The Odyssey Armament Training System
An Adaptable System for Operators
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1. Abstract

The Odyssey Armament Training System is a wearable computing platform for firearms that enable users to train on real weapons in virtual and augment reality as well as in the field. The system is versatile and with proper software packages, allow operators to practice decision making, firearm operation, reflex, and accuracy.

The Odyssey platform can run in standalone mode, be accessorized with add on components, and be integrated into larger massive multiuser systems. The machine learning capabilities mean the system can work with all kinds of firearms from pistols, rifle, and shotguns, down to laser trainer, BB, pellet, and even airsoft guns. The very compact form factor of the Odyssey even allows it to fit into handgun holsters that are designed to accommodate tactical flashlights.

The durable shockproof and waterproof field grade casing allows the system be left permanently on the firearm of users and be used in both training and deployment. This allows commanders to either evaluate training effectiveness in real time or download for later evaluation. The always attached to the firearm nature of the device also enables auxiliary benefits such as shot counting (gun odometer), firearm performance analysis, and even firearm maintenance record storage.

2. Specifications

The Odyssey is a full blown wearable computer for guns. Below are some of its specifications:

Dual 1GHz Cores
Single 200MHz Real Time Core
512 MB of RAM
8 GB of Flash Storage
USB Type C Port - USB 2.0 HS capable
Bluetooth LE 5.0
12 Degree of Freedom System
High Sensitivity and High Shock Sensing Capabilities to 200 G's
Runtime from 3 Hours in VR Training Mode to 1 Month on Field Logging Mode
Audio from 50Hz to 22KHz

3. Training System Integration with Odyssey

The Odyssey System is the platform that bridges mechanical firearms to the world of electronics. The machine learning algorithms running on the Odyssey identifies specific firearm operations and map them to virtual worlds for training applications. The Odyssey is designed to interface to other smart devices such as VR headsets, smart phones, tablets, computers, and smart watches. These devices when running Odyssey interfacing apps can set the run mode of the Odyssey, download logged data, function as internet gateways for Cloud services, and run Odyssey virtual and augmented reality training programs.

A. Entry Level Training and Shooting Analysis

The Odyssey is designed to provide realistic training at the lowest entry price possible. A simple system consisting of cellphone VR and an Odyssey mounted firearm can act as a gateway to decision and precision training. The Odyssey maps the firearm's motion and operation into the cellphone VR app. The app can make use of the Odyssey's fine motion sensing feature to even throw off shots in VR when the user incorrectly pulls the trigger. If the firearm is shot either with a live round or CO2 recoil unit, the Odyssey can also sense how well the user is handling recoil to provide better firearm handling instruction. The quality of the VR app and responsiveness of the system will be determined by the VR readiness of the cellphone used.

Pros:
Extremely low cost
Compact
Durable

Con:
Lack of full spatial tracking

Picture 1: Odyssey Mounted to Handgun Tactical Rail Working with Cellphone VR

B. Retrofitting Existing Projection Training Systems

The programmable, expandable, and flexible nature of the Odyssey platform means it can be used to retrofit existing computer projection training systems to provide more information on shooter performance. The high sensitivity sensors and machine learning algorithms means Odyssey equipped projection training systems can also measure weapon draw, reload times, and even user nervousness. The Odyssey can also sense trigger pull quality, recoil handling and report or allow the training system to throw off point of impact of poorly handled shots.

Pros:
Extends the capabilities of existing systems
Attractively priced feature expansion
Improve durability of existing system
Allows existing training to be used with features found in **A**

Con:
Require system integration coding

C. Integration with Spatial Tracking Systems

The Odyssey is designed to be customizable and can be adapted to work with current tracking systems like the ones used in the Vive, Rift, and camera based motion capture systems. This would allow precise full room scale and even larger tracking while retaining the Odyssey benefits of firearm draw, precision and recoil training. Depending on system, custom accessories may need to be created to allow integration.

Pros:
Integrate and Extend the Capabilities of virtual reality systems
Depending on system, incremental cost may not be much
Can allow full motion that scales to very large area

Cons:
Cost increase depending on area covered
System integration development

Picture 2: Odyssey Mounted to Handgun Rail Working with Oculus System

D. Inside Out Tracking

The Odyssey can accept a camera expansion accessory which can provide the system with computer vision based inside out tracking. This allows the Odyssey to have mostly self-contained spatial tracking. The system may still need guide points depending on the level of tracking software used. The advantage of this approach is the camera serves two purposes. First, it enables self-contained tracking. Second, the video stream from the camera can also be used for shot analysis.

Pros:
Enables full movement
Compact and self-contained
Durable
Lower cost

Cons:
Shortens battery life
May lengthen system so pistols won't fit in holster
May need guide points to assist tracking
Needs Inside Out tracking software