CLAIMS

1. A method, in a data processing system, comprising at least one processor and at least one memory, wherein the at least one memory comprises instructions that are executed by the at least one processor to configure the at least one processor to implement an intraoral control mechanism that allows a user to control an operation of a computer system or an electronic device in accordance with an illustrative embodiment, the method comprising:

generating a machine learning classifier trained using strain measurements mapped to character and gesture labels;

receiving, from an intraoral control mechanism, a digital input signal, wherein the digital input control signal is received from the intraoral control mechanism through the intraoral control mechanism performing the following:

detecting, by a sensor of the intraoral control mechanism, a strain ~~based on~~cause by a tongue of a user moving a control mechanism away from a fixed position, wherein the intraoral control mechanism is comprised within a dental retainer worn by the user, wherein the dental retainer comprises a molded plastic center section that affixes to the hard palate in the user's mouth, and wherein the molded plastic center section comprises at least the control mechanism and the sensor;

transducing, by the sensor, the detected strain into a control signal;

amplifying, by an amplifier of the intraoral control mechanism, an amplitude of the control signal thereby producing an amplified control signal;

converting, by an analog-to-digital converter of the intraoral control mechanism, the amplified control signal to a digital input signal;

modulating, by a radio frequency (RF) microcontroller of the intraoral control mechanism, the digital input signal onto a transmission frequency wave;

transmitting, by the RF microcontroller, the digital input signal to the computer system ~~which then interprets~~;

predicting characters or gestures from the digital input signal ~~by means of pre-trained classifiers and other software into a digital control signal;~~

~~either:~~

~~executing~~using the ~~digital control signal on~~machine learning classifier;

performing, by the computer system ~~itself and performing,~~ an operation ~~associated with~~based on the ~~digital control signal;~~predicted characters or gestures; and

~~transmitting the digital control signal to an electronic device control mechanism of the electronic device thereby causing the electronic device in which the electronic device control mechanism is comprised to operate as indicated by the digital control signal; and~~

~~saving~~ the digital input signal for analysis and characterization of the user.

2. ~~The method of~~ claim 1~~, wherein the intraoral control mechanism is comprised within a dental retainer worn by the user.~~

~~3. The method of claim 2, wherein the dental retainer comprises a molded plastic center section that affixes to the hard plate in the user's mouth and wherein the molded plastic center section comprises at least the control mechanism and the sensor.~~

~~4. The method of claim 3~~, wherein the amplifier, the analog-to-digital converter, the microcontroller, and the antenna are comprised within the molded plastic center section.

~~5.~~ 3. The method of ~~claim~~ ~~3~~1, wherein the amplifier, the analog-to-digital converter, the microcontroller, and the antenna are comprised within wires attached to the molded plastic center section, the wires wrapping around the ~~user's~~user's upper teeth and holding the dental retainer in the ~~user's~~user's mouth.

~~6.~~ 4. The method of claim 1, wherein the control mechanism has 360 degrees of motion and an up motion followed by a down motion.

~~7.~~ 5. The method of claim 1, wherein the sensor is selected from the group ~~comprising~~consisting of a metal structure, a piezo-resistive structure, or a piezoelectric structure.

~~8.~~ 6. The method of claim 1, wherein the strain is selected from the group ~~comprising~~consisting of a stress, a force, a torque, a displacement, an acceleration, or a position.

~~9.~~ 7. The method of ~~claim~~ claim 1, wherein the control mechanism is a projection on a molded plastic center section of a dental retainer and wherein the projection is selected from the group ~~comprising~~consisting of a kinematic projection, spreading projection, breakup projection, recoiling projection, or bouncing projection.

8. ~~10.~~ The method of ~~claim~~ claim 1, wherein the control signal indicates an operation for the electronic device and wherein the operation is selected from the group ~~comprising~~consisting of on, off, select, forward, backward, left, right, up, down, or any other arbitrarily defined operation.

9. ~~11.~~ An apparatus comprising:

~~at least one processor; and~~

~~at least one memory coupled to the at least one processor, wherein the at least one memory comprises instructions which, when executed by the at least one processor, cause the at least one processor for allowing a user to control an operation of a computer system or an electronic device in accordance with an illustrative embodiment, and further cause the at least one processor to:~~

~~receive, from an intraoral control mechanism, a digital input signal, wherein the digital input control signal is received from the intraoral control mechanism through the intraoral control mechanism:~~ performing the following:

~~detecting, by a sensor of the intraoral control mechanism, a strain based on~~cause by a tongue of a user moving a control mechanism away from a fixed position~~;~~, wherein the intraoral control mechanism is comprised within a dental retainer worn by the user, wherein the dental retainer comprises a molded plastic center section that affixes to the hard palate in the user's mouth, and wherein the molded plastic center section comprises at least the control mechanism and the sensor;

~~transducing, by the sensor, the detected strain into a control signal;~~

~~amplifying, by an amplifier of the intraoral control mechanism, an amplitude of the control signal thereby producing an amplified control signal;~~

~~converting, by an analog-to-digital converter of the intraoral control mechanism, the amplified control signal to a digital input signal;~~

~~modulating, by a radio frequency (RF) microcontroller of the intraoral control mechanism, the digital input signal onto a transmission frequency wave; and~~

~~transmitting, by the RF microcontroller, the digital input signal to the computer system which then interprets;~~

predict characters or gestures from the digital input signal using the machine learning classifier;

either:

perform, by ~~means of pre-trained classifiers and other software into a digital control signal;~~

~~either:~~

~~executing the digital control signal on the~~ the computer system ~~itself and performing~~ an operation ~~associated with~~based on the ~~digital control signal;~~predicted characters or gestures; and

~~transmitting the digital control signal to an electronic device control mechanism of the electronic device thereby causing the electronic device in which the electronic device control mechanism is comprised to operate as indicated by the digital control signal; and~~

~~save~~ the digital input signals for analysis and characterization of the user.

10. The method of claim 1, further comprising grouping strain measurements corresponding to known movement actions, applying dynamic time warping, and identifying idioms.

11. The method of claim 1, wherein the machine learning classifier comprises a piece-wise linear regression model.

12. The method of claim 1, wherein saving the digital input signals comprises recording strain signals over time at different visits to a physician or technician.

13. The method of claim 1, wherein analysis and characterization of the user comprise characterizing health states related to chewing, swallowing, coughing, bruxism, or temporomandibular joint disorders.

14. ~~The apparatus of~~ claim ~~1~~19, wherein the ~~intraoral~~ control mechanism ~~is comprised within a dental retainer worn~~has 360 degrees of motion and an up motion followed by ~~the user~~a down motion.

~~13. The apparatus of claim 12, wherein the dental retainer comprises a molded plastic center section that affixes to the hard plate in the user's mouth and wherein the molded plastic center section comprises at least the control mechanism and the sensor~~15. The apparatus of claim 14.

~~14. The apparatus of claim 13~~, wherein the amplifier, the analog-to-digital converter, the microcontroller, and the antenna are comprised within the molded plastic center section.

~~15.~~ 16. The apparatus of ~~claim 13~~14, wherein the amplifier, the analog-to-digital converter, the microcontroller, and the antenna are comprised within wires attached to the molded plastic center section, the wires wrapping around the ~~user's~~user's upper teeth and holding the dental retainer in the ~~user's~~user's mouth.

~~16.~~ 17. The apparatus of ~~claim 11, wherein the control mechanism has 360 degrees of motion and an up motion followed by a down motion.~~

~~17. The apparatus of claim 11~~14, wherein the sensor is selected from the group ~~comprising~~consisting of a metal structure, a piezo-resistive structure, or a piezoelectric structure.

18. The apparatus of ~~claim 11~~14, wherein the strain is selected from the group ~~comprising~~consisting of a stress, a force, a torque, a displacement, an acceleration, or a position.

19. The apparatus of ~~claim 11~~14, wherein the control mechanism is a projection on a molded plastic center section of a dental retainer and wherein the projection is selected from the group ~~comprising~~consisting of a kinematic projection, spreading projection, breakup projection, recoiling projection, or bouncing projection.

20. A computer program product comprising a computer readable storage medium having a computer readable program for allowing a user to control an operation of a computer system or an electronic device stored therein, wherein the computer readable program, when executed on a data processing system, causes the data processing system to:

receive, from an intraoral control mechanism, a digital input signal, wherein the digital input control signal is received from the intraoral control mechanism through the intraoral control mechanism:

detecting, by a sensor of the intraoral control mechanism, a strain ~~based on~~cause by a tongue of a user moving a control mechanism away from a fixed position~~;~~, wherein the control mechanism is comprised within a dental retainer worn by the user, wherein the dental retainer comprises a molded plastic center section that affixes to the hard palate in the user's mouth, and wherein the molded plastic center section comprises at least the control mechanism and the sensor;

transducing, by the sensor, the detected strain into a control signal;

amplifying, by an amplifier of the intraoral control mechanism, an amplitude of the control signal thereby producing an amplified control signal;

converting, by an analog-to-digital converter of the intraoral control mechanism, the amplified control signal to a digital input signal;

modulating, by a radio frequency (RF) microcontroller of the intraoral control mechanism, the digital input signal onto a transmission frequency wave; and

transmitting, by the RF microcontroller, the digital input signal to the computer system which then interprets; and

predict characters or gestures from the digital input signal by means of pre-trained classifiers and other software into a digital control signal; and

either:

executingusing the digital control signal onmachine learning classifier;

perform, by the computer system itself and performing an operation associated withbased on the digital control signal;predicted characters or gestures; and

transmitting the digital control signal to an electronic device control mechanism of the electronic device thereby causing the electronic device in which the electronic device control mechanism is comprised to operate as indicated by the digital control signal; and

save the digital input signals for analysis and characterization of the user.