Questionnaires

## 0. General instructions to participants

Please answer each section in order.

Choose the response that best reflects your personal experience; there are no right or wrong answers.

## 1. System Usability Scale (SUS)

Scale 1 = Strongly disagree | 5 = Strongly agree (Reverse‑scored items are marked R).

1. I would like to use this spatial‑audio feedback system frequently in future SRL tasks.

2. I found the spatial‑audio feedback system unnecessarily complex. (R)

3. I thought the spatial‑audio feedback system was easy to use.

4. I think I would need technical support to be able to use the spatial‑audio feedback system. (R)

5. I found the various functions in the spatial‑audio feedback system well integrated.

6. I thought there was too much inconsistency in the spatial‑audio feedback system. (R)

7. I would imagine most people would learn to use the spatial‑audio feedback system quickly.

8. I found the spatial‑audio feedback system very cumbersome to use. (R)

9. I felt very confident using the spatial‑audio feedback system.

10. I needed to learn a lot of things before I could get going with the spatial‑audio feedback system. (R)

## 2. Presence & Trust Short Form

Scale 1 = Strongly disagree | 7 = Strongly agree

1. 1. I felt that the virtual sound sources existed in the space around me.
2. 2. I was highly involved in tracking the sound sources during the tasks.
3. 3. I trust the spatial‑audio feedback system to represent the SRL’s position accurately.

## 3. Tailored Simulator Sickness Questionnaire (SSQ‑A)

Scale 0 = None | 1 = Slight | 2 = Moderate | 3 = Severe

* General discomfort
* Fatigue
* Nausea
* Sweating
* Vertigo (spinning)
* Difficulty concentrating
* Difficulty walking
* Ear pressure or fullness
* Ttinnitus
* Auditory fatigue
* Difficulty localizing sound

Strike-through any symptom you did not experience.

## 4. NASA Task Load Index (NASA‑TLX)

Rating Mark each dimension on a 0 – 100 line (left = Very Low, right = Very High).

|  |  |
| --- | --- |
| Dimension | Scale anchors |
| Mental Demand | Very Low … Very High |
| Physical Demand | Very Low … Very High |
| Temporal Demand | Very Low … Very High |
| Effort | Very Low … Very High |
| Frustration | Very Low … Very High |

## 5. Spatial Audio Quality Inventory (short SAQI)

Rating 0 = Very Poor | 100 = Excellent

|  |  |
| --- | --- |
| Attribute | Slider 0 – 100 |
| Externalisation (sounds perceived outside the head) |  |
| Spatial stability (position does not wobble) |  |
| Localisation clarity |  |
| Spaciousness / envelopment |  |
| Timbre fidelity (naturalness of sound timbre) |  |
| Distance realism |  |
| Overall audio quality |  |

Questionnaires processing

## 1. SUS

The scores for each question were converted according to the SUS scale rules:

Forward questions (questions 1, 3, 5, 7, 9): score = original score - 1.

Reverse questions (questions 2, 4, 6, 8, 10): score = 5 - original score.

The converted scores for the 10 questions for each subject were summed and multiplied by 2.5 to obtain the final total SUS score.

The total SUS scores for each subject were as follows: 90.0, 70.0, 57.5, 85.0, 80.0, 67.5, 70.0, 85.0, 97.5, 100.0, 55.0, 50.0, 77.5, 82.5, 40.0, 97.5, 90.0, 100.0, 100.0, 87.5

For the total SUS scores of all 20 subjects statistical indicators, mean score: 79.13, standard deviation: 17.92, minimum score: 40.0, maximum score: 100.0.

## 2. Presence and Trust

The scores for each question were converted according to the SUS scale rules:

Score = (original score – 1)\*100/6.

The total Presence scores for each subject were as follows: 91.7, 100.0, 66.7, 100.0, 100.0, 100.0, 66.7, 58.3, 100.0, 100.0, 91.7, 83.3, 75.0, 91.7, 66.7, 91.7, 100.0, 91.7, 100.0, 83.3

The total Trust scores for each subject were as follows: 83.3, 100.0, 83.3, 100.0, 100.0, 100.0, 83.3, 83.3, 100.0, 100.0, 83.3, 66.7, 83.3, 83.3, 50.0, 83.3, 100.0, 100.0, 100.0, 100.0

## 3. SSQ-A

First, turn the four option levels into numerical scores using this table:

|  |  |
| --- | --- |
| Initial options | Scores |
| None | 0 |
| Slight | 1 |
| Moderate | 2 |
| Severe | 3 |

Calculate the average score (0-3) for each sensation across all participants. The average scores for each symptom are as follows:

* General discomfort 0.3
* Fatigue 0.5
* Nausea 0.15
* Sweating 0.10
* Vertigo (spinning) 0.25
* Difficulty concentrating 0.4
* Difficulty walking 0.05
* Ear pressure or fullness 0.10
* Tinnitus 0.00
* Auditory fatigue 0.50
* Difficulty localizing sound 0.60

## 4. NASA-TLX

The processing method is the same as SSQ-A.

Mental Demand 55.4

Physical Demand 29.3

Temporal Demand 47.2

Effort 100.0

Frustration 53.3.

## 5. SAQI

The processing method is the same as SSQ-A.

Externalisation 87.9

Spatial stability 86.8

Localisation clarity 84.8

Spaciousness / envelopment 86.3

Timbre fidelity 85.35

Distance realism 90.9

Overall audio quality 87.8