a camera module.”

(61) In preferred embodiments, ideally situated at the uppermost section of the inner pad member **12** may be a control input **64** that may function as a camera toggle switch, as shown in FIG. **3**, that may be configured for enabling the user **200** or wearer to manually initiate and terminate recording and streaming functions of the camera **61**.

(62) In some embodiments, preferably positioned directly within the inner pad member **12**, an accelerometer **62** may be positioned, that is designed to measure rapid forces on the device **100**. In some embodiments, a charging port **66**, such as a USB-C charging port **66**, may be coupled to inner pad member **12**, as shown in FIG. **3**.

(63) In preferred embodiments, stringent sealing and gasket mechanisms are effectively utilized on the interface between removable covers **37**, **38**, and the interface of inner pad member **12** and outer chin safety cover **13** to prevent the intrusion of water or moisture into the body **11**, thereby preserving the camera **61** and power source **65** reliability and longevity, even when subjected to adverse conditions. In preferred embodiments, the device **100** may comprise a power module that is meticulously constructed to securely anchor the power source **65** in place, effectively averting any inadvertent disconnection, movement, or displacement during gameplay. Within the body **11**, materials characterized by their heat-resistant attributes, such as fire-retardant plastics or insulating materials, are judiciously employed. These materials, in combination with well-conceived ventilation and cooling features integrated into the removable covers **37**, **38**, serve the dual purpose of dissipating heat generated during power source **65** operation and maintaining safe operating temperatures, thereby ensuring the device's **100** reliable and secure performance.

(64) While some exemplary shapes and sizes have been provided for elements of the device **100**, it should be understood to one of ordinary skill in the art that the body **11**, inner pad member **12**, outer chin safety cover **13**, and any other element described herein may be configured in a plurality of sizes and shapes including “T” shaped, “X” shaped, square shaped, rectangular shaped, cylinder shaped, cuboid shaped, hexagonal prism shaped, triangular prism shaped, or any other geometric or non-geometric shape, including combinations of shapes. It is not intended herein to mention all the possible alternatives, equivalent forms or ramifications of the invention. It is understood that the terms and proposed shapes used herein are merely descriptive, rather than limiting, and that various changes, such as to size and shape, may be made without departing from the spirit or scope of the invention.

(65) Additionally, while some materials have been provided, in other embodiments, the elements that comprise the device **100** may be made from or may comprise durable materials such as aluminum, steel, other metals and metal alloys, wood, hard rubbers, hard plastics, fiber reinforced plastics, carbon fiber, fiberglass, resins, polymers or any other suitable materials including combinations of materials. Additionally, one or more elements may be made from or may comprise durable and slightly flexible materials such as soft plastics, silicone, soft rubbers, or any other suitable materials including combinations of materials. In some embodiments, one or more of the elements that comprise the device **100** may be coupled or connected together with heat bonding, chemical bonding, adhesives, clasp type fasteners, clip type fasteners, rivet type fasteners, threaded type fasteners, other types of fasteners, or any other suitable joining method. In other embodiments, one or more of the elements that comprise the device **100** may be coupled or removably connected by being press fit or snap fit together, by one or more fasteners such as hook and loop type or Velcro® fasteners, magnetic type fasteners, threaded type fasteners, sealable tongue and groove fasteners, snap fasteners, clip type fasteners, clasp type fasteners, ratchet type fasteners, a push-to-lock type connection method, a turn-to-lock type connection method, a slide-to-lock type connection method or any other suitable temporary connection method as one reasonably skilled in the art could envision to serve the same function. In further embodiments, one or more of the elements that comprise the device **100** may be coupled by being one of connected to and integrally

formed with another element of the device **100**.
(66) Although the present invention has been illustrated and described herein with reference to preferred embodiments and specific examples thereof, it will be readily apparent to those of ordinary skill in the art that other embodiments and examples may perform similar functions and/or achieve like results. All such equivalent embodiments and examples are within the spirit and scope of the present invention, are contemplated thereby, and are intended to be covered by the following claims.

Claims

1. A chinstrap camera device, the device comprising: a body comprising an inner pad member and an outer chin safety cover, wherein the inner pad member is coupled to the outer chin safety cover, and wherein the inner pad member comprises a body cavity that is configured to receive a portion of a chin of a user; one or more flexible straps coupled to the body; a helmet fastener that is coupled to the one or more flexible straps, wherein the helmet fastener is configured to be coupled to a helmet; a camera coupled to the body; and a radio module coupled to the body, the radio module in electronic communication with the camera, wherein the radio module is configured to transmit image data recorded by the camera.
2. The device of claim 1, wherein the radio module is configured to transmit image data recorded by the camera in real-time.
3. The device of claim 1, wherein the one or more straps are removably coupled to the body.
4. The device of claim 1, wherein the helmet fastener comprises a snap fastener.
5. The device of claim 1, wherein the helmet fastener comprises a helmet buckle.
6. The device of claim 1, wherein the inner pad member comprises a cushioning material.
7. The device of claim 1, wherein the outer chin safety cover comprises a substantially rigid material.
8. The device of claim 1, wherein the image data recorded by the camera comprises video image data.
9. The device of claim 1, further comprising a power source that is coupled to the body.
10. The device of claim 9, wherein power source is a rechargeable battery.
11. The device of claim 10, further comprising a charging port that is in electronic communication with the power source.
12. The device of claim 1, further comprising an accelerometer that is in electronic communication with the radio module.
13. The device of claim 1, wherein the accelerometer is configured to measure acceleration of motion data of the body, and wherein the radio module is configured to transmit the acceleration of motion data of the body.
14. The device of claim 1, further comprising a microphone that is in electronic communication with the radio module.
15. The device of claim 14, wherein the radio module is configured to transmit sound data recorded by the microphone in real-time.
16. The device of claim 1, further comprising a control input that is operable to activate and deactivate the camera.
17. The device of claim 1, further comprising a first removable cover that is removably coupled to the body.
18. The device of claim 17, further comprising a power source that is coupled to the body, wherein the power source is positioned between the body and the first removable cover.
19. The device of claim 17, further comprising a second removable cover that is removably coupled to the body, wherein the second removable cover covers a portion of the camera.
20. The device of claim 1, further comprising a physiological sensor that is coupled to the inner pad

member, wherein the physiological sensor comprises a pulse oximeter, and wherein the physiological sensor is in electronic communication with the radio module.