US009409549B2

(12) **United States Patent**
Yopp et al.

(10) **Patent No.: US 9,409,549 B2**
(45) **Date of Patent: Aug. 9, 2016**

(54) **AUTONOMOUS VEHICLE WINDOW CLEARING**

(71) Applicant: **Ford Global Technologies, LLC**, Dearborn, MI (US)

(72) Inventors: **Wilford Trent Yopp**, Canton, MI (US); **Mark Allan Lippman**, New Baltimore, MI (US)

(73) Assignee: **Ford Global Technologies, LLC**, Dearborn, MI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 181 days.

(21) Appl. No.: **14/036,159**

(22) Filed: **Sep. 25, 2013**

(65) **Prior Publication Data**

US 2015/0088374 A1 Mar. 26, 2015

(51) **Int. Cl.**

B60S 1/04	(2006.01)
B60H 1/00	(2006.01)
B60S 1/02	(2006.01)
B60S 1/08	(2006.01)

(52) **U.S. Cl.**

CPC ***B60S 1/04*** (2013.01); ***B60H 1/00764*** (2013.01); ***B60H 1/00785*** (2013.01); ***B60S 1/023*** (2013.01); ***B60S 1/0818*** (2013.01); *B60H 1/00878* (2013.01)

(58) **Field of Classification Search**

CPC B60H 1/00785; B60H 1/00878; B60S 1/023; B60S 1/04; B60S 1/0818

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,960,996	A *	10/1990	Hochstein	B60S 1/0822	15/250.001
4,975,978	A	12/1990	Ando et al.		
5,323,637	A *	6/1994	Bendicks	B60S 1/0822	318/119
5,414,257	A *	5/1995	Stanton	B60S 1/0822	250/227.25
5,498,866	A *	3/1996	Bendicks	B60S 1/0822	250/227.25
5,703,568	A *	12/1997	Hegyi	B60S 1/0818	15/250.01
5,811,793	A *	9/1998	Pientka	B60S 1/0837	250/216
5,998,782	A *	12/1999	Koyama et al.	250/227.25	
6,151,539	A *	11/2000	Bergholz et al.	701/25	
6,353,392	B1	3/2002	Schofield et al.		
2007/0227718	A1	10/2007	Hill et al.		
2009/0299547	A1 *	12/2009	Becker et al.	701/1	
2011/0010045	A1 *	1/2011	Yopp	B60S 1/0818	701/36
2012/0020102	A1 *	1/2012	Lambert et al.	362/503	
2012/0218412	A1	8/2012	Dellantoni et al.		
2013/0141574	A1 *	6/2013	Dalal et al.	348/148	
2013/0219294	A1	8/2013	Goldman-Shenhar et al.		
2014/0307247	A1 *	10/2014	Zhu	G01S 17/023	356/4.01
2014/0336935	A1 *	11/2014	Zhu	G01W 1/14	702/3

FOREIGN PATENT DOCUMENTS

DE	4426610	9/1995
DE	10136138	2/2003

OTHER PUBLICATIONS

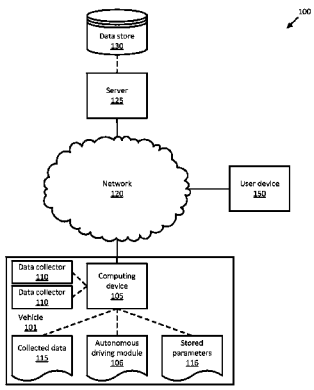
Kahle et al., Preheat: Automatic Windshield Defroster, Olin Projects, May 2013, http://www.olinprojects.com/ projects/ 5187d431e885afce55818c13.

* cited by examiner

Primary Examiner — Mussa A Shaawat

(74) *Attorney, Agent, or Firm* — Frank MacKenzie; Bejin Bieneman PLC

(57) **ABSTRACT**

At least one datum is received relating to a condition of a window in the vehicle. A determination is made to change a parameter based on the at least one datum, the parameter governing clearing the window. An instruction is provided to initiate or change operation of a vehicle component based on the change of the parameter.

19 Claims, 2 Drawing Sheets