**New IoT Scenario: Smart Sports Coach and Immersive Social Platform**

In this IoT scenario, we have designed a home-oriented smart wearable device made from elastic materials in the form of a ~~bodysuit or~~ kit, integrated with micro-sensors that do not impede movement and can accurately capture motion data (sensors are designed to be integrated into gloves, soles, headbands, or wristbands, capturing crucial motion data while maintaining the wearability and comfort of the device.) This device is specifically tailored for sports enthusiasts, such as tennis and basketball players, who are constrained by time and space. It utilizes high-precision sensors to capture the wearer's body movements and reflect this data in real-time within a virtual sports scene. At the same time, it is equipped with a "floor" that can be used at home. It is made of ultrasonic vibrating ceramic materials instead of rollers, so that people can safely "walk and run" on it, ensuring a sports area at home. The core functionalities of this scenario are summarized in the following points:

**1. Personalized Sports Coaching:** Through the use of VR glasses（Lightweight design, similar in size to a diving goggle, supports battery replacement and fast charging design to support battery life）, users can immerse themselves in a virtual sports scene. Based on the motion data captured by sensors, intelligent algorithms evaluate the accuracy and safety of the user's sports posture (for example, assessing whether the hand position is correct during a tennis match, or if certain movements might potentially harm the knees) and provide professional guidance and suggestions for improvement. This not only helps users correct their movements and prevent sports injuries but also enables the system to automatically generate or adjust personalized training plans based on the user's performance and progression speed. This means that as users improve their skills, the challenge level and training content will be correspondingly adjusted to maintain the training's effectiveness and keep users' interest sustained. Besides guiding sports skills, the device can also track health data (such as heart rate and calories burned) and provide visual feedback on progress；Sensors added to the floor can wirelessly transmit weight data, etc. This allows users to not only see their technical improvements but also gain insights into their health improvements.

2. **Virtual Social Platform:** The built-in community feature of the device allows users to enter a virtual sports community. Here, they can see other players using the same device, and through invitations or room creation, utilize VR technology to fully immerse in the environment, teaming up with players from around the world for virtual matches in tennis, basketball, etc., thus breaking through time and space limitations. This community is not limited to competitions but can also be a space for various exchanges and sharing of techniques. Based on the community feature, virtual sports tournaments are regularly organized, allowing users to sign up from all over the world. This not only adds elements of social interaction and competition but also gives users the opportunity to showcase their skills on a larger platform. For competitive matches, users need to wear devices to conduct ability tests, and the data is transmitted to the cloud for processing and ratings. The first game thereafter will be assigned opponents and teammates based on the ability test. Subsequent games will be based on the performance of the previous game and accumulated points to comprehensively match opponents and teammates. For entertainment activities, you can refresh yourself and select "Sports Ground".

3. **Intelligent AI Opponents:** Through advanced artificial intelligence algorithms, users are provided with a highly customized and interactive sports experience. They can compete against virtual AI opponents that can simulate the techniques and strategies of real athletes at various levels, from beginners to professional players. Interaction with AI opponents not only enhances users' sports skills but also offers an exciting and challenging competitive experience.

Question 1:

Introduce this new IoT-based solution/ service in 1 or 2 slides and identify at least 2 main stakeholders who will be affected positively or negatively.

Stakeholders positive：

* students and staff with limited exercise time.
* disabled people who have difficulty going out

Stakeholders negative：

* sports area holder
* sports coach

Question 2：

Define 2 capabilities and 1 (or more) associated devices. (These capabilities & IoT-enabled device must be focused to serve the 2 or more stakeholders identified in question 1)

Describe what building blocks of the solution that would be IoT enabled (Explain why IoT brings a specific value, why the solution requires IoT)

Capabilities:

* Body data analysis
* Remote sports competition

associated devices:

* Lightweight AR glasses
* Data transfer bracelet
* Data transmission anklet
* Technology floor (optional)

why the solution requires IoT:

* AR glasses need to be connected to the Internet for image data interaction.
* Body and movement data need to be sent to the cloud for analysis.

Question 3:

Describe and explain (possibly with a diagram) the technical components (hardware/applications/communications…) of the solution.

For each element, identify what technology aspects/components would be available now and which ones require specific research and product development.

For remote body data analysis, commonly used data sensors include:（available now）

* Heart rate sensor: used to monitor heart rate, which can be a photoplethysmograph (PPG) or electrocardiogram (ECG) sensor.
* Accelerometer: Used to monitor body movement and posture.
* Body temperature sensor: used to measure body surface or internal body temperature.
* Blood pressure sensor: used to monitor blood pressure and may be self-inflating or based on other technology.
* Blood oxygen sensor: Estimates blood oxygen saturation by measuring the ratio of oxyhemoglobin and reduced hemoglobin in the blood.
* Respiration rate sensor: Used to monitor respiratory rate and pattern.
* Information transmission technology: Wi-Fi

Network data transmission of VR glasses: （available now but require product development to reduce weight）

* Gyroscope and accelerometer: used to track the movement and position of the head.
* Near Field Communication (NFC) or Bluetooth: For low-power, short-range communication between the glasses and a computing device or external controller.
* Wi-Fi: Used for high-speed data transmission between glasses and devices on the Internet or local area network.
* USB or HDMI: Used for a wired connection to a computer or game console to transfer video and audio data.

Technology floor: （require product development.）

* made of ultrasonic vibrating ceramic materials instead of rollers, to achieve lightweight and low noise.

Question 4:

Outline the intended Business Model for deploying your IOT application/ service. How will it be profitable ? Will it be deployed as a non-profit service? Who is going to finance it or pay for it? How much ? Per subscription or pay-per-use? What value strategy would you choose to focus on?

Operating excellence (cost) Product leadership Customer intimacy

Cost:

* Hardware development and development consumption

finance it or pay for it:

* After users purchase hardware, they can choose to subscribe monthly/yearly or purchase per-time for value-added services.

Profitable:

* Attract more users to pay for services by providing excellent value-added services.
* Provide certain preferential systems for young people, students, the elderly, and the disabled.
* For large competitions held, a certain entry fee is charged.
* Spectators can choose to place bets on the match.