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**Datasheet for the decision  
of 21 September 2021**

**Case Number:** T 1376/19 - 3.5.05

**Application Number:** 11732602.5

**Publication Number:** 2524285

**IPC:** G06F3/042

**Language of the proceedings:** EN

**Title of invention:**

INTERACTIVE SYSTEM WITH SUCCESSIVELY ACTIVATED ILLUMINATION  
SOURCES

**Applicant:**

SMART Technologies ULC

**Headword:**

SUCCESSIVELY ACTIVATED ILLUMINATION SOURCES / SMART  
Technologies

**Relevant legal provisions:**

EPC Art. 123(2), 84, 56

**Keyword:**

Amendments - main request - added subject-matter (yes)  
Inventive step - auxiliary request (yes) - non-obvious  
solution



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Case Number: T 1376/19 - 3.5.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.05**  
**of 21 September 2021**

**Appellant:** SMART Technologies ULC  
(Applicant) 3636 Research Road NW  
Calgary, Alberta T2L 1Y1 (CA)

**Representative:** Gibbs, Richard  
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**Decision under appeal:** **Decision of the Examining Division of the  
European Patent Office posted on 29 November  
2018 refusing European patent application No.  
11732602.5 pursuant to Article 97(2) EPC.**

**Composition of the Board:**

**Chair** E. Konak  
**Members:** N. H. Uhlmann  
E. Mille

## Summary of Facts and Submissions

- I. The appellant appealed against the decision of the examining division to refuse European patent application No. 11732602.5, which was filed on 14 January 2011.
- II. The examining division decided that the subject-matter of the claims of the main request and of auxiliary request 1 did not involve an inventive step and that claim 1 of both requests did not meet the requirements of Article 123(2) EPC. Auxiliary requests 2 and 3 were not admitted into the proceedings under Rule 137(3) EPC.
- III. The examining division made reference, *inter alia*, to the following documents:
- D1 US 2003/0085871
  - D2 WO 2005/031554
  - D3 JP2002132435
  - D4 WO2009135320
- IV. In its statement setting out the grounds of appeal, the appellant submitted the previous auxiliary request 1 as its main request. Furthermore, auxiliary requests 1 to 4 were submitted, of which auxiliary request 2 was the same as auxiliary request 2 on which the decision under appeal was based.
- V. The board summoned the appellant to oral proceedings.
- In a communication pursuant to Article 15(1) RPBA 2020, the board set out its provisional view of the case.
- VI. With a letter dated 20 August 2021, the appellant submitted an amended main request and auxiliary

request 1. The previous auxiliary requests 1 to 4 were renumbered as auxiliary requests 2 to 5.

- VII. In the course of the oral proceedings, the appellant submitted an amended auxiliary request 1, which replaced the auxiliary request 1 which was filed with the letter dated 20 August 2021.
- VIII. The appellant's final requests were that the decision under appeal be set aside and a patent be granted based on the main request filed by the appellant with its letter dated 20 August 2021 or, alternatively, on amended auxiliary request 1 which was submitted by the appellant during the oral proceedings before the board, or on one of auxiliary requests 2-5 filed by the appellant with the statement setting out the grounds of appeal.
- IX. Claim 1 of the main request reads as follows:

"An illumination assembly for an interactive input system, comprising:

at least one imaging device (70) capturing image frames of a region of a plurality of illumination sources (84a, 84b, 84c) associated with each imaging device and being located at different positions relative to said imaging device, wherein two of the plurality of illumination sources (84a, 84b) are positioned on opposite sides of said imaging device and wherein one of the plurality of illumination sources (84c) is generally vertically aligned with said imaging device, said illumination sources providing illumination to said region of interest; and

a controller (50) communicating with said illumination sources, said controller conditioning said illumination sources so that the illumination sources provide illumination to said region of interest in succession,

the timing of image frame capture by said imaging device being coordinated with the illumination pattern of said illumination sources, wherein said controller conditions said illumination sources so that for an exposure cycle of said imaging device, the imaging device captures an image frame with each illumination source on and the other illumination sources off and an image frame with all illumination sources off, such that for an exposure cycle of said imaging device the imaging device captures:

an image frame with the illumination source of the plurality of illumination sources that is generally vertically aligned with said imaging device switched on and every other illumination source is switched off;  
an image frame with all illumination sources switched off;

an image frame with the illumination source of the plurality of illumination sources that is positioned on one side of said imaging device switched on and every other illumination source of the plurality of illumination sources is switched off; and an image frame with the illumination source of the plurality of illumination sources that is positioned on another one side of said imaging device is switched on and every other illumination source of the plurality of illumination sources is switched off."

X. Claim 1 of the amended auxiliary request 1 reads as follows:

"An illumination assembly for an interactive input system, comprising:

at least one imaging device (70) capturing image frames of a region of interest;

a plurality of illumination sources (84a, 84b, 84c) associated with each imaging device and being located at different positions relative to said imaging device, wherein one illumination source (84c) is generally vertically aligned with the at least one imaging device(70), and at least one other illumination source (84a, 84b) is positioned on each side of said imaging device (70), said illumination sources providing illumination to said region of interest; and

a controller (50) communicating with said illumination sources, said controller conditioning said illumination sources so that the illumination sources provide illumination to said region of interest in succession, the timing of image frame capture by said imaging device being coordinated with the illumination pattern of said illumination sources, wherein said controller conditions said illumination sources so that for an exposure cycle of said imaging device the imaging device captures:

an image frame with each illumination source (84a, 84b, 84c) on and the other illumination sources (84a, 84b, 84c) off and an image frame with all illumination sources (84a, 84b, 84c) off."

XI. The wording of the claims of the lower-ranking auxiliary requests is of no relevance for this decision.

### **Reasons for the Decision**

1. The application pertains to a system for detecting user input. An imaging device captures image frames of a region in which user input, i.e. hovering or touching with a finger or a stylus, is to be detected. A plurality of specifically positioned illumination

sources provides illumination to the region. Images are taken with all sources switched off and with each one of the sources switched on singly while the others are switched off.

2. Document D1 discloses a similar system for detecting user input using two illumination sources which are switched on at the same time.

**Main request**

3. Amendments

- 3.1 The features

such that for an exposure cycle of said imaging device the imaging device captures:

- an image frame with the illumination source of the plurality of illumination sources that is generally vertically aligned with said imaging device switched on and every other illumination source is switched off;
- an image frame with all illumination sources switched off;
- an image frame with the illumination source of the plurality of illumination sources that is positioned on one side of said imaging device switched on and every other illumination source of the plurality of illumination sources is switched off; and
- an image frame with the illumination source of the plurality of illumination sources that is positioned on another one side of said imaging device is switched on and every other illumination source of the plurality of illumination sources is switched off

have been added to claim 1. The appellant submitted paragraphs 12, 13, 42, 47, 55 and 56, claim 8 and

Figures 11 and 12 of the application as filed as a basis for these features.

- 3.2 Paragraphs 42, 47, 55 and 56 and Figure 12 refer specifically to IR LEDs and to DSP-based control of the LEDs and of the imaging device and do not provide a basis for the broader formulation "illumination source" in claim 1.
- 3.3 Figure 11 refers to LEDs but does not disclose the positions of the illumination sources with respect to the imaging device.
- 3.4 Paragraphs 12 and 13 and claim 8 also do not disclose the positions of the illumination sources with respect to the imaging device, nor do they disclose the claimed sequence of switching the illumination sources on and off.
- 3.5 Hence, these features extend beyond the content of the application as filed, contrary to the requirements of Article 123(2) EPC.
4. Consequently, the main request is not allowable.

**Amended auxiliary request 1**

5. Admission

The amended auxiliary request 1 was filed in the course of the oral proceedings before the board in reaction to the board's clarity objections to the previous first auxiliary request. The claims as amended overcame this objection.

Thus, the amended auxiliary request 1 was admitted into the proceedings.



6. Amendments

Claim 1 as amended is based on original claims 1, 2, 6 and 8. Claim 5 as amended is based on original claims 10, 2, 6 and 8.

Hence, amended auxiliary request 1 meets the requirements of Article 123(2) EPC.

7. Clarity

Minor inconsistencies in claims 1 and 3 were overcome by appropriate amendments. The objection that no illumination sources were recited in system claim 9 was resolved by deleting this claim.

The claims comply with the requirements of Article 84 EPC.

8. Patentability

8.1 According to the decision under appeal, section 5.2, with regard to the then main request, document D1 did not disclose three features of claim 1, labelled (i), (ii) and (iii). Furthermore, it was stated that these features solved different problems and "[did] not interact in a synergistic manner (at best they interact[ed] in a foreseeable manner)". Finally, the examining division found that the skilled person, starting from document D1 and using only their general knowledge, would arrive at the subject-matter of claim 1 in an obvious way.

8.2 The appellant agreed that (i) to (iii) are the distinguishing features in view of document D1.

8.3 The board holds that document D1 forms a suitable starting point for inventive-step analysis and that this document does not disclose features (i) to (iii).

In the following, these features are reproduced using wording which is essentially similar to the wording in claim 1.

8.4 The board is not convinced that the distinguishing features lead to independent effects or that they are functionally independent. However, even when features (i) to (iii) are considered independently of each other, the subject-matter of claim 1 involves an inventive step.

8.5 In the decision under appeal it was argued (with reference to document D2 and Figure 1) that feature (i)

one illumination source is generally vertically aligned with the at least one imaging device

related to an additional illumination source, leading to a more accurate coordinate detection, at its usual location.

8.6 The board observes that none of the documents on file discloses more than two LEDs and none suggests adding a further LED to an illumination arrangement. Furthermore, the claimed position "generally vertically aligned with the at least one imaging device" is not a usual location.

In the documents at hand, it is disclosed only in document D2. In particular, Figure 1 in document D2 is described in the section pertaining to related art. It is explained that a position "at the top vicinity" leads to problems with unreliable detection of touches; see the last five lines on page 1 of the translation of D2. D2 then goes on to state that it is preferable to arrange the light source 6 "as possible near" to the detection region 2, as illustrated in Figures 3a and 3b.

Hence, document D2 teaches away from a light source being generally vertically aligned with an imaging device.

For these reasons, a skilled person would not arrive at feature (i) in an obvious way.

8.7 Distinguishing feature (ii) reads:

said controller conditions said illumination sources so that for an exposure cycle of said imaging device the imaging device captures an image frame with each illumination source on and the other illumination sources off.

8.8 The board agrees with the impugned decision that the objective technical problem could be seen as how to obtain more clearly defined shadows.

8.9 None of the prior-art documents at hand appears to relate to such a problem or to feature (ii). Furthermore, it is not apparent how the skilled person would come up with the claimed specific illumination scheme without resorting to hindsight.

It is evident that there is, in general, a dependency between the illumination and the clarity of the shadows. For example, the size of a light source influences the clarity of the shadows.

8.10 Documents D2 and D3 merely teach that the position of the shadow is shifted depending on the position of an illumination source. The shifting is independent of any illumination scheme. Documents D1 and D4, which disclose two LEDs, do not address any dependency between illumination and clarity or shift of shadows.

8.11 The decision under appeal states on page 7, immediately following the problem formulation: "However, as to the illumination scheme there are two principal choices".

The board observes that no reasons were provided as to why the skilled person, striving to solve the problem, would make recourse to an illumination scheme. Rather, this conclusion is based on hindsight.

8.12 Overall, the board is of the opinion that the skilled person could come up with feature (ii); however it is not apparent, in view of the documents on file and common general knowledge, why and how they would do so.

8.13 The board agrees with the impugned decision that feature (iii)

the imaging device captures an image frame with all illumination sources off

does not contribute to inventive step.

8.14 In summary, the subject-matter of claim 1 involves an inventive step having regard to the prior-art documents on file. Similar observations apply to the subject-matter of claim 5.

## 9. Conclusion

The claims of the amended auxiliary request 1 meet the requirements of the EPC.

## Order

### For these reasons it is decided that:

The decision under appeal is set aside and the case remitted to the examining division with the order to grant a patent based on claims 1-8 of the amended auxiliary request 1 filed during the oral proceedings before the board, description and figures to be adapted.

The Registrar:

The Chair:



K. Götz-Wein

E. Konak

Decision electronically authenticated