

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

(10) **Patent No.:** **US 9,409,474 B2**
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **METHOD AND SYSTEM FOR ADJUSTING GRILLE SHUTTERS BASED ON TEMPERATURE AND POSITION FEEDBACK**

(71) Applicant: **Ford Global Technologies, LLC**, Dearborn, MI (US)
(72) Inventors: **Kevin Macfarlane**, Northville, MI (US); **Christopher Semanson**, Dearborn, MI (US); **Robert Roy Jentz**, Westland, MI (US); **Joseph James Gallo**, Fraser, MI (US); **Chuck Irwin Rackmil**, Ypsilanti, 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 106 days.

(21) Appl. No.: **14/092,495**

(22) Filed: **Nov. 27, 2013**

(65) **Prior Publication Data**
US 2015/0149043 A1 May 28, 2015

(51) **Int. Cl.**
B60R 22/00 (2006.01)
E05F 15/00 (2015.01)
G05D 1/00 (2006.01)
G05D 3/00 (2006.01)
G06F 7/00 (2006.01)
G06F 17/00 (2006.01)
B60K 11/08 (2006.01)
F01P 7/12 (2006.01)
G06F 11/30 (2006.01)
G06F 19/00 (2011.01)
G07C 5/00 (2006.01)

(Continued)

(52) **U.S. Cl.**
CPC **B60K 11/085** (2013.01); **F01P 7/12** (2013.01); **B60K 11/04** (2013.01); **B60K 11/08** (2013.01); **G06F 7/00** (2013.01); **G06F 17/00** (2013.01)

(58) **Field of Classification Search**
CPC G06F 17/00; G06F 7/00; B60K 11/04; B60K 11/08
USPC 701/49, 29.2; 180/68.1
See application file for complete search history.

(56) **References Cited**
U.S. PATENT DOCUMENTS

8,311,708 B2 11/2012 Kerns
8,505,660 B2 8/2013 Fenchak et al.
2011/0118945 A1 5/2011 Mochizukil

(Continued)

OTHER PUBLICATIONS

Macfarlane, Kevin et al., "Method for Adjusting Vehicle Grille Shutters Based on Vehicle Speed and Direction of Grille Shutter Adjustment," U.S. Appl. No. 14/092,546, filed Nov. 27, 2013, 45 pages.
Pursifull, Ross D., "Method and System for Reducing Charge Air Cooler Condensate Using a Secondary Intake Throttle," U.S. Appl. No. 14/084,295, filed Nov. 19, 2013, 38 pages.
Sowards, John et al., "Active Grille Shutter System with a Staged Progressive Linkage to Reduce Engine Misfire From Charge Air Cooler Condensation," U.S. Appl. No. 13/857,365, filed Apr. 5, 2013, 43 pages.

(Continued)

Primary Examiner — Helal A Algahaim
Assistant Examiner — Mahmoud Ismail
(74) *Attorney, Agent, or Firm* — Julia Voutyras; Alleman Hall McCoy Russell & Tuttle LLP

(57) **ABSTRACT**

Methods and systems are provided for adjusting vehicle grille shutters based on engine coolant temperature. In one example, a method includes adjusting grille shutters based on engine coolant temperature and additional engine operating conditions when engine coolant temperature is below a threshold and adjusting the grille shutters base on the engine coolant temperature only when the engine coolant temperature is above the threshold. Further, the method may include recalibrating a position of the grille shutters based on a grille shutter position error.

17 Claims, 7 Drawing Sheets

