Assignment 2: Requirement Analysis Document (RAD) with Security by Design (SBD)

1. **Project Information**

Fill in the following basic information:

Project Name: PhoSho	Team ID: 29	Mentor(s): Niek Aukes

2. **Security by Design Checklist:**

Table 1:

Security Mechanism (at least 1 to be completed)	Brief Justification (1-2 sentences)	Risks (at least 1)	Mitigation Controls (List at least 1)	Tick ✓if applied
Authentication	We decided to use passwords to ensure that only the person knowing the password has access to the data.	Storing plain passwords Password theft	Hashing the passwords	✓
Authorization	Role-based access control, to allow admins to control the game and users to view the current game state / leaderboard.	Privilege Escalation	Privilege Principle	✓

3. **Requirement Analysis Document Template**

   a. **Introduction:** We want to build a networked laser tag game system that consists of a central server; laptop clients and raspberry pi units connected to the client(s). Server runs continuously as the central hub to make the connection between the pis and clients, it can keep track of the database of players in

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real time constantly updating it. Each player has a raspberry pi and they are connected to infared laser shooters and they have an armor mounted with infared sensors. When a player is shot by the beam, the pi immediately reports it to the server over WiFi. The server updates the database on which player died as well as always remember how many times any player died. The laptop clients can keep track of logging into the system, manage sessions/gamemodes. Once a player is shot, they can't shoot anymore, the infared blaster will be disabled.

- **Purpose of the Application:**
  We are developing a laser tag system, that allows the user to “shoot” other players via IR led and being hit by other players. We are aiming to create a system with a live leaderboard of the teams.
- **Limitations of Existing Solution:**

The current system is costly and does not allow for tracking of the leaderboard live from server. They do not allow you to play the Never gonna give you up song when being hit by another player. They are also often based on one game mode which cannot be changed by end users. They are also often only played in environments that are set up beforehand without much light so lasers can be seen.

b. Scope

- **Resources Needed:** List the hardware and software tools you'll use.
  KY-005 Infrared transmitter
  KY-022 Infrared receiver
  KY-011 2-Color 5mm LED
  Led strip 2m
  Cables
  Batteries AA
  KY-004 Button
  Passive Piezo-Buzzer
  Active Piezo-Buzzer
  6x AA Battery Holder with Loose Wires
  Shirts
  Scissors
  Sewing Needle
  Thread 5m

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Tape 10m
Laptop
IntelliJ
Visual Studio Code

c. **SMART Goals:** Choose **at least 3 SMART goals** (Specific, Measurable, Achievable, Relevant, and Time-bound) for your project
   - Goal 1:
     - **Specific:** Achieve almost live leaderboard of the teams.
     - **Measurable:** The update of the score from hit, if the raspberry pi is connected to Wi-Fi is less then 30 seconds.
     - **Achievable:** Use networking libraries and languages that are built for fast server logic.
     - **Relevant:** Ensuring the accessibility of the status of the game to onlookers.
     - **Time-bound:** Complete the raspberry pi-server-web by Week 8
   - Goal 2:
     - **Specific:** When being hit by another user, your transmitter will be deactivated for the amount of time specified on the server.
     - **Measurable:** The cooldown will need to match the settings; we will measure with a stopwatch.
     - **Achievable:** Write code that will deactivate the transmitter.
     - **Relevant:** Ensuring fairness between multiple users.
     - **Time-bound:** Complete this feature by Week 8.

   - Goal 3:
     - **Specific:** The systems will ensure security through role-based accounts and storing hashed passwords.
     - **Measurable:** The system will never store un-hashed passwords and always restrict access to vital functionality to the administrator.
     - **Achievable:** Use hashing libraries and implement a database to store accounts along with respective roles and hashed passwords.
     - **Relevant:** Ensuring users can access game data while preventing cheating through unauthorized access.
     - **Time-bound:** Complete before week 8.

d. **Product Features (at least 5 requirements):**

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- **Functional Requirements: List at least 3 core functions that the system must perform.**
  - The system must register being hit by IR diode.
  - The system must keep track of the numbers of hits received by a team.
  - The system must show the user via LED which team they are part of.
  - The system must transmit IR signal upon pressing the button.
  - (New) The system must offer the option to change the cooldown of the IR "gun".
  - (New) The system must offer the user the ability to customize the sound effects buzzed.
  - (New) The system should offer multiple game modes for the users.
- **Non-Functional Requirements: List at least one quality-related feature (e.g., performance, reliability)**
  - The system must transmit hits to the server with less than a 5 second delay, if connected.
- **Security Requirements: List at least one key security requirement.**
  - Secure accounts using passwords and hashing.
  - Use privilege-based access control to restrict user access.

e. Conclusion

- Summarize the key points and outline **any next steps or challenges** for the next phase of the project.
  - Our upcoming goal is to allow seamless gameplay for users through fluent communication between raspberry pi and the server (game controller). Our next steps will focus on establishing the communication protocols which will provide the foundation for the gameplay aspects of our project. We'll also be figuring out the exact functionality of our hardware, and how we'll be able to use it to meet our goals and requirements.

f. References

- List any key resources or references (articles, blogs, papers) that helped shape your project.
- **https://sensorkit.joy-it.net/en/sensors/ky-006 - for the needed components**
- **https://www.allekabels.nl - lookup different components**

g. Usage of AI Tools

Our team has been using AI to search up the names of hardware that we are using such as "transistors" as we often find our minds unable to come up with the words we are looking for. Other than that. Hopefully this is acceptable and up to standard with the Universities policy on the use of AI.

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