

**UNITED STATES PATENT AND TRADEMARK OFFICE**

---

**BEFORE THE PATENT TRIAL AND APPEAL BOARD**

---

TCT MOBILE (US), INC.; TCT MOBILE (US) HOLDINGS, INC.;  
HUIZHOU TCL MOBILE COMMUNICATION CO. LTD.; AND  
TCL COMMUNICATION, INC.

Petitioner,

v.

Fundamental Innovation Systems International LLC,  
Patent Owner.

---

Case IPR2021-00428  
Patent No. 8,624,550

---

**DECLARATION OF DR. KENNETH FERNALD IN SUPPORT OF  
PATENT OWNER'S RESPONSE**

## TABLE OF CONTENTS

	<u>Page</u>
I. Introduction .....	1
II. Technology Background .....	5
A. USB Topology .....	5
B. USB Hub .....	6
C. Device States and Enumeration .....	14
D. Speed Detection .....	23
III. Use of SE1 in Cited Prior Art.....	26
IV. The '550 Inventions .....	33
V. Level And Knowledge Of Skill In The Art.....	35
VI. Use of SE1 in Morita's System.....	37
A. Morita.....	37
B. TCT's modification would disable the USB-hub controllable charger's primary functionality .....	46
C. There is no conceivable reason for Morita's charger to generate a signal that identifies a power source type.....	56
D. There were other known methods to enable charging or inform power source type that would not interfere with normal USB communications .....	60

## **I. Introduction**

1. My name is Kenneth Fernald, Ph.D. My qualifications are summarized below and are addressed more fully in my CV attached as EXHIBIT A.

2. For over 35 years I have been involved in the design of integrated circuits. A large portion of my work has involved the design of integrated circuits that involve power management, battery charging and USB control. I have designed USB controllers that have sold in the hundreds of millions of units, and I was intimately involved in this field during the time of the patents at issue in this case.

3. I earned my Bachelor of Science and Master of Science degrees in Electrical Engineering from North Carolina State University (NCSU) in 1985 and 1987. During this period I worked for the Space Electronics Group developing software for predicting the effects of radiation environments on integrated circuits. I also consulted for the Naval Research Laboratory (NRL). My services to NRL included the design of dosimetry instrumentation and the execution of radiation studies on electronic devices at various facilities around the United States. I joined NASA Langley Research Center in 1987 where I designed motor control instruments and firmware for ground and space station experiments.

4. I returned to NCSU in 1988 to earn my Ph.D. in Electrical

Engineering. My doctoral research efforts were funded by the National Science Foundation and focused on the development of medical systems utilizing wireless digital telemetry. My work included a thorough investigation of medical telemetry technology and design of a microprocessor-based system for the fast prototyping of implantable medical instruments. I also completed the design and testing of various components of this system, including a bidirectional digital telemetry integrated circuit (IC) and a general-purpose sensor interface and conversion IC. I completed my Ph.D. in 1992, after which I joined Intermedics Inc. in Angleton, Texas.

5. My responsibilities at Intermedics included system and circuit design of telemetry, signal-processing, and control ICs for medical devices. Examples include the design of a sensor acquisition, compression, and storage IC for implantable pacemakers and defibrillators. I also worked on advanced wireless digital telemetry technology, control ICs for therapy delivery in defibrillators, and software development for sensor waveform compression and recovery. I left Intermedics in 1998 to join Analog Devices Inc. in Greensboro, NC.

6. My work at Analog Devices included the design of advanced ICs for wireless digital communication devices. Specific projects included the design, debug, and testing of a base-band receiver IC for digital satellite systems. This IC performed QPSK demodulation, symbol recovery, and

forward-error correction for high-bandwidth wireless video signals. I also performed system design for a CDMA base-band transceiver IC for personal communication devices.

7. I rejoined Intermedics in 1998 as the first employee of an IC design group in Austin, Texas. I continued to work on next-generation medical telemetry ICs until Intermedics was acquired by Guidant in 1999. At that time I joined Cygnal Integrated Products, a startup company in Austin, Texas. My responsibilities at Cygnal included the design and development of mixed-signal embedded products for industrial and instrumentation applications. Specific projects included the design of a proprietary communication system for in-system debug, a proprietary clock recovery method for USB devices, and the design of numerous analog and digital circuits and systems. I remained at Cygnal until its acquisition by Silicon Laboratories Inc. in 2003, at which time I joined Zilker Labs, a start-up company in Austin, Texas, as their first VP of Engineering and later became their Chief Technical Officer.

8. My responsibilities at Zilker Labs included the development of advanced IC technologies for power management and delivery for board-level electronic systems. Specific duties included architecture design and firmware development for all Zilker Labs products. I left Zilker Labs in 2006 to join Keterex as their first VP of Engineering. My responsibilities at Keterex included management of engineering resources, design and layout of

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.