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**Datasheet for the decision  
of 21 October 2024**

**Case Number:** T 2445/22 - 3.5.05

**Application Number:** 17763681.8

**Publication Number:** 3400676

**IPC:** H04L9/32, B64C39/02,  
G05B19/418, G01C21/20,  
G05D1/00, G05D1/02

**Language of the proceedings:** EN

**Title of invention:**

A safety architecture for autonomous vehicles

**Patent Proprietor:**

Carnegie Mellon University

**Opponent:**

ZF Friedrichshafen AG

**Headword:**

Safe autonomous driving/CARNEGIE

**Relevant legal provisions:**

EPC Art. 56

RPBA 2020 Art. 12(4), 12(8)

**Keyword:**

Decision in written proceedings - (yes): cancellation of oral proceedings upon proprietor's withdrawal of its request for oral proceedings

Inventive step - main request (no)

Admittance of claim amendments filed on appeal - 1st to 3rd auxiliary requests (no): not suitable to address the relevant issues



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Case Number: T 2445/22 - 3.5.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.5.05**  
**of 21 October 2024**

**Appellant:** ZF Friedrichshafen AG  
(Opponent) Löwentaler Strasse 20  
88046 Friedrichshafen (DE)

**Respondent:** Carnegie Mellon University  
(Patent Proprietor) 5000 Forbes Avenue  
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**Representative:** Fish & Richardson P.C.  
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**Decision under appeal:** Interlocutory decision of the Opposition  
Division of the European Patent Office posted on  
20 September 2022 concerning maintenance of the  
European Patent No. 3400676 in amended form.

**Composition of the Board:**

**Chair** K. Bengi-Akyürek  
**Members:** P. Tabery  
C. Almberg

## Summary of Facts and Submissions

- I. The opposition division's decision was to maintain the opposed patent as amended according to a "second auxiliary request", having found that the patent as granted (main request) lacked novelty (Article 54 EPC), and that the patent as amended according to a "first auxiliary request" did not involve an inventive step (Article 56 EPC).
- II. The prior-art documents referred to by the opposition division included:
- ZF1:** US 2007/0164166 A1,  
**ZF2:** EP 2 587 378 A1.
- III. The opponent appealed the decision seeking revocation of the patent whilst the responding proprietor sought a dismissal of the appeal or the maintenance of the patent in further amended forms.
- IV. In response to the board's communication issued under Article 15(1) RPBA, the proprietor indicated that it would not be attending the oral proceedings and that no further written submissions would be filed.
- V. The scheduled oral proceedings were then cancelled.
- VI. The parties' final requests are as follows:

The opponent requests that the appealed decision be set aside and that the patent be revoked.

The proprietor requests that the appeal be dismissed (**main request**). Alternatively, it requests that the

patent be maintained in amended form in accordance with the claims of one of a **first to third auxiliary request** submitted with the written reply to the statement of grounds of appeal.

VII. Claim 1 of the **main request** reads as follows (labelling introduced by the board):

"A safety architecture system (400, 500) for autonomous vehicles comprising:

- (a) a first stage comprising:
- (b) a primary unit (402) that generates primary data for performing normal system functionality;
- (c) a secondary unit that generates secondary data for performing alternative system functionality;
- (d) a primary safety gate (404) coupled to the primary unit (402), with the primary safety gate (404) providing the primary data as a primary output responsive to a determination of validity of the primary data,
- (e) wherein the primary safety gate (404) determines validity of the primary data responsive to a permissive envelope provided by the secondary safety gate; and
- (f) a secondary safety gate coupled to the secondary unit, with the secondary safety gate providing the secondary data as a secondary output responsive to a determination of validity of the secondary data; and

(g) an output selector (410) that is coupled to both the primary safety gate (404) and the secondary safety gate of the first stage, with the output selector providing a system output responsive to the determinations of the validities of the primary data and the secondary data."

Claim 1 of the **first auxiliary request** relates to "[a]n autonomous vehicle" comprising the "safety architecture system" of claim 1 of the main request.

Claim 1 of the **second and third auxiliary requests** differs from claim 1 of the main request and the first auxiliary request, respectively, in that the following wording has been added at the end (board's labelling):

(h) "wherein the system output comprises control data for operating a vehicle".

### **Reasons for the Decision**

1. The present patent concerns a safety architecture system for self-driving autonomous vehicle, e.g. an aircraft, wherein control is switched from a "primary unit" to a "backup unit" if validation of control data fails. Validation may be performed by checking the operational flight parameters against the aircraft's "permissive envelope" (or "flight envelope").
2. Decision in written proceedings
  - 2.1 The parties have had an opportunity to respond to the board's preliminary opinion. No substantive response has been received.

- 2.2 After reconsideration, the board finds no reason to deviate from that opinion. No request for oral proceedings is pending: that of the proprietor is in effect withdrawn, and that of the opponent does not apply with an unmet condition. As any holding of oral proceedings would also not be expedient, this decision is handed down in written proceedings (Article 12(8) RPBA).
3. Main request
- 3.1 Inventive step (Article 56 EPC)
- 3.1.1 The board concurs with the opposition division that the subject-matter of claim 1 differs from the system known from document **ZF1** in **feature (e)**. This has not been contested by the parties.
- 3.1.2 As to the sub-feature of **feature (e)** that the validity of the "primary data" is determined by the "primary safety gate", the board holds that this constitutes a mere selection out of a very limited number of equally likely alternatives for performing data-validity checks in the system of ZF1. Hence, the skilled person would have arrived at this implementation measure in an obvious manner. For the sake of completeness, the board adds that it agrees with the conclusion of the opposition division that the claimed "permissive envelope" was commonly known to the skilled person at the opposed patent's priority date. Document ZF1 even mentions "flight envelopes" in paragraph [0003].
- 3.1.3 With respect to the sub-feature of **feature (e)** that the "permissive envelope" is provided by the "secondary safety gate", the board concurs with the opponent that it does not credibly cause a technical effect. As

argued by the opponent, it is not evident that the "secondary safety gate" could provide any special properties to the "permissive envelope". Therefore, this sub-feature may not contribute to an inventive step either.

- 3.1.4 The proprietor argued that the provision of the "permissive envelope" by the "secondary safety gate" allowed for a *meaningful* validation: the control signals of the "primary unit" were verified using an "envelope" provided by the "secondary unit". Otherwise, this could lead to a situation where the "primary unit" verifies itself.

The board is not convinced by this argument, since it appears to imply that the "permissive envelope" changes over time. This is however not reflected in claim 1.

- 3.1.5 Consequently, the board holds that the subject-matter of claim 1 of the main request is not inventive in view of document ZF1.

- 3.2 In view of the above, the main request is not allowable under Article 56 EPC in view of document ZF1.

#### 4. Auxiliary requests

The **first, second and third auxiliary requests** are amended claim requests which were not presented during the opposition proceedings but filed for the first time with the written reply to the statement of grounds of appeal. Their admittance into the proceedings is therefore governed by the relevant parts of Article 12 RPBA.

#### 4.1 First auxiliary request

4.1.1 As already noted in the decision under appeal (see Reasons 2.2), document ZF1 in fact discloses the use of "unmanned aerial vehicles" (see paragraph [0051]). Thus, the board is not convinced by the proprietor's argument that document ZF1 did "not describe autonomous vehicles".

4.1.2 Hence, the amendment is not suitable to address the objection under Article 56 EPC raised with respect to claim 1 of the main request.

4.1.3 In view of the above, the board has decided not to admit the first auxiliary request into the proceedings (Article 12(4), fifth sentence, RPBA).

#### 4.2 Second and third auxiliary requests

4.2.1 The proprietor argued that the second and third auxiliary request were motivated by the opponent's arguments based on prior-art document **ZF2**. Hence, these auxiliary requests are apparently not suitable to address the inventive-step objection in view of prior-art document ZF1.

4.2.2 Therefore, the board has decided not to admit the second and third auxiliary request into the appeal proceedings either (Article 12(4), fifth sentence, RPBA).

## Order

### For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chair:



B. Brückner

K. Bengi-Akyürek

Decision electronically authenticated