



US008447443B1

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

(10) **Patent No.:** **US 8,447,443 B1**  
(45) **Date of Patent:** **May 21, 2013**

(54) **SYSTEMS AND METHODS FOR PEAK-SEEKING CONTROL**  
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(\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

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(21) Appl. No.: **13/367,990**

(22) Filed: **Feb. 7, 2012**

(Continued)

**Related U.S. Application Data**

(60) Provisional application No. 61/499,249, filed on Jun. 21, 2011.

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(51) **Int. Cl.**  
**G05B 19/042** (2006.01)  
**G06F 17/00** (2006.01)

(52) **U.S. Cl.**  
USPC ..... **701/3; 701/480; 701/510; 340/992**

(58) **Field of Classification Search**  
USPC ..... **701/3, 480, 510; 340/992**  
See application file for complete search history.

(57) **ABSTRACT**

A computerized system and method for peak-seeking-control that uses a unique Kalman filter design to optimize a control loop, in real time, to either maximize or minimize a performance function of a physical object ("plant"). The system and method achieves more accurate and efficient peak-seeking-control by using a time-varying Kalman filter to estimate both the performance function gradient (slope) and Hessian (curvature) based on direct position measurements of the plant, and does not rely upon modeling the plant response to persistent excitation. The system and method can be naturally applied in various applications in which plant performance functions have multiple independent parameters, and it does not depend upon frequency separation to distinguish between system dimensions.

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**9 Claims, 6 Drawing Sheets**

