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June 2023

## SAFETY SYSTEM FOR ADJUSTING WINDSCREEN WIPER FUNCTIONALITY IN CASE OF ICING RISK DUE TO WIPER WATER

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### Recommended Citation

Unger, Axel, "SAFETY SYSTEM FOR ADJUSTING WINDSCREEN WIPER FUNCTIONALITY IN CASE OF ICING RISK DUE TO WIPER WATER", Technical Disclosure Commons, (June 30, 2023)  
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## SAFETY SYSTEM FOR ADJUSTING WINDSCREEN WIPER FUNCTIONALITY IN CASE OF ICING RISK DUE TO WIPER WATER

### Current status

At low temperatures, windscreen washer water<sup>1</sup> can ice up after application to the windscreen - with subsequent distribution by the windscreen wiper system<sup>2</sup>.

### Disadvantage

There is no technical procedure for the uncomplicated determination of the alcohol content in the windscreen washer fluid that is relevant for anti-freeze functions. Actuating the windscreen washer system with too little anti-freeze can pose a significant safety risk due to the resulting lack of visibility to the outside.



### New idea

The new idea comprises a procedure and technical system for dealing with the special situation in winter, in which actuating the windscreen wiper system leads to icing of the windscreen due to excessively low temperatures, with a resulting deterioration in visibility. After recognising the special situation, the system automatically applies an adapted windscreen wiping and washing procedure for optimised windscreen cleaning. Thermography<sup>3</sup> is used to determine the temperature of the windscreen in the area relevant to the driver's field of vision.

### Advantage

The system offers the following advantages:

- Driver safety: Targeted avoidance of situations that result in restricted visibility for the driver
- Optimisation: Concrete improvement of windscreen wiper systems through function expansion
- Image: Smart/learning component as a „feature to talk about to your friends
- „Function on Demand: In principle, it can be implemented as an FoD

<sup>1</sup>Bei starker oder angetrockneter Verschmutzung wird die Scheibe mit Scheibenwaschwasser der Scheibenwaschanlage befeuchtet.

<sup>2</sup>Ein Scheibenwischer ist eine Vorrichtung zum Säubern der Front- und Heckscheibe oder von Lichtaustrittsscheiben eines Kraftfahrzeuges. Scheibenwischer bestehen aus Wischerarm, Wischerblatt und Antrieb. Das Wischerblatt ist mit einem Gummi-Profil bestückt, das störende Feuchtigkeit oder Schmutz von der Scheibe schiebt und den Fahrzeuginsassen bessere Sicht nach außen ermöglicht.

<sup>3</sup>Thermografie ist ein berührungsloses bildgebendes Verfahren, das die für das menschliche Auge unsichtbare Wärmestrahlung (mittleres Infrarot) eines Objektes oder Körpers sichtbar macht. Bei der Thermografie werden Temperaturverteilungen auf Flächen und Gegenständen erfasst und dargestellt.

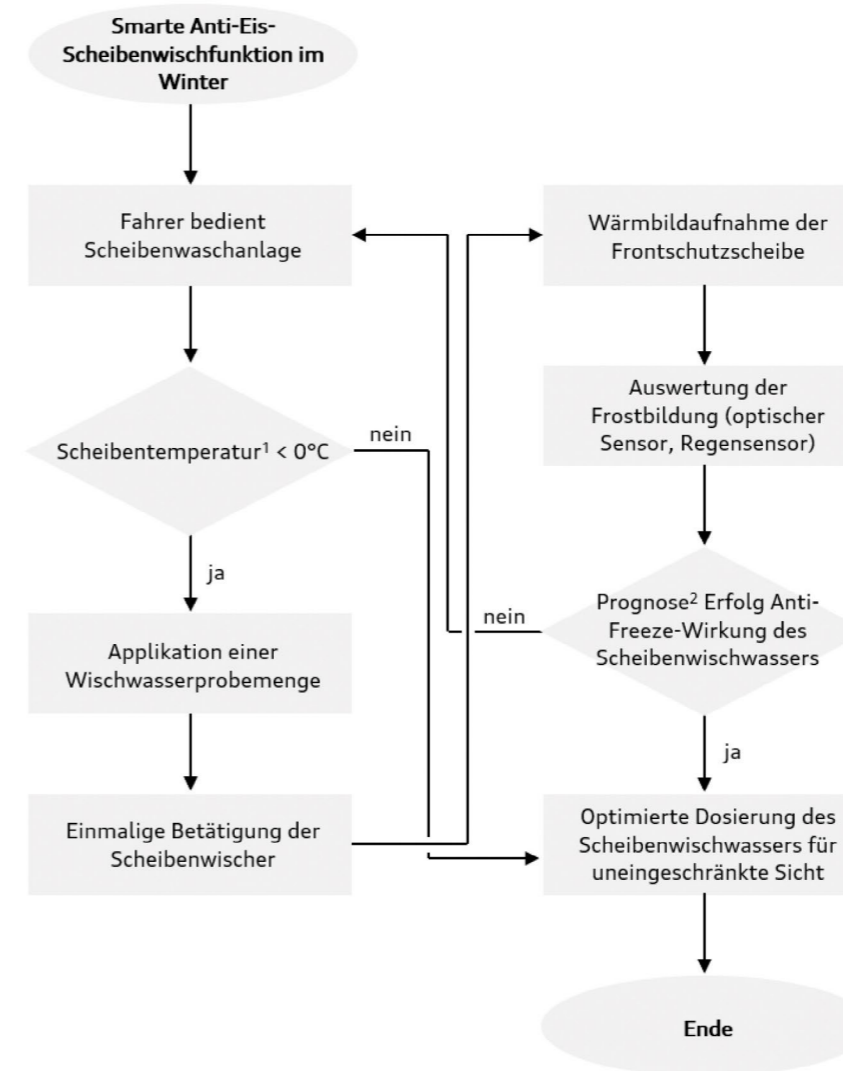
### Technical implementation

The technical implementation requires the following components:

- Rain sensor
- automatic windscreen wiper and washer system
- Infrared sensor
- computable backend with buffer memory

The logic of the smart windscreen wiper function in winter is shown in the following figure:

- The driver operates the windscreen washer system.
- At temperatures below 0 °C, only a very limited amount of windscreen wiper water is applied to the windscreen.
- The infrared camera takes a thermal image of the windscreen and an optical module or the rain sensor identifies the resulting frost formation.
- The anti-freeze effect (condition) of the windscreen wiper water is determined based on the parameters windscreen wiper water quantity, outside temperature, wind/driving speed and windscreen temperature.
- Based on this, it is calculated whether or not operating the windscreen washer system will result in freezing, assuming a maximum available amount of wiper water.
- Depending on the result, the system may refuse to activate the wiper water function to ensure optimal outward visibility for the driver.



<sup>1</sup> Temperaturermittlung der Windschutzscheibe im für das Sichtfeld des Fahrers relevanten Bereich mittels Infrarotkamera

<sup>2</sup> Anti-Freeze-Wirkung des Scheibenwischwassers als Funktion von Scheibenwischwassermenge, Außentemperatur, Wind-/Fahrtdgeschwindigkeit, Scheibentemperatur