cation Ser. No. 10/944,436; U.S. Pat. No. 6,969,408; U.S. patent application Ser. No. 10/742,455; U.S. Pat. No. 6,899, 737; U.S. Pat. No. 5,181,932; U.S. Pat. No. 4,822,363; U.S. Pat. No. 6,071,313; and U.S. Pat. No. 6,811,571.

[0090] As illustrated, the foot member of the intelligent prosthetic foot **30** of **FIG. 4** includes an elongated member **34** extending between a front end **47** and at a rear end **48**. The foot member of the intelligent prosthetic foot **30** is preferably made from an integral piece of material which is substantially plate-like, having a substantially flat configuration with a substantially rectangular cross-section along its length. As shown in **FIG. 6**, the foot member further comprises a heel member **32** extending rearwardly from a location on the foot member intermediate the front end **47** and rear end **48**. The heel member **32** may also have an elongate, substantially-plate like configuration like the elongated member **34**. As shown in **FIG. 6**, the elongated member **34** and heel member **32** can be connected using bolts **56** or other suitable means. An adapter **58** is provided on an upper surface of the foot member for connection to a pylon or other intermediate member.

[0091] The elongated member **34** and heel member **32** are preferably constructed of a resilient material that is capable of flexing in multiple directions. The material may comprise multiple layers, or laminae. Examples of possible materials for the members are carbon, any polymer material, and any composite of polymer and fiber. The polymer could be thermoset or thermoplastic. In a composite, the fiber reinforcement could be any type of fiber, such as carbon, glass or aramid. The fibers could be long and unidirectional, or they could be chopped and randomly oriented.

[0092] The elongated member **34** as illustrated in **FIG. 4** is split into multiple independent toe members configured to flex substantially independently of one another at least partially along their length. In the illustrated embodiment, the elongated member **34** is split into two independent toe members **45**, **46**. For example, the foot member **10** may comprise at least one longitudinal slot **49** having a substantially constant width extending from the front end **47** thereof towards a rear point proximal the rear end **48** of the elongated member **34**.

[0093] Further details of a base prosthetic foot may be found in U.S. patent application Ser. No. 10/642,125, incorporated by reference herein.

[0094] In **FIGS. 5 through 10** the same reference numbers refer to similar features common to both figures. Additionally, the text below refers to a component called a "sensor system." The sensor system should be understood to mean any collection of bending force sensors in accordance with the embodiments of the invention. In the illustrated embodiments in **FIGS. 5 through 10**, the sensor system **50** comprises two bending force sensors **38**. In addition to the sensors, the phrase "sensor system" refers to the substrate upon which the sensors are embedded, which substrate may be, for example, attached, bonded, embedded, adhered, laminated, combinations of the same and the like, etc. to a device associated with a limb, such as a prosthetic foot. Additionally, the sensor system illustrated in **FIG. 5** comprises connecting wires **42** that provide the path for sensed data to reach some processing unit, not generally to be considered part of the sensing system. The illustrated sensor system **50** also includes an attachment portion **52** without any sensor material. The illustrated attachment portion **52** provides additional surface area for adhering the sensor system **50** to, for instance, a prosthetic foot. In other embodiments, the sensor system **50** may be laminated into the fibers of an intelligent device, such as the carbon fibers of a prosthetic foot. The holes **54** provide an entry for the bolts, for example the bolts **56** as illustrated **FIG. 6**, that are used to adjoin plates of the prosthetic foot. The connecting wires **55** provide a communication path from the bending force sensors **38** to a connecting attachment that provides a communication path to a computing device that processes the data.

[0095] The sensor system **50** shown in **FIG. 5** includes two elongate sensors **38**, which may be resistive strips such as described above. It will be appreciated that any suitable sensor may be used to measure a desired performance, force, alignment, or biomechanical characteristic of the foot. Such sensors **38** comprise an elongate, substantially planar body that provides a flat surface that extends across an upper surface of the prosthetic foot in a longitudinal or posterior-to-anterior direction. As used herein, the elongate configuration of the sensors **38** generally refer to the sensors having a length to width ratio of greater than about 2:1, more preferably greater than about 5:1 or even 10:1. In one embodiment, the sensors **38** have a length of about ½ inch or greater, more preferably about one inch or greater, more preferably about two inches or greater, or even about three inches or greater. The width of the sensors **38** may in one embodiment be between about ⅛ of an inch and ½ inch. The sensors **38** also have a flexible construction, allowing them to bend with the foot member during use of the foot. Some sensors may comprise resistive carbon technology. Suitable sensors are available from Spectra Symbol Corp. of Salt Lake City, Utah.

[0096] As illustrated in **FIG. 6**, the sensors **38** are preferably located along an intermediate portion of an upper surface of the foot member. However, it will be appreciated that the sensors **38** may be provided at any suitable location for taking bending or other measurements. The sensor system **50** as illustrated is provided such that left and right sensors **38** are provided on opposite sides of the slot **49**, such that measurements can be taken not only for bending along an anterior-posterior direction, but also comparisons can be made for medial/lateral differences.

[0097] Because **FIGS. 6 through 10** contain many similar elements previously described, the description of those elements is not repeated.

[0098] **FIG. 6** illustrates a simple intelligent foot with a clip on connector for communicating data gathered from the bending sensors. In the illustrated embodiment, the sensor system **50** is adhered to the top surface of a prosthetic foot. In this simple embodiment, the intelligent foot does not perform any processing. Instead, the connecting wires providing a path for the sensed data are configured into a connecting band **60** to which a simple clip-on connector **62** may be attached. The clip-on connector **62** provides paths for the sensed data, leading to a connectible processing component, such as those discussed below. In this embodiment, the processing, storing, and outputting of sensed data occurs on a connectible device (not illustrated). Such an external processing component may be adapted to perform functions as described below. Because the sensor system