



US009409565B2

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

(10) **Patent No.:** **US 9,409,565 B2**
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **HYBRID ELECTRIC VEHICLE CONTROL SYSTEM AND METHOD**

USPC 701/22
See application file for complete search history.

(71) Applicant: **Jaguar Land Rover Limited**, Coventry (GB)

(56) **References Cited**

(72) Inventors: **Baptiste Bureau**, Coventry (GB);
Clement Dextreit, Coventry (GB);
David McGeoch, Coventry (GB)

U.S. PATENT DOCUMENTS
6,048,289 A 4/2000 Hattori et al.
6,190,282 B1 * 2/2001 Deguchi B60K 6/442
180/65.23

(73) Assignee: **Jaguar Land Rover Limited** (GB)

(Continued)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

FOREIGN PATENT DOCUMENTS

DE 10 2006 018 624 A1 10/2007
EP 1 782 988 A1 5/2007

(Continued)

(21) Appl. No.: **14/650,390**

(22) PCT Filed: **Dec. 6, 2013**

OTHER PUBLICATIONS

(86) PCT No.: **PCT/EP2013/075817**

Notice of Reason(s) for Rejection, Japanese Patent Application No. 2015-546034, May 10, 2016, 3 pages.

§ 371 (c)(1),
(2) Date: **Jun. 8, 2015**

Primary Examiner — Thomas Tarcza

Assistant Examiner — Tyler J Lee

(87) PCT Pub. No.: **WO2014/090704**

(74) *Attorney, Agent, or Firm* — Myers Bigel & Sibley

PCT Pub. Date: **Jun. 19, 2014**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2015/0307084 A1 Oct. 29, 2015

The present invention relates to a control system for a hybrid electric vehicle having an engine (121) and first (123C) and second (123B) electric machines operable as propulsion motors. The second electric machine is arranged to be drivably coupled to the engine, the engine being arranged to be drivably coupled to a driveline of the vehicle by clutch means (122). The system is operable to control the vehicle to operate in one selected from amongst: an engine-driven mode in which the clutch means is closed and the engine applies torque to the driveline of the vehicle; an electric vehicle (EV) mode in which the clutch means is open and the first electric machine applies torque to the driveline; and an EV boost mode in which the clutch means is closed and both the first and second electric machines apply torque to the driveline, the engine being motored by the second electric machine, the mode in which the vehicle is operated being selected by the system in dependence on the value of one or more vehicle parameters.

(30) **Foreign Application Priority Data**

Dec. 10, 2012 (GB) 1222175.0

(51) **Int. Cl.**

B60W 20/00 (2016.01)
B60W 10/08 (2006.01)

(Continued)

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

CPC **B60W 20/1088** (2013.01); **B60K 6/442** (2013.01); **B60W 10/06** (2013.01);

(Continued)

(58) **Field of Classification Search**

CPC B60W 20/00; B60W 20/40; Y10S 903/93

15 Claims, 2 Drawing Sheets

