



US009411010B2

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

(10) **Patent No.:** **US 9,411,010 B2**  
(45) **Date of Patent:** **Aug. 9, 2016**

(54) **SYSTEM FOR INTROSPECTION AND ANNOTATION OF ELECTRONIC DESIGN DATA**

(58) **Field of Classification Search**  
CPC ..... G06F 17/5081; G01R 31/2834  
USPC ..... 716/136  
See application file for complete search history.

(71) Applicants: **Pragun Goyal**, Cambridge, MA (US);  
**Joseph A. Paradiso**, Arlington, MA (US)

(56) **References Cited**

U.S. PATENT DOCUMENTS

(72) Inventors: **Pragun Goyal**, Cambridge, MA (US);  
**Joseph A. Paradiso**, Arlington, MA (US)

8,150,498 B2 \* 4/2012 Gielen ..... A61B 5/06  
382/128  
8,175,681 B2 \* 5/2012 Hartmann ..... A61B 19/5244  
128/899  
8,303,502 B2 \* 11/2012 Washburn ..... A61B 8/00  
600/424  
2010/0130853 A1 \* 5/2010 Chandonnet ..... A61B 5/06  
600/424

(73) Assignee: **Massachusetts Institute of Technology**,  
Cambridge, MA (US)

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

\* cited by examiner

*Primary Examiner* — Sun Lin

(21) Appl. No.: **14/506,584**

(74) *Attorney, Agent, or Firm* — Norma E. Henderson

(22) Filed: **Oct. 3, 2014**

(57) **ABSTRACT**

(65) **Prior Publication Data**

US 2015/0213187 A1 Jul. 30, 2015

A system for introspection and annotation of electronic design data includes a tracked probe that interacts with an electronic circuit, a tracking system, schematics, design files, or models for the circuit, electronic design system software, and a user interface. The probe has a sensor that tracks the position of the probe within the circuit. The tracking system receives data from the sensor and translates it into coordinates reflecting the location of the probe within the circuit. The software uses the probe coordinates to locate the position of the probe on the circuit schematic, identify the circuit component at the probe location, and display information about the identified component. The displayed information preferably includes an annotated version of the circuit schematic. The system may include a measurement or instrumentation device, the probe may include at least one parameter measurement device, and the display may include information derived from the parameter measurements.

**Related U.S. Application Data**

(60) Provisional application No. 61/886,584, filed on Oct. 3, 2013.

(51) **Int. Cl.**  
**G06F 17/50** (2006.01)  
**G01R 31/28** (2006.01)  
**G06Q 10/00** (2012.01)  
**G01R 1/067** (2006.01)

(52) **U.S. Cl.**  
CPC ..... **G01R 31/2834** (2013.01); **G06F 17/50** (2013.01); **G06Q 10/00** (2013.01); **G01R 1/06788** (2013.01); **G01R 31/2806** (2013.01)

**20 Claims, 18 Drawing Sheets**

