This invention relates to systems and methods for a martial arts training station which includes an impact target having one or more impact sensors measuring workout performance data such as a position, direction, timing, velocity and force of impacts generated by a user. The training station also includes a reactive coach application which provides a workout routine for the user, receives workout performance data, and reactively modify the workout routine based on the received workout data. The reactive coach application also reactively providing motivational feedback. This motivational feedback is dynamically adjusted to the effectiveness of the motivational feedback as measured by the user’s compliance and/or improvement of the user’s performance. In some embodiments, the training station communicates with other training stations via a reactive coach server over a local area network and/or a wide area network, thereby enabling the user to compete against other users.
1000

START

1010

TRAINING STATION SYSTEM START UP SEQUENCE

1020

LOGIN MENU LAUNCHES

1030

MAIN MENU VIEW DISPLAYED

1040

USER COMPLETES WORKOUT SESSION AND LOGS OFF?

1099

YES

END

FIG. 10
FROM STEP 1000

REACTIVE COACH ("RC") APPLICATION IS LAUNCHED

RC SERVER APPLICATION IS LAUNCHED

RC APPLICATION SCREEN SHOTS ARE LOADED

TO STEP 1020

FIG. 11
FROM STEP 1020

NEW USER?

VIDEO HOST RECOMMENDS NEW USERS TO VIEW "GETTING STARTED" AND "HOW TO" VIDEOS

USER TOUCHES "GETTING STARTED" BUTTON

USER TOUCHES "HOW TO" BUTTON

TO INTRODUCTION (SEE FIG. 13)

TO PREPARATION (SEE FIG. 14)

TO STEP 1230

FIG. 12A
TO MEDICAL TIPS (SEE FIG. 15)

TO WARM UP (SEE FIG. 16)

TO WORKOUT (SEE FIG. 17)

TO PROGRESS SCREEN (SEE FIG. 20)

FROM STEP 1225

USER TOUCHES "DOCTORS SAFETY TIPS" BUTTON

USER TOUCHES "WARM UP EXERCISES"

USER TOUCHES "CHOOSE A WORKOUT" BUTTON

USER TOUCHES "YOUR PROGRESS REPORT" BUTTON

TO STEP 1040

FIG. 12B
FROM STEP 1215

"GETTING STARTED" VIEW MENU SCREEN LAUNCHES

USER CAN CHOOSE TO VIEW "EQUIPMENT NEEDED TO START" VIDEOS

USER CAN CHOOSE TO VIEW "COACH MONITOR INTRO" VIDEOS

TO STEP 1215

FIG. 13
FROM STEP 1220

"HOW TO'S" VIEW MENU SCREEN LAUNCHES

USER CAN CHOOSE TO VIEW "WRAP YOUR HANDS" VIDEOS

USER CAN CHOOSE TO VIEW "BREATHEING PROPERLY, PROPER STANCE, BASIC PUNCH OR KICK" VIDEOS

TO STEP 1215

FIG. 14
FROM STEP 1235

DOCTOR ON VIDEO EXPLAINS COMMON INJURIES RELATED TO MIXED MARTIAL ARTS

USER CAN VIEW MEDICAL VIDEOS OF COMMON INJURIES

USER CAN VIEW MEDICAL VIDEOS OF TREATING COMMON INJURIES

TO STEP 1215

FIG. 15
1242

FROM STEP 1240

“WARM UP EXERCISES” VIEW SCREEN APPEARS

USER CAN VIEW STRETCHING VIDEOS

USER CAN VIEW WARM UP VIDEOS

USER CAN VIEW “JUMP ROPE” WARM UP EXERCISE VIDEO

TO STEP 1215

FIG. 16
FROM STEP 1245

USER CHOOSES BOXING WORKOUT

USER CHOOSES KICKBOXING WORKOUT

USER CHOOSES MUAY THAI WORKOUT

USER CHOOSES WORKOUT X

USER CHOOSES "LIVE COMPETITION"

FIG. 17

TO STEP 1801

TO STEP 1901

TO STEP 1215

TO STEP 1247
FROM STEP 1710, 1720, OR 1730

REACTIVE COACH APPLICATION LOADS USER DATA TO DETERMINE WHICH WORKOUT ROUTINES ARE AVAILABLE

WORKOUT MAIN MENU SCREEN FOR RESPECTIVE WORKOUT ROUTINE IS LOADED

USER CHOOSES AND BEGINS WORKOUT BY FOLLOWING INSTRUCTOR ON THE VIDEO PLAYBACK SCREEN

USER HITS ARE REGISTERED WITH SENSORS ON PUNCHING BAG; SENSOR DATA IS SENT TO THE REACTIVE COACH SOFTWARE

TO STEP 1830

FIG. 18A
FROM STEP 1825

REACTIVE COACH APPLICATION COMPARES USER SENSOR DATA TO THE RECORDED HITS OF THE VIDEO INSTRUCTOR

REACTIVE COACH APPLICATION DETERMINES IF USER IS FALLING BEHIND, ON TIME, OR AHEAD OF THE VIDEO INSTRUCTOR

REACTIVE COACH APPLICATION PROMPTS USER TO CATCH UP OR SLOW DOWN BY AUDIO AND VISUAL MEANS

REACTIVE COACH APPLICATION SIMULTANEOUSLY CALCULATES AND DISPLAYS CALORIES BURNED BY USER

TO STEP 1860

FIG. 18B
FIG. 18C
FROM STEP 1785

USER SEARCHES ONLINE USING REACTIVE COACH APPLICATION TO FIND OTHER LIVE REMOTE USER(S) TO LOCATE

REACTIVE COACH FINDS REMOTE USER(S) LOGGED IN ON A VIP CM MACHINE AND REQUESTS COMPETITION

REMOTE USER(S) TO COMPETE?

YES

REACTIVE COACH APPLICATION ON ALL CONNECTED TRAINING PLATFORMS ACTIVATE BUILT IN VIDEO CAMERAS FOR USERS TO SEE EACH OTHER

TO STEP 1930

NO

TO STEP 1780
1900B

FROM STEP 1925

COMPETITION LIVE SCREEN DISPLAYS ON ALL TRAINING PLATFORMS WITH LIVE VIDEO FEEDS FROM ALL CONNECTED USERS

CONNECTED USERS AND/OR COACHES SELECT WORKOUT FOR COMPETITION

REACTIVE COACH APPLICATIONS SYNCHRONIZE WITH REACTIVE COACH SERVER AND COMPETITION BEGINS

USER HITS, ACCURACY, AND CALORIES BURNED DATA RECORDED BY RESPECTIVE RC APPLICATIONS

TO STEP 1960

FIG. 19B
AT END OF WORKOUT COMPETITION ALL REACTIVE COACH APPLICATIONS SEND USER DATA TO RC SERVER

REACTIVE COACH SERVER COMPARES ALL USER DATA TO DETERMINE USER WITH THE MOST ACCURATE HITS

REACTIVE COACH SERVER SENDS COMPILED DATA TO ALL USERS & DETERMINES WINNER AND USER RANKINGS OF WORKOUT COMPETITION

REACTIVE COACH SERVER TERMINATES CONNECTION BETWEEN RC APPLICATIONS

TO STEP 1740
From Step 1250,

User can choose to check current workout progress on screen of training platform.

User has the option to log on to personal social network account online through RC application.

User has the option to post weight loss, calories burned, and hits completed on social network account.

User has the option to post live competition results on social network account.

User exits out of progress report screen.

To step 1299.

**FIG. 20**
FIG. 21A
Getting Started

2140
Main Menu

2145
Equipment Needed

2150
Coach Monitor Intro

FIG. 21B
How To's

- Main Menu
- Wrap Your Hands
- Breathing Properly
- Proper Stance
- Basic Punches
- Basic Kicks
- Proceed to Warm Ups

FIG. 22A
FIG. 22B

Wrap Your Hands

Main Menu
Back
FIG. 22C
Breathing Properly

2210  Main Menu
2290  Back

FIG. 22C
Proper Stance

FIG. 22D
Basic Kicks

FIG. 22F
FIG. 24A

Warm Up Exercises

- 2410 Main Menu
- 2490 Back
- 2422 Stretching Only
- 2424 Stretch/Warm Up A
- 2426 Stretch/Warm Up B
- 2429 Stretch/Warm Up M
FIG. 24B

Stretching Only

2410
Main Menu

2490
Back
FIG. 24C

Stretch / Warm Up A

Main Menu

Back

2410
2490
Choose A Workout

- Main Menu
- Boxing
- Kickboxing
- Muay Thai
- ...
- Workout X
- LIVE Competition

FIG. 25
Boxing

Beginner

INTRO - Basic Punches
1. Jab
2. Cross
3. Jab, Cross
4. Double Jab, Cross
5. Double Jab, Double Cross

Duration: 10 Min

INTRO - Basic Combos #2
1. Jab
2. Cross
3. Jab, Cross
4. Double Jab, Cross
5. Double Jab, Double Cross

Duration: 10 Min

INTRO - Basic Combos #1
1. Jab
2. Cross
3. Jab, Cross
4. Double Jab, Cross
5. Double Jab, Double Cross

Duration: 10 Min

INTRO - Basic Combos #3
1. Jab
2. Cross
3. Jab, Cross
4. Double Jab, Cross
5. Double Jab, Double Cross

Duration: 10 Min

FIG. 26A
FIG. 26B
Muay Thai Workouts

**Beginner**

- **INTRO - Basic Punches**
  1. Jab
  2. Cross
  3. Jab, Cross
  4. Double Jab, Cross
  5. Double Jab, Double Cross
  
- **INTRO - Basic Kicks**
  1. Jab, Cross
  2. Switch
  3. Jab (Left Front Kick)
  4. Jab (Right Rear Round Kick)
  5. Right Rear Round Kick, Switch Kick

**INTRO - Basic Combos #1**

- Jab, Right Rear Round Kick
- Jab, Cross, Switch Kick
- Jab, Cross, Right Rear Round Kick
- Jab, Cross, Switch Kicks
- Jab, Cross, Switch Kicks, Right Rear Round Kick

**INTRO - Basic Combos #2**

- Jab, Front Kick, Cross
- Jab, Cross, Teb (Left Front Kick)
- Jab, Cross, Teb (Left Front Kick)
- Jab (Right Rear Round Kick)
- Jab, Double Jab, Cross, Teb (Left Front Kick)

**INTRO - Basic Combos #3**

- Jab, Right Rear Round Kick
- Jab, Switch Kick
- Jab, Right Rear Round Kick, Jab
- Jab, Right Rear Round Kick, Cross
- Jab, Right Rear Round Kick, Jab, Cross

**INTRO - Basic Combos Random Move**

**FIG. 26C**
Muay Thai Workouts

INTER - Punches
1. Jab
2. Cross
3. Jab, Cross
4. Double Jab, Cross
5. Double Jab, Double Cross

INTER - Kicks
1. Right Rear Round Kick
2. Switch
3. Neb (Left Front Kick)
4. Neb (Right Rear Front Kick)
5. Right Rear Round Kicks, Switch Kick

INTER - Combos #1
1. Jab, Right Rear Round Kick
2. Cross, Switch Kick
3. Jab, Cross, Right Rear Round Kick
4. Jab, Cross, Switch Kick
5. Jab, Cross, Switch Kick, Right Rear Round Kick

INTER - Combos #2
1. Neb, Front Kick, Cross
2. Jab, Cross, Neb (Left Front Kick), Cross
3. Cross, Neb, Right Rear Round Kick, Cross
4. Double Jab, Switch Kick
5. Double Jab, Double Cross, Neb, Cross

INTER - Combos #3
1. Neb, Right Rear Round Kick
2. Switch Kick
3. Neb, Right Rear Round Kick, Jab
4. Neb, Right Rear Round Kick, Cross
5. Neb, Right Rear Round Kick, Jab, Cross

INTER - Combos Random Mode

FIG. 26D
Live Competition Workout

- ✔ Competitor #1  USA
- ✔ Competitor #2  CAN
- ✔ Competitor #3  MEX

FIG. 27A
Live Competition Workout

Competitor #1 USA

Competitor #2 CAN

Competitor #3 MEX

FIG. 27B
INTERACTIVE SYSTEMS AND METHODS FOR REACTIVE MARTIAL ARTS FITNESS TRAINING

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to provisional application No. 61/293,944 (Attorney Docket Number 6680778) filed Jan. 11, 2010, entitled “MIXED MARTIAL ARTS BASED CARDIOVASCULAR FITNESS MACHINE”, by Anthony D. Morales, which is incorporated by reference herein for all purposes.

BACKGROUND

[0002] The present invention relates to reactive systems and methods for fitness training in many styles of martial arts including mixed martial arts (MMA).

[0003] Computerized exercise machines such as treadmills, stationary bicycles, and elliptical machines have been in common use for several years and they offer users with a menu of cardio vascular training programs which can be altered to suit individual users. These machines are generally standalone and configured as needed by each individual prior to a static training session.

[0004] There are also martial art machines that monitor the performance of users and provide feedback regarding the speed and intensity of their punches. Again, these machines are generally standalone and configured as needed by each individual prior to a static training session.

[0005] It is therefore apparent that an unfilled need exists for computerized reactive fitness training platforms that provide customizable single or multi-user dynamic martial arts training with an optional social networking capability. These improved networkable fitness training platforms enable users to work out alone and/or in competition with other users in a reactive coaching environment.

SUMMARY

[0006] To achieve the foregoing and in accordance with the present invention, a computerized martial arts training system and method provides comprehensive customizable multi-user martial arts training with a social networking capability is provided.

[0007] In one embodiment, the martial arts training station includes an impact target with one or more impact sensors measuring workout performance data such as position, direction, timing, velocity and force of impacts generated by a user. The training station also includes a reactive coach application which provides a workout routine for the user, receives the workout performance data, and dynamically modifies the workout routine based on the received workout data.

[0008] The reactive coach application also reactively provides motivational feedback. This motivational feedback is dynamically adjusted to the effectiveness of the motivational feedback as measured by the user’s compliance and/or improvement of the user’s performance.

[0009] In some embodiments, the training station communicates with other training stations via a reactive coach server over a local area network and/or a wide area network, thereby enabling the user to compete against other users.

[0010] Note that the various features of the present invention described above may be practiced alone or in combination. These and other features of the present invention will be described in more detail below in the detailed description of the invention and in conjunction with the following figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] In order that the present invention may be more clearly ascertained, some embodiments will now be described, by way of example, with reference to the accompanying drawings, in which:

[0012] FIG. 1 is an isometric view of the embodiment of a computerized interactive fitness training station suitable for a martial artist;

[0013] FIG. 2 is an isometric view of two or more fitness training stations configured to communicate with an external reactive coach server;

[0014] FIGS. 3A, 3B, 4A and 4B illustrate alternate embodiments of impact targets for the fitness training station of FIG. 1;

[0015] FIGS. 5A and 5B show exemplary dome-mounted illuminators for the impact target of FIG. 1;

[0016] FIG. 6 shows a fitness training station accessory with an optional energy recapture capability;

[0017] FIG. 7 is an isometric view of a lower-cost embodiment of the fitness training station of FIG. 1;

[0018] FIG. 8 illustrates a portable version of the base pad and the impact target for another embodiment of a fitness training station;

[0019] FIG. 9 is an isometric view of yet another embodiment of a fitness training platform which provides multiple computer-controlled mobile impact targets;

[0020] FIGS. 10, 11, 12A and 12B are flow diagrams illustrating the start up sequence and main menu choices for the fitness training station of FIG. 1;

[0021] FIGS. 13, 14, 15, and 16 are flow diagrams illustrating the “Getting Started”, “How To’s”, “Doctor’s Medical Tips” and “Warm Up Exercises” routines in greater detail;

[0022] FIG. 17 is a flow chart illustrating the “Choose A Workout” option in greater detail;

[0023] FIGS. 18A, 18B and 18C are flow diagrams detailing a reactive coach application executing on the computerized coach monitor of the fitness training station of FIG. 1;

[0024] FIGS. 19A, 19B and 19C are flow diagrams illustrating a live competition between multiple users training on their respective fitness training stations;

[0025] FIG. 20 is a flow diagram illustrating the social networking functionality of the fitness training station of FIG. 1;


[0027] FIGS. 25 and 26A-26D are screenshots detailing the various workout options provided by the fitness training station of FIG. 1;

[0028] FIG. 26E is a screenshot enabling the user to monitor his/her progress during a typical workout on the fitness training station of FIG. 1; and

[0029] FIGS. 27A and 27B are exemplary screenshots illustrating a live competition between two or more users working out on their respective fitness training stations.

DETAILED DESCRIPTION

[0030] The present invention will now be described in detail with reference to several embodiments thereof as illustrated in the accompanying drawings. In the following description, numerous specific details are set forth in order to provide a thorough understanding of embodiments of the
present invention. It will be apparent, however, to one skilled in the art, that embodiments may be practiced without some or all of these specific details. In other instances, well known process steps and/or structures have not been described in detail in order to not unnecessarily obscure the present invention. The features and advantages of embodiments may be better understood with reference to the drawings and discussions that follow.

[0031] The present invention relates to interactive systems and methods for martial arts based cardiovascular fitness training, with or without human instructors.

[0032] To facilitate discussion, FIG. 1 shows an isometric view of one embodiment of a computerized interactive mixed martial arts training station 100 for a user 190 which includes an impact target 110, a computerized coach monitor 120 with a user interface, a base pad 130, an audio-visual dome 140, a support frame 150 and a motion sensing camera 160. An optional weighing scale 135 can be installed adjacent to base pad 130.

[0033] In this embodiment, impact target 110 is an elongated cylindrical punching bag and corresponds to the height and width of an average person. Impact target 110 includes one or more embedded sensors (not shown) providing feedback such as direction, duration, location and intensity of impact forces generated by user 190 to computerized coach monitor 120. These sensors are embedded in strategic locations on impact target 110, and at different levels to simulate target zones on a hypothetical martial art opponent. Sensors can include impact sensors, accelerometers, and any other suitable direction, motion and/or force measuring devices. Further, one or more sensors can externally couple impact target 110 to support frame 150. Commercially available examples of suitable sensors include the iLoad Pro sensor available from Loadstar Sensors Inc., Fremont, Calif.

[0034] Likewise, base pad 130 also provides feedback regarding stance of user 190 during a workout to computerized coach monitor 120. For example, base pad 130 senses when the striking right foot of user 190 leaves pad 130 while impact target 110 senses when and where the right foot impacts, thereby allowing coach monitor 120 to compute the distance and speed of user 190's kick. In addition, by sensing the transitional position and pressure between the heel and ball of user 190's supporting left foot during the execution of the right kick, coach monitor 120 can also provide useful feedback regarding the use of user 190's left foot to add power to the right kick.

[0035] In some embodiments, the surface of impact target 110 and/or base pad 130 are illuminated from an internal source thereby allowing coach monitor 120 to give visual cues to teach or correct user 190 proper techniques and stances, and also to direct user 190 towards one or more strike zones on target 110. Internal illumination of target 110 can also be used to train and improve the reflexes of user 190.

[0036] Audiovisual dome 140 enables computerized coach monitor 120 to provide both audible and/or visual instructions and feedback to user 190 without disrupting other users who may be using adjacent training platforms 210, 220, 230 as shown in FIG. 2. Such an exemplary layout allows one or more human coaches to effectively monitor users 210, 220, 230 working out on training stations 210, 220, 230 via their respective computerized coach monitors 215, 225, 235 in real time.

[0037] Instead of or in addition to internally illuminating specific areas of pad 130 and/or impact target 110 as discussed above, audiovisual dome 140 can also provide an ideal support structure for one or more projectors 145 configured to externally project visual image(s) onto base pad 130 for training proper foot placement, and/or presenting video images(s) onto target 110 for user 190 to strike. Projected video images may also be presented as hit feedback such as color changes and may indicate on the surface of impact target 110 impact forces and location of hits generated by user 190 as hit achievement or failure in response to hit instructions from a reactive coach application executed on coach monitor 120.

An optional external reactive coach (“RC”) server 290 can be coupled to platforms 210, 220, 230 so that a human trainer (not shown) or an automated master coach monitoring software application executing on reactive 290 can monitor the progress of users 219, 229, 239. RC server 290 can be located adjacent to or remotely from platforms 210, 220, 230. It is also possible for one or more additional training platforms and/or clusters of platforms (not shown) to be coupled to one or more additional RC servers (not shown). Training platform(s) and RC server(s) can be coupled to each other directly or indirectly over one or more local area networks (LANs) and/or one or more wide area networks (WANs).

[0038] Motion sensing camera 160 provides spatial information regarding the user 190 to coach monitor 120. Suitable cameras include Microsoft’s Kinect camera. In addition to motion sensing camera 160, it is also possible to attach one or more positional and/or motion sensors on the head, torso, arms and/or legs of user 190 thereby generating additional spatial information. Such motion sensing capability permits computerized coach monitor 120 to accurately track if for example user 190 has executed an optimally effective powerful kick, by fully utilizing the supporting leg, the torso (core), and finally the kicking leg and feet, thereby increasing the potential impact of such a kick.

[0039] Other exemplary impact targets for training station 100 include mixed martial arts (MMA) dummy 310 and speed bag 320. Speed bag 320 are also possible as shown in FIGS. 3A and 3B. Speed bag sensors 332 provide impact accuracy and/or speed data of speed bag 320 to coach monitor 120. Note that dummy 310 or similar variants may also be applicable for other grappling martial arts such as Jujitsu, Judo and/or wrestling. Dummy 310 can also include embedded sensors (not shown) to measure forces exerted on its torso, limbs and neck to, for example, measure the effectiveness of the user grappling techniques such as joint locks, chokeholds, and bars and takedowns.

[0040] FIGS. 4A and 4B show additional embodiments of impact targets 410 and 420 respectively for training station 100. In one embodiment, modified impact target 410 includes an attachment for impact target 110 which simulates a “Wing Chun” style target with protruding extensions 412, 414, 416, 418 popular with Chinese martial art practitioners. This type of external attachment can be coupled to target 110 via one or more straps 411. One or more sensors coupled to modified impact target 410, for example, on extensions 412, 414, 416, 418 can provide feedback to computerized coach monitor 120 via wired and/or wireless connections. Alternatively, it is also possible to manufacture an integrated impact target with permanent protruding extensions.

[0041] As shown in FIG. 4B, impact target 110 of training station 100 can be replaced by a more manlike upright impact target 420 with a head 421, torso 423, arms 424, 425, legs 426, 427, and mounted a stable support base 429. Sensors (not shown) can be also imbedded into strategically selected locations on manlike impact target 420 to provide feedback to computerized coach monitor 120.

[0042] In some embodiments as illustrated by FIGS. 5A and 5B, audio visual enabled impact targets 510 and 520 include target illuminating devices. For example, target 510
includes an AV dome with controllable visible light pointers 512, 514, 516 which can be directed by computerized coach monitor 120 to illuminate one or more target areas on impact target 110. The position, intensity and duration of the illumination can be varied in accordance to the selected training protocol executing on computerized coach monitor 120. Pointers 512, 514, 516 can be any suitable and safe visible light sources such as LEDs, low power lasers and combinations thereof.

As illustrated by FIG. 5B, AV enabled target 520 includes an AV dome with one or more video projectors 522, 524 which project one or more images onto impact target 110 thereby enabling coach monitor 120 to direct user 190 to strike specific impact zones during a workout. Suitable images include imaginary manikin opponents practicing similar or different martial arts from that of user 190.

FIG. 6 shows yet another workout accessory which is an enhanced jump rope 600 equipped with sensors coupled to a microcontroller 620 and potentially an energy recapture generator 680 which may generate sufficient energy to power rope 600 for extended periods of time. Microcontroller 620 can communicate with computerized coach monitor 120 via a suitable link such as Bluetooth or WiFi.

Lower cost versions of training platforms are also possible as exemplified by platform 700 of FIG. 7. This embodiment, computerized coach monitor 720 can be an off-the-shelf laptop or desktop readily available from many retail outlets. Other off-the-shelf portable devices such as touch pads (e.g., iPads) and tablet PCs can also be used as coach monitor 720. Coach monitor 720 is coupled via a suitable communication channel, using for example a network 780, to a transceiver 715 relaying workout data to and from computer monitor target 710.

FIG. 8 illustrates an alternate impact target 810 installed on an impact base 832 and configured to be coupled to a detachable base pad 834 using suitable connectors 836. A suitable inexpensive weighted medium, such as water or sand, can be introduced into the perimeter of such an impact target 810 for stability.

In yet another embodiment, as shown in FIG. 9, a training platform 900 provides multiple mobile impact targets 914 and 916 controlled by computerized coach monitor 920. Impact targets 914 and 916 can include strategically located embedded sensors (not shown) functioning in a manner described above for impact target 110. In this example, independent vertical motion of targets 914 and 916 is made possible by geared impact target bases 912 and 917, respectively. Impact target bases 912 and 917 are operatively coupled to a pair of horseshoe shaped horizontal tracks 918 and 919, thereby providing independent horizontal motion. The resulting structure of training platform 900 can be mounted a base pad 930 with embedded sensors that communicate with coach monitor 920.

Exemplary flow diagrams FIGS. 10 to 20, and exemplary screenshots FIGS. 21A to 27B illustrate the operation of one embodiment of training station 100, wherein reactive coach ("RC") application is executing on computerized coach monitor 120 and interacting with user 190 during a workout.

In FIG. 10, in steps 1010, 1020, computerized training station 100 executes a start up sequence by booting up, executing system diagnostics, and then launches a login menu for user 190. If station 100 recognizes user 190, then the main menu is displayed (step 1030). Eventually, when user 190 has completed a workout, user 190 can elect to start another workout, or choose to logout (step 1040).

In some embodiments, hardware and/or software serialization enables manufacturing and distribution channels to track product delivery and repairs, and also decreases the likelihood of product piracy. Serialization also assists training stations to definitively identify each other during workouts.

Referring now to FIG. 11, which illustrates the startup sequence 1010 in greater detail, reactive coach application is launched (step 1110), and RC database service is launched and various RC screens also uploaded into memory of coach monitor 120 (steps 1120, 1130).

FIGS. 12-A to 12-B are flow diagrams and FIG. 21A is a screenshot illustrating the top level "Main Menu" options presented to user 190 upon a successful login. If user 190 is a relatively new user, then video host 2180 recommends touching "Getting Started" button 2110 and "How To's" button 2115 to select the respective "Getting Started" related videos and "How To's" related videos (step 2100).

Upon selecting the "Getting Started" button 2110, the screenshot of FIG. 21B is displayed (step 1310), user 190 is given choice of view videos relating to "Equipment Needed" and "Coach Monitor Intro", as shown in steps 1320 and 1330 of flow diagram 2117 of FIG. 13, by selecting from buttons 2145 and 2150, respectively. User 190 can also return to the "Main Menu" screen of FIG. 20 by selecting button 2140.

Similarly, when user 190 selects the "How To's" button 2115, a corresponding "How To's" screen as shown in FIG. 22A is displayed (step 1410), and a choice of "Wrap Your Hands" button 2221, "Breathing Properly" button 2222, "Proper Stance" button 2223, "Basic Stance" button 2223, "Basic Punches" button 2224 and "Basic Kicks" button 2225, as shown in steps 1420, 1430, 1440 of flow diagram 2212 of FIG. 14 and illustrated by corresponding screenshots 2230, 2231, 2232, 2233.

Choosing the "Proceed to Warm Ups" button 2229 causes the RC application to steers user 190 into selecting a warm up exercise as if user 190 had selected the "Warm Up Exercises" button from the Main Menu screenshot of FIG. 21A.

Referring back to the flow diagram of FIG. 12B and the "Main Menu" screenshot of FIG. 21A, in steps 1235, 1240, 1245, 1250, within the "Main Menu" screen, user 190 is also presented with a choice of "Doctor's Medical Tips", "Warm Up Exercises", "Choose A Workout" and "Your Progress Report" (buttons 2120, 2125, 2130, 2135).

If user 190 selects "Doctor's Medical Tips" button 2120, a "Doctor's Medical Tips" screen as shown in FIG. 23 is presented with choices that include "Common Injuries" button 2320, "Injury Analysis" button 2330, and "Injury Treatment" button 2340. As shown in the flow diagram 1237 of FIG. 15, videos related to injuries, such as prevention and treatment of common injuries are made available for viewing by user 190. For example, in step 1510, a doctor explains common injuries related to mixed martial arts, such as joint sprains and hyperextensions, in step 1520, user 190 can view videos of common martial art related injuries, and in step 1520, videos of treatment of common injuries are presented to user 190.

Returning to the "Main Menu" level (see FIGS. 123 and 21A), user 190 can also select "Warm Up Exercises" button 2125. Within "Warm Up Exercises", as illustrated by screenshots of FIGS. 24A-C and flow diagram 1242 of FIG. 16, user 190 can choose from a variety of warm up routines such as stretching only, or a combination stretching and warm up, or rope jumping. Note that these warm up routines described are exemplary and other suitable warm up routines
known to one skilled in the physical education arts and/or martial arts including mixed martial arts are also possible. [0059] After user 190 completes one or more recommended “Warm Up Exercises”, which reduces the risk of injury, user 190 can elect to begin a workout by selecting “Choose A Workout” button 2130 from the “Main Menu”, which causes coach monitor 120 of training station 110 to display “Choose A Workout” screen of FIG. 25. Accordingly, a choice of workouts is offered to user 190 as illustrated by the flow diagram 1247 of FIG. 17. Workout choices can include “Boxing” button 2520, “Kick Boxing” button 2530, “Muay Thai Workout” 2540 and any other suitable martial arts workout “Workout X” button 2580, which can be for example a mixed martial arts workout (“MMA”) Workout (steps 1710, 1720, 1730 . . . 1770). In step 1780, user 190 can also select “Live Competition” 2590, which is described in greater detail below.

[0060] Note that the reactive coach (“RC”) application executing on coach monitor 120 enables user 190 and/or his/her human trainer(s) to customize both warm up routines and workout routines based on his/her skill level (strengths and weaknesses), fitness level, and/or any pre-existing injuries inputted by user 190 into the RC application’s user injury database. The RC application can then avoid aggravation of pre-existing injury by disabling one or more specific technique(s) within these warm up or workout routines, based on reported injuries and the RC application’s medical database associating specific techniques with certain injuries.

[0061] It is also contemplated that other martial art workouts can also be incorporated into, or in place of these exemplary arts described above. Hence, Karate, Taekwondo, Jujitsu, Escrima, Aikido, Ninjitsu, Wrestling, Kendo, Judo, Krav Maga, military-style hand-to-hand combat training, and the many styles of Chinese martial arts such as Shaolin Kung Fu, Tai Chi, are also within the scope of this invention.

[0062] FIGS. 18A-C are flow diagrams illustrating in greater detail the operation of one embodiment of the reactive coach (“RC”) application interacting with user 190 during an exemplary workout session on training station 100. In step 1805, the RC application begins by looking up user data to determine which workout routines are available and displays the available choices to user 190 via “Choose a Workout” screen as shown in FIG. 25. Upon the selection of the specific workout routine, the respective workout screen is displayed on coach monitor 120 (step 1810). Detailed exemplary Boxing and Muay Thai workout screenshots are shown in FIGS. 26A-26D. User 190 is now able to choose specific moves such as kicks and punches by following the instructor on the video screen (step 1815). Workouts can also be modified depending on the specific accessories selected by user 190.

[0063] Referring also to the screenshot of FIG. 26E, the RC application tracks the performance of user 190 by monitoring the hits on the sensor(s) of impact target 110 and recording the sensor data associated with user 190 (step 1820). CountDown timers 2652, 2654, 2656 allow user 190 to pace himself or herself during the warm-up, workout and cool-down phases. As shown in flow diagram of FIG. 18B, this performance data is compared with a predetermined target performance level thereby enabling the RC application to determine if user 190 is performing below, at or above the target performance level (steps 1835, 1840). By using audio and/or visual feedback, e.g., “Behind”, “On Target” and “Ahead” icons 2682, 2684, 2686, the RC application is able to prompt user 190 to maintain, speed up or slow down the intensity of the workout (step 1845). Based on the recorded performance, the RC application is also able to compute and display the calories burned by user 190 on coach monitor 120 (step 1850). [0064] Audible feedback can be dynamically adjusted to optimally motivate user 190 to perform at the appropriate level. For example, if user is falling “Behind”, appropriate motivational sound bites include “You’re falling behind”, “Pick up the pace”, “A little faster”, “Stay focused”, and/or “You can do it”. More detailed sound bites may include “Breathe in through nose, out through mouth” when for example user 190 is about ten hits behind.

[0065] Conversely, when user 190 is “On Target”, appropriate motivational sound bites include “There ya go!”, “Good Job!”, “Excellent”, “Good pace. Keep it up”, “That’s it! Right there”, and/or “You’re on target. Keep it up”. Whenever user 190 is on target for twenty or more seconds, appropriate sound bits may include “You’re doing great! Stay focused” and/or “Keep it up.”

[0066] When user 190 is “Ahead” of the prescribed workout regimen provided by the RC application, then appropriate sound bits include “Slow it Down”, “You’re going too fast”, “Don’t burn out”, “Watch your pace”, “Stay in sync” and/or “Easy does it . . . Stay with me.”

[0067] In addition to the intensity of the workout, FIG. 18C illustrates the RC application tracking the accuracy of user 190, by determining if user 190 is accurately hitting the correct locations of impact target 110 (step 1865). Upon request at anytime during the workout, the RC application can display recorded user hits, accuracy and/or caloric data to user 190 (step 1870). Based on current user workload profile, which can optionally include biometric information such as heart rate, respiration rate and/or environment conditions, the RC application determines and recommends appropriate workout levels to optimize the effectiveness and safety of the workout (step 1875). The RC application can also highlight available workout routines based on the profile of user 190 (step 1880).

[0068] Referring back to step 1780 of flow diagram 1247 in FIG. 17, and also the “Live Competition” button 2550 of FIG. 25, in this embodiment, the reactive coach application also enables user 190 to initiate a live competition with, for example, one or more other users 219, 229 . . . 289 working out on platforms 210, 220 . . . 280 of FIG. 2. Hence by selecting “Live Competition” user 190 is able to compete online with one or more other users working out on similar training stations coupled to station 110 via a local or wide area network, such as the Internet, in a manner described in greater detail below and as shown in FIGS. 19A-19C.

[0069] Flow diagram of FIG. 19A and screenshot 27A illustrates the RC application executing on station 110 enabling user 190 to search for other remote users over a network to compete with (step 1905). Next, a request is made to the selected user(s) requesting competition (step 1910). If the remote user(s) accepts the invitation to compete, then the PC application connects the competing users and activates video connection(s), thereby enabling the users to see each other during the competition on their respective coach monitor displays (step 1920). Note that Live Competitions can be organized informally by a group of users, or organized more formally by human coaches or promoters in amateur or professional settings. Communications between training stations can occur peer to peer or via RC server.

[0070] In step 1935 of FIG. 19B, a Live Competition screenshot as illustrated by FIG. 27B is displayed, enabling the connected competing users and any coaches to be able to view each other in real-time via video feeds. The connected users then select the type of workout (step 1940).

[0071] Having selected a particular workout routine for competing, the RC applications executing on the respective training stations, e.g. stations 210, 220 . . . 280, synchronize
with a RC Server 290, and the live competition session begins (step 1945). During the live competition session, the performance of users 219, 229 . . . 289, such as accuracy of hits, calories burned, are recorded on their RC monitors executing on training stations 210, 220 . . . 280, respectively (step 1950). To facilitate ease of implementation in different networking environments, training stations 210, 220 . . . 280 can communicate directly with each other and/or via RC Server 290.

[0072] As an option, the RC server 290 can also be possible for users of different skill levels to compete by permitting the introduction of handicaps, for example, by weighting the scores of the users to create a more level playing field. The RC server 290 can also permit the competing users to share each other's workout data in real time.

[0073] As shown in step 1965 of flow diagram of FIG. 19C, at the end of each competition between, the performance data of competing users including user 190 is uploaded to a reactive coach server, e.g., server 290. Next, the RC server 290 compares all the user data to determine which user has the most accurate hits, and sends compiled data to the competing users and determines the ranking of the competing users of the workout competition, including the ranking of user 190 (steps 1970, 1975). At the end of the workout competition, the RC server 290 terminates connections of the individual coach monitors executing on training platforms involved in the competition (step 1980). The RC server 290 then determines which users are eligible for posting results to social networking walls and pages.

[0074] Other competitive arrangements are also possible. For example, in addition to being about to compete live against other remote users, it may also be possible to compete against a simulation of one or more well-known martial art artists programmed into the reactive coach application, or against one of more fictional martial artists such as avatars, action heroes and/or villains from movies or comic strips.

[0075] Before, during and after solo workouts and/or live competitions, user 190 can elect to display workout progress data locally (step 2010), or share workout progress data with others in a social networking context by logging in (step 2015), as shown in the flow diagram FIG. 20. Sharing options include posting weight loss, calories burned (step 2020) and posting live competition results (step 2025).

[0076] In some embodiments, user 190 can also register to facilitate donations to a charity based on the results of one or more workouts. For example, user 190 may have multiple sponsors who have pledged to donate $1 to the American Red Cross for every pound that user 190 is able to shed during a specific period. The reactive coach application is able to monitor user 190 as he/she is working out and automatically send the appropriate messages to the donor(s) and the charity to facilitate such pledged donations.

[0077] In some embodiments, instead of displaying the couch on the display screen of coach monitor 120, a holographic image of the coach can be projected proximate to user 190. It is also possible to replace the physical form of impact target 110 with a holographic image of an impact target. Further, holographic images of live competitors can also be projected proximate to user 190.

[0078] It is also possible to incorporate shopping cart(s) functionality into the reactive coach application. For example, a link to an online music store such as "iTunes" can be incorporated into the RC application user options. Similarly, an online store for fitness equipment and accessories can also be incorporated into the RC application.

[0079] In sum, the present invention provides a system and methods for reactive martial arts fitness training that provide customizable single or multi-user dynamic martial arts training with an optional social networking capability. The advantages of such a system include the ability to reactively train a user over time without aggravating any pre-existing injuries that the user may have.

[0080] While this invention has been described in terms of several embodiments, there are alterations, modifications, permutations, and substitute equivalents, which fall within the scope of this invention. For example, many of the functionality of the embodiments described above can be implemented entirely in software, entirely in hardware, or a combination of both software and hardware. Although subsection titles may be provided to aid in the description of the invention, these titles are merely illustrative and are not intended to limit the scope of the present invention.

[0081] It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that the following appended claims be interpreted as including all such alterations, modifications, permutations, and substitute equivalents as fall within the true spirit and scope of the present invention.

What is claimed is:
1. A martial arts fitness machine comprising:
an impact target having one or more sensors disposed to collect user input with respect to hit direction, impact g-force, hit timing, and hit location on the impact target; a base pad having one or more pressure switches disposed to calculate velocity of a kick, foot location, weight, user location, kick impact, and kick start/ completion; a computer disposed to collect data from sensors and pressure switches, operatively coupled to a reactive virtual coach monitor application disposed to evaluate a user's progress, injuries and workout/ regimen recommendations; and a frame disposed to hold the impact target.
2. The martial arts fitness machine of claim 1 wherein the fitness machine is networked to a competing martial arts fitness machine via a reactive coach server, and wherein a user working out on the fitness machine is interactively competing with a competitor working out on the competing martial arts fitness machine.
3. The martial arts fitness machine of claim 1 further comprising a motion sensing camera configured to track movement and position of the user.
4. The martial arts fitness machine of claim 1 wherein the computer monitors calories burned by the user.

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