

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

CHARGELOGIC LLC,
Patent Owner

Case IPR2026-00381
U.S. Patent 11,909,010

DECLARATION OF SAMUEL RUSS, PH.D.

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I. Introduction

1. I have been retained as a technical expert by ChargeLogic LLC (“ChargeLogic” or “Patent Owner”) and asked to provide my objective and unbiased opinions concerning the patentability of U.S. Patent No. 11,909,010 (“the ’010 Patent”). Specifically, I have been asked to provide my opinions on the patentability of the challenged claims of the ’010 Patent in view of the grounds advanced in the pending Petition for Inter Partes Review filed by Tesla, Inc. (“Tesla” or “Petitioner”) against the ’010 Patent (IPR2026-00381), the state of the art at the time of the claimed inventions, and the knowledge of a person of ordinary skill in the art at the time of the claimed inventions.

II. Background and Qualifications

2. My Curriculum Vitae is attached hereto as Appendix A.
3. In forming the opinions expressed in this Declaration, I have considered and relied upon my education, background, and experience. In addition, I have reviewed and relied upon materials in preparation of this Declaration, as described herein.
4. I received a Bachelor’s degree in Electrical Engineering from the Georgia Institute of Technology (“Georgia Tech”) in 1986 and a Ph.D. in Electrical Engineering from Georgia Tech in 1991.
5. From 2007 to the present, I have been a member of the faculty of the University of South Alabama as an Assistant and Associate Professor in the Department

of Electrical and Computer Engineering. During that time, I have won awards for excellent teaching.

6. I am active in the Institute of Electrical and Electronic Engineers (IEEE) and am a Distinguished Lecturer for the IEEE Consumer Electronics Society. As a consultant, I have conducted briefings for members of the financial community on technology trends in the cable, satellite, and IPTV sectors.

7. I also served on the faculty of Mississippi State University from 1994 to 1999 as an Assistant Professor in the Department of Electrical & Computer Engineering, where I taught circuit board design and two-way interactive video classes, among other things.

8. I have also authored at least 15 journal articles and at least 31 conference papers.

9. With regards to batteries and battery charging, subject matter associated with the '010 Patent, I have actively developed numerous systems that used batteries and battery chargers.

10. From 1999 to 2000, I developed a portable version of a payment terminal. To complete the design based on Nickel Metal Hydride (NiMH) batteries, I had to consider thermal issues, charge management, and charge memory associated with incomplete discharging.

11. From 2016 to 2022, I managed the design of a fully functional satellite that was successfully deployed on orbit in 2022. The satellite included a maximum power-point tracking solar battery charger and Lithium-Ion batteries. The batteries required a special safety rating for safe storage on the International Space Station and I architected the software specifically for very low power consumption. I overhauled the EE 457 Embedded Systems course to include components of safety and ethics, and I use batteries and battery chargers as examples of systems with significant safety risks. I also teach specifically on battery charging and battery chemistry so that students can be prepared for battery-equipped systems.

12. I have no financial interest in ChargeLogic or the '010 Patent. I am being compensated for my time spent in connection with these proceedings at an hourly rate. I am also being reimbursed for reasonable expenses, such as travel expenses. My compensation is not contingent on my opinions, on the outcome of any matter, or on any of the technical positions I explain in this declaration.

III. Legal Standards

13. I am not an attorney. For purposes of this Declaration, I have been informed about certain aspects of the law that are relevant to my opinions, as set forth below.

A. Patentability

14. I understand that for an invention claimed in a patent to be valid and patentable, it must be, among other things, new and not obvious in light of what was known and came before it. That which was known or came before the invention claimed is generally referred to as “prior art.”

15. I understand that there are two ways in which prior art may render a patent claim unpatentable. First, the prior art can be shown to “anticipate” the claim. Second, the prior art can show that the claim was obvious to a person of ordinary skill in the field of the invention at the time the invention was made.

16. I understand that, for a patent claim to be “anticipated” by the prior art, each and every element or requirement of the claim must be found, expressly or inherently, in a single prior art reference. Further, I understand that anticipation requires that the single prior art reference must disclose the elements of the claim arranged or combined in the same way as in the claim. It is my understanding that whether a claimed invention is obvious is a question of law, with underlying factual inquiries that are determined from the perspective of a person of ordinary skill in the art at the time of the claimed invention.

17. It is my understanding that a claimed invention is obvious if the differences between the claimed invention and the prior art are such that the claimed invention as

a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art (a “POSITA”).

18. It is my understanding that obviousness requires consideration of the following underlying factual inquiries:

- determining the scope and content of the prior art
- ascertaining the differences between the claimed invention and the prior art;
- resolving the level of ordinary skill in the art; and
- evaluating objective evidence or “secondary considerations” of non-obviousness, such as experimental results, commercial success, long-felt but unresolved needs, failure of others, industry praise, and unexpected results.

19. It is my understanding that a reference must be analogous art to the claimed invention in order to be properly considered for use in an obviousness inquiry. It is my understanding that a reference is analogous art to the claimed invention if:

- The reference is from the same field of endeavor as the claimed invention (even if it addresses a different problem); or
- The reference is reasonably pertinent to the problem faced by the inventor (even if it is not in the same field of endeavor as the claimed invention).

20. It is my understanding that whether a reference is reasonably pertinent depends on how the problem faced by the inventor is reflected, either explicitly or implicitly, in the specification.

21. It is my understanding that the following are exemplary rationales that may support a conclusion of obviousness:

- Combining prior art elements according to known methods to yield predictable results;
- Simple substitution of one known element for another to obtain predictable results;
- Use of known techniques to improve a similar method or product in the same way;
- Applying a known technique to a known method or product ready for improvement to yield predictable results;
- Obvious to try – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;
- Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and
- Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

22. In addition to the above, I understand that a person of ordinary skill in the art may resort to logic, judgment and common sense available to him or her at the time of the invention or prior to the invention to find a claim feature obvious, even if the prior art relied on does not explicitly state or teach that feature. I understand that when common sense is relied on to find a feature obvious, the reasoning for that conclusion must be articulated with sufficient clarity.

23. I also understand that a patent claim is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. An obviousness determination requires finding both that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so. I understand that it is important to be careful not to allow hindsight reconstruction of references to produce the claimed invention, without any explanation as to how or why the references would be combined to produce the claimed invention.

24. Regarding “objective evidence” or “secondary considerations,” I understand that for such evidence to be relevant to the obviousness of a claim, there must be a causal relationship (called a “nexus”) between the claim and the evidence. I also understand that such objective evidence may include: commercial success of products covered by the patent claims; long-felt need for the invention; failed attempts by others to solve the problem addressed by the invention; copying of the invention by

others in the field; unexpected results achieved by the invention; praise of the invention; the taking of licenses under the patent by others; expressions of surprise by experts and those skilled in the art at the making or use of the invention; and that the patentee proceeded contrary to the accepted wisdom of the prior art.

25. I understand that a person of ordinary skill is also a person of ordinary creativity. I further understand that the obviousness analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, but instead can take into account “ordinary innovation” that does no more than yield predictable results, which are inferences and creative steps that a person of ordinary skill in the art would be understood to employ.

26. I understand that sometimes it will be necessary to look to interrelated teachings of multiple patents and publications; the effects of demands known to the relevant field or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art. I understand that all these issues may be considered to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

B. Prior Art

27. I understand that for purposes of this proceeding, prior art includes patents and printed publications (e.g., journal articles) in or outside the United States before the effective filing date of the claimed invention. I also understand that prior art includes

U.S. patents, published U.S. patent applications, and published international applications (pursuant to the Patent Cooperation Treaty) that themselves have an effective filing date before the effective filing date of the claimed invention, as long as they name another inventor.

C. Inherency

28. I understand that if a prior art reference does not expressly set forth a particular claim element, the prior art may still disclose that element if it is “inherent” in its disclosure. To establish inherency, it is my understanding that evidence must make clear that the missing descriptive matter is necessarily present in the thing described in the reference. It is my understanding that inherency may not be established by probabilities or possibilities. In other words, it is my understanding that the mere fact that a certain thing may result from a given set of circumstances is not sufficient to establish inherency.

29. I understand that under the principles of inherency, if a prior art device, in its normal and usual operation, would necessarily perform a claimed method, then the method will be considered to be anticipated by the prior art device. I also understand that when the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed that the device will inherently perform the claimed process.

D. Person of Ordinary Skill In The Art

30. I understand that “a person of ordinary skill in the art” or POSITA is a hypothetical person who is presumed to have known the relevant art at the time of the invention. Such a person would necessarily have the capability of understanding any scientific and engineering principles applicable to the pertinent art.

31. I understand that factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the following:

- the educational level of the inventor;
- the type of problems encountered in the art;
- prior art solutions to those problems;
- the rapidity with which innovations are made;
- the sophistication of the technology; and
- the educational level of active workers in the field.

32. I understand that a person of ordinary skill in the art is not a real person, but rather is a hypothetical individual having the qualities reflected by the factors above. This hypothetical person has knowledge of all prior art in the relevant field as if it were arranged on a workshop wall and takes from each reference what it would teach to a person of ordinary skill in the art.

33. I understand that a person of ordinary skill in the art is a person of ordinary creativity, not an automaton. In many cases a person of ordinary skill will be able to fit the teachings of multiple prior art references together like pieces of a puzzle.

34. I understand that a person of ordinary skill in the art can collaborate with one or more other persons of ordinary skill in the art for one or more aspects with which the other person may have superior expertise, experience, and/or knowledge.

E. Claim Construction

35. It is my understanding that claim construction, or the interpretation of the claims of a patent, is ultimately a question of law. I have been informed that claim terms are generally presumed to carry their ordinary and customary meaning. However, I understand that a patent applicant is his own lexicographer and is entitled to provide alternate definitions of words in common usage, but if the patent applicant uses a term that is in common usage without providing an alternate definition, then that term should generally be understood as having its common meaning.

36. I understand that a person of ordinary skill in the art is deemed to read a claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent specification and the “file history” of the patent developed during examination by the Patent Office.

37. I understand that the claims, the specification, and the file history are referred to as “intrinsic evidence,” and are to be read as a person of ordinary skill in the art at the time of the invention would have done at the time of the alleged invention.

38. In addition to the intrinsic evidence, I understand that the court or tribunal may also consider other relevant evidence, which is called “extrinsic evidence,” concerning relevant scientific principles, the meaning of technical terms, and the state of the art. Such evidence includes the testimony of qualified expert witnesses. Although extrinsic evidence may be used to resolve ambiguities that may exist after reviewing the intrinsic evidence, I understand that extrinsic evidence cannot be used to contradict a claim construction that is clear from the intrinsic evidence.

39. I understand that some claims are independent, and that those independent claims are complete by themselves. Other claims refer to these independent claims, or other dependent claims, and are “dependent” on those claims. The dependent claims include all of the limitations of the claims on which they depend.

IV. Bases For Opinions

40. The opinions set forth in this Declaration are my own. In forming the opinions herein, I have considered the Petition for Inter Partes Review filed in the IPR proceedings referenced above and exhibits thereto, as well as the additional materials cited in this Declaration (including the exhibits to the Patent Owner’s Response cited herein), and my education, training, and experience.

41. My analysis of the materials relating to this matter is ongoing and I will continue to review any new material that is provided to me. This Declaration represents certain opinions that I have formed to date and the bases for those opinions. I reserve the right to revise, supplement, and/or amend my opinions based on new information presented to me and on my continuing analysis of the materials cited herein or later provided to me.

V. Level of Ordinary Skill In The Art

42. I understand that the Petition asserts the following level of skill of a POSITA at the time of the '010 Patent:

A POSITA at the time of the '010 Patent would have had at least a bachelor's degree in electrical or mechanical engineering (or an equivalent field) and at least two years of work experience involving automotive systems, including electric vehicle battery charging systems. Additional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser levels of industry experience.
EX1003-Dec., ¶¶29-31.

Petition, 2.

43. I understand that Petitioner's expert, Dr. Andrews, provides the following opinion on the level of a POSITA as of August 18, 2008:

[A] POSITA at the time of the '010 Patent would have been knowledgeable regarding the field of automotive systems, including

electric vehicle battery charging systems. In my experience working in this field, most workers of ordinary skill in the art as of the earliest possible priority date of August 18, 2008, would have had at least a bachelor's degree in electrical or mechanical engineering (or an equivalent field) and at least two years of work experience involving automotive systems, including electric vehicle battery charging systems. Additional industry experience or technical training may offset less formal education, while advanced degrees or additional formal education may offset lesser levels of industry experience.

EX 1003 ¶ 29.

44. For purposes of this Declaration only, I have applied the definition of a person having ordinary skill in the art ("POSITA") proposed by Dr. Andrews and Petitioner but with the one modification. Specifically, the proposed definition should not require "automotive systems" experience generally, which encompasses experience with systems unrelated to the technology at issue, such as transmissions, cooling systems, and the like. Likewise, although the '010 Patent focuses on electric vehicle battery chargers, a POSITA would not require specific experience with such chargers if they have sufficient experience with other types of chargers. For example, I have considerable experience with battery chargers for satellite systems and for portable payment terminals, which are not meaningfully different in terms of technical complexity or complexity of operation as compared to vehicle chargers.

45. My education and experience exceed that of a POSITA as described above and qualify me to testify as to the knowledge of a POSITA under any reasonable definition. *See* Section II (“Background and Qualifications”). Moreover, even under Petitioner’s proposed level of ordinary skill in the art, I qualify based on my significantly higher level of education, which offsets the requirement of any specific industry experience.

46. All references to a POSITA here are made pursuant to this modified definition. However, my application of that definition is not a reflection of my agreement or disagreement with it. I reserve the right to provide my own opinion on the level of ordinary skill should there be further proceedings.

47. With these understandings, my testimony herein relates to the knowledge and understanding of a POSITA as of August 18, 2008. I understand this is the priority date applied by Petitioner, and I have been asked to use this date for the purposes of my testimony. I have formed no opinion on whether this date is the appropriate date, nor have I been asked to do so.

VI. Claim Construction

48. I understand that, with one exception, the Petition asserts that it is applying the “ordinary and customary meaning of the claim terms,” but does not provide any explanation of any such meanings. Petition, 3. The one term identified in the Petition

for construction, “cost of power,” appears in dependent claims 5, 11, and 19. *Id.*, 3-4; EX 1001.

49. As detailed below, my review of the Petition indicates that none of the Grounds directed at the independent claims (Ground 1, directed at independent claims 1 and 9, and Ground 2, directed at independent claim 15) show that any of the independent claims are unpatentable. The other grounds (3-6) do not contend that any of their additional references address the deficiencies identified for Grounds 1 or 2, and appear to assert the same combinations as those grounds for their included limitations of claim 1. Therefore, these grounds too do not show that any challenged claim is unpatentable, based solely on the analyses of Ground 1 and 2 for claims 1, 9, and 15. Therefore, at this time I do not address the Petition’s construction of “cost of power” appearing only in the dependent claims, as it is not necessary to construe this term to resolve the issues presented in the Petition.

50. At this stage, I also have not identified any claim terms that require construction to resolve the challenge to the independent claims presented in the Petition. I may undertake additional analysis of the asserted grounds and the associated challenges to the patentability of the claims to the extent this proceeding continues to a later stage. Therefore, I reserve the right to identify and provide my opinion as to the construction of any claim terms that I later recognize are material to resolving the challenges presented in the Petition.

VII. Opinions Regarding Ground 1

51. Ground 1 is directed at independent claims 1 and 9, as well as claims 7-8 (dependent from Claim 1), claim 13 (dependent from Claim 9), and claim 14 (dependent from Claim 13). The Petition asserts that Ishii alone teaches claims 1[Pre], 1[a], 1[b], 1[c][1], 1[c][2], and 1[d], and the corresponding claim elements of claim 9, 9[pre], 9[a], and 9[b], as well as claim 9[d]. The Petition further asserts that Ishii-Fujita teaches claim 1[a] and Ishii-Hayashi teaches claim 1[d], 1[e], and 1[f], as well as corresponding elements 9[c] and 9[e]. The Petition also asserts that Ishii-Hayashi-Fujita teaches claim 1[f] and 9[e].

A. 1[b]: a controller onboard the vehicle and coupled to the display, the controller configured to

52. The Petition collectively maps Ishii's controller 6 and the microcomputer of charger 8 to the claimed controller "dependent on the performed functionality." Petition, 12-13. The Petition further asserts that controller 6, but not charger 8, is "coupled to the display" as required by the claim. *Id.*, 14. Specifically, the Petition identifies Ishii's controller 6 as "performing a main control of the operation of the electric device" and being coupled to the Ishii's display because it "has an interface" with display and operation unit 13. Petition, 13-14. The Petition specifically identifies controller 6 as performing the displaying function of Claims 1[e] and 1[f]. Petition, 37. The Petition identifies the microcomputer of charger 8 as "executing charge modes for charging the battery," and specifically identifies charger 8's microcomputer as

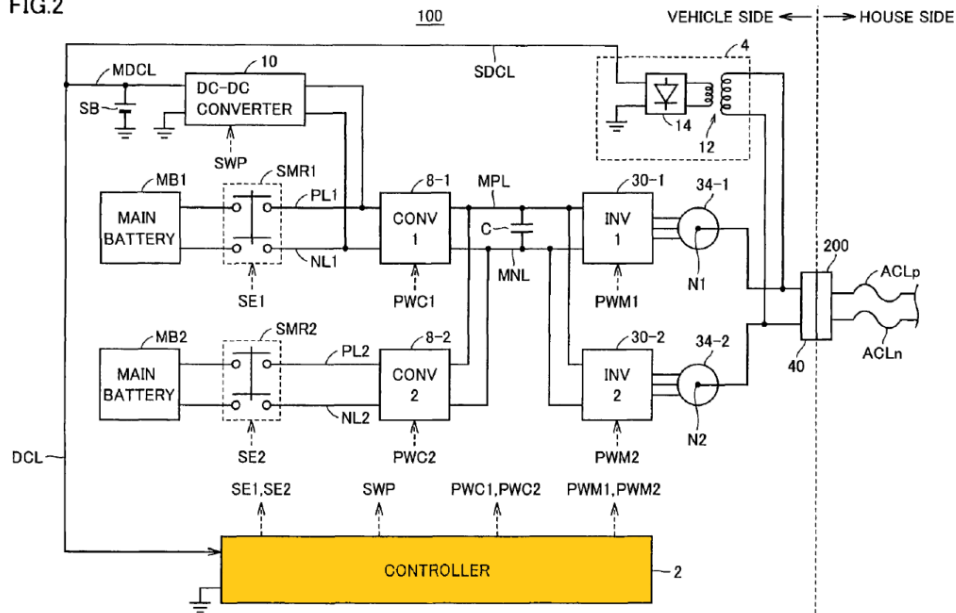
performing the required functions of Claims 1[c][1], 1[c][2], and 1[d], and of the non-display function of Claim 1[e]. *Id.*, 13, 21-24, 37. Although the Petition does not specifically identify which component performs the function of Claim 1[f], Dr. Andrews asserts that charger 8 would send charge duration calculations to controller 6 which would then send the charge duration to the display. EX 1003 ¶ 171.

53. Although Ishii explicitly refers to element 6 as the “controller,” the Petition maps the “controller” to both controller 6 and the microcomputer of charger 8. I find nothing in the Petition (or Dr. Andrews’ expert declaration) explaining why the claimed “controller” expands beyond controller 6. The Petition merely asserts that this is the case, because the charger’s microcomputer performs functions the Petition needs to map to a controller. Petition, 13; EX 1003 ¶ 110.¹

54. The prior art demonstrates why this unexplained mapping is problematic. For example, U.S. Patent No. 8,618,771 (assigned to Toyota) depicts its “controller 2” (orange) as a single contiguous device:

¹ I understand that the sole issue here is whether the Petition adequately explains why the identified components constitute the claimed “controller.” I have not been asked to provide my opinion on whether those components would collectively qualify as the “controller,” because it is my understanding that it is the Petition’s burden to first explain how they qualify.

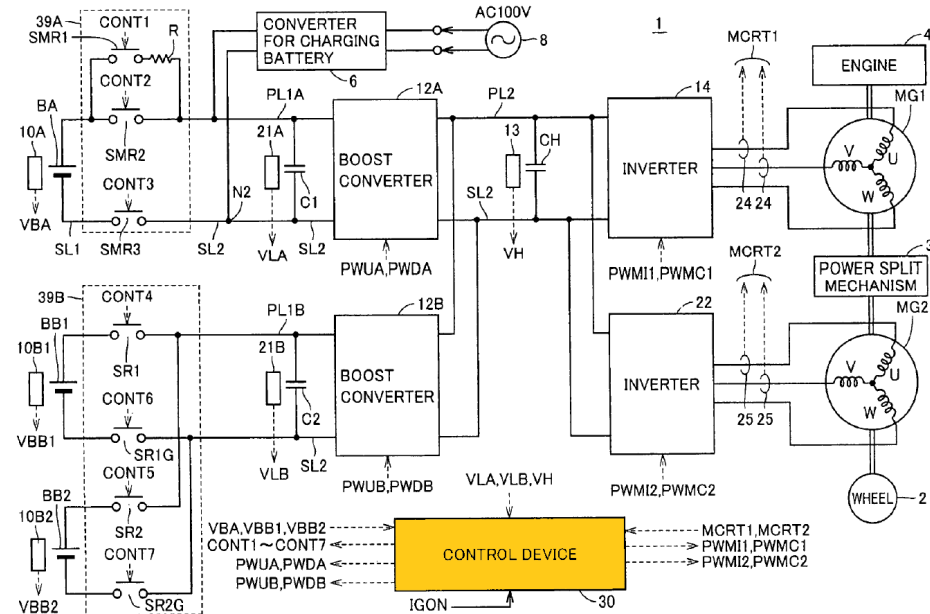
FIG.2



EX 2101.

55. Similarly, U.S. Patent No. 8,004,109 (also assigned to Toyota) depicts its “control device” 30 (orange) as a single contiguous device:

FIG.1



EX 2102. In contrast, the Petition identifies the alleged “controller” of Ishii as

encompassing both controller 6 and the microcomputer of charger 8. However, there is no explanation, including claim construction, to support this mapping.

56. Whether the Petition adequately explains why the microprocessor of charger 8 makes up part of the claimed “controller” matters, because the language of claim 1[b] requires that the “controller” be “coupled to the display,” and later claim elements 1[c][1] and 1[c][2] require that the controller be configured to begin an active charging session and start charging based on at least one condition being met, and claim 1[d] requires the controller to calculate an amount of time required to charge the battery. EX 1001, 47:6-27. Claim 1[e] further requires the controller be configured to display the calculated time. *Id.*

57. With respect to the requirement of 1[b], a POSITA would understand that the display and operation unit 13 is isolated from charger unit 5, which is the aggregate component (comprising charger 8, discharger 15, and switches 19 and 20) that electrically interacts with the commercial (AC) power supply and converts it to direct-current (DC) voltage and outputs it. EX 1004 [0022], [0043]. Indeed, my experience is that modules such as the charger unit 5 serve this very purpose in order to protect the relatively sensitive components in the display and operation unit 13. Thus, charger 8 (part of the charge unit 5) is not coupled to the display 13. Stated differently, the elements of charger unit 5 are designed specifically to isolate the functions of the charger, which involve access to relatively high voltages and currents, from the

independently satisfy the requirements of the claimed “controller.”

- B. 1[e]: [the controller configured to] display, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon the display, and
9[c]: displaying, during the active charging session but before starting charging of the battery according to the at least one condition, the amount of time upon a display mounted within the vehicle;**

59. Claim 1[e] requires a controller configured to display, and Claim 9[c] requires displaying, during an active charging session but before battery charging is started, the amount of time required to charge the battery. The amount of time required to charge the battery is calculated in claims 1[d] and 9[b]. The Petition appears to concede that none of the asserted references teach or disclose this element (without modification), because it admits that Ishii only displays this time during charging, and argues for an internal modification to Hayashi before combining it with Ishii to target the claim limitation. Petition, 32-35, 49.

60. The Petition first states that Ishii’s “time-specified charge mode” is carried out “during the active charging session” and that Ishii’s calculated “time required to charge” is displayed. Petition, 32. The Petition acknowledges that Ishii only displays this time after battery charging has begun, after step B4 in Fig. 4. *Id.* (“The displaying of the time required to charge occurs after charging of the batteries has started (after step B4).”). Therefore, Ishii alone does not disclose the claim limitation requiring display before charging begins.

61. The Petition next explains that Hayashi provides an “[i]nternal MTC [motivation to combine]” multiple embodiments in Hayashi, and then explains its proposed combination of the modified Hayashi with Ishii. *Id.*, 32-37. Specifically, the Petition explains that Hayashi teaches, when its system is in “standby waiting to start charging,” that it displays a predicted charging completion time. *Id.*, 33. Because Hayashi does not here disclose displaying the time required to charge, as required by the claims, the Petition asserts it was obvious to display the charging time during standby prior to the point where charging begins (at S125 in Fig. 4). *Id.*, 33-35. This is based on Hayashi’s suggestion that the predicted charging time may be displayed instead of the charge completion time. *Id.*, 35 (citing EX 1005 [0170]).

62. However, the cited portion of Hayashi (paragraph [0170]) does not propose displaying the charging time during standby, but rather during charging itself. Hayashi explains that “the time required to charge the battery 6 is estimated using the battery current limit value IBS, the battery voltage VB at the start of charging, and the ambient temperature” EX 1005 [0169]. Voltage VB, by definition, is only available at the start of charging. Therefore, the time required to charge the battery (the predicted charging time) is also only estimated from the start of charging, not before. I note that it would be clear to a POSITA that this distinction is important, because the act of charging (supplying current to the battery) nearly always raises the measured voltage of the battery. Hence, it is not sufficient to measure VB – the charge state must also be

taken into account. The process of measuring VB is more consistent and more accurate if the battery is being charged the whole time VB is measured. Thus, this context—beginning estimation of the charging time only when charging begins—for the suggestion in the next paragraph ([0170]) to display the charging time instead of the charging completion time, which specifically refers back to “the example described above.” EX 1005 [0170]. Hayashi explicitly states that the sequence described in paragraph [0170], including display of either the estimated charging completion time or the predicted charging time, occurs “when charging control is executed” and the charging time should be “incrementally reduced in accordance with progress in the charging process to indicate the remaining time until charging is complete.” *Id.* [0170].

63. The Ishii-Hayashi combination for these claim elements thus requires a modification to Hayashi based on an internal motivation to modify the reference, and then a combination of modified-Hayashi with the modified-Ishii described for claim 1[d]. Petition, 36 (“The modified Ishii system ...”). The Petition asserts as motivation to modify the modified Ishii to display the calculated charge time “for user convenience to review the charging time” because a POSITA “would have appreciated that displaying the required time to charge would allow the user to confirm the charging schedule before leaving the vehicle,” and because displaying the charging time before the scheduled charge begins “would allow the user to confirm whether the charging time works with the user’s own schedule” or should be modified. *Id.* The Petition also

asserts that simply “presenting charging information was known to be beneficial to users” and a POSITA would have recognized the advantage of providing the charging time. *Id.*

64. The Petition’s asserted motivations to combine contain at least one logical flaw. Displaying the required time to charge rather than the charge completion time does not provide the proposed benefits to the user. Ishii already displays both the predicted charge completion time (or alternatively the predicted charging time) during the time-specified charge mode setting process. EX 1004 [0044], [0046]-[0058]. This display allows the user to “confirm the charging schedule before leaving the vehicle” and “confirm whether the charging time works with the user’s own schedule,” to the same or even greater degree than in the proposed combination. When displaying the charge time itself, this is to the same degree as in the proposed combination. When displaying the charge completion time, the system is already determining for the user the expected time that charging will complete. The user would then not have to perform his own calculations to determine the completion time, which is necessary in the proposed combination. That is, in the unmodified system, the scheduling calculation is already done for the user. Knowing the charging completion time rather than merely the charging time better enables a user to determine if the charging will be completed before the user will need the vehicle again.

65. In addition, the proposed combination relies on extraction of very specific aspects of Hayashi's system to combine with Ishii. The Petition does not provide any analysis or explanation why a POSITA, looking to improve Ishii, would look to Hayashi. This is necessary, given what Ishii and Hayashi as a whole would have taught and suggested to a POSITA. Specifically, Ishii teaches a system that improves the accuracy in determining remaining EV battery capacity, so that battery charging for a single electric vehicle may be scheduled to start or complete at specific times. EX 1004 [0009]. Hayashi is directed to a system implemented at facilities for charging multiple connected electric vehicles, and is specifically designed to schedule the charging of those vehicles to prevent exceeding the facility load capacity and tripping a circuit breaker. EX 1005 [0005]-[0008]. A POSITA would not have considered Hayashi's specific teachings—designed to limit total current draw when scheduling the charging of multiple vehicles—to be applicable to Ishii's system, where there is no suggestion of any scenario similar to Hayashi's multiple vehicle charging needs.

- C. **1[f]: [the controller configured to] repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition**
9[e]: updating the amount of time upon the display during the active charging session, repeatedly update the amount of time upon the display during the active charging session, including during the active charging session but before starting charging of the battery according to the at least one condition

66. Claims 1[f] requires a controller configured to repeatedly update, and claim 9[e] requires repeatedly update[ing], the amount of time on the display with the calculated amount of time required to charge the battery, during the active charging session but before starting battery charging.

67. The Petition proposes two combinations to yield a system performing these claim elements: Ishii-Hayashi or Ishii-Hayashi-Fujita. Petition, 38. However, as shown below, none of the asserted references disclose repeated updating of displayed charging time before battery charging begins. Further, the Petition's asserted motivation to modify Ishii is premised on disclosures in Hayashi and Fujita, where the same disclosure is already present in Ishii.

68. For Ishii-Hayashi, the Petition asserts that Hayashi teaches, when displaying the charging duration (time required to charge or charging time), that the charging time on the display is repeatedly updated via incremental reduction. Petition at 38-39 (citing EX 1005 [0170]). The Petition asserts that Hayashi's control unit, which performs the charging control process, is "*configured to ... repeatedly ...*", apparently

asserting that this discloses the entire claim limitation of repeated updating of the charging duration before charging begins. *Id.*, 39 (citing EX 1005 [0086]). If this was indeed what the Petition intended to assert, it is simply mistaken. This is because Hayashi only teaches updating of charging duration on its display after battery charging has already begun; therefore, Hayashi does not teach the claim limitation.

69. Hayashi teaches that battery charging begins when “charging control is executed.” EX 1005 [0096]. Specifically, Hayashi explains that when it determines that a “start charging” instruction has been entered, it calculates (based on existing current limit and the charging status of other connected devices) the current limit value for charging of the device in question and a predicted charging completion time. *Id.* [0094], Fig. 4 (S121-123). It then displays the charging condition screen, which may include the charging status, the total current, and the predicted charging completion time, and (if the system is in a “standby for charging” state waiting to start charging), the charging start time. *Id.* [0095], [0104]; Fig. 4 (S124); Fig. 5 (S204). Then, the processing proceeds to begin controlling charging of the battery. *Id.* [0096]; Fig. 4 (S125). This process is described as execution of charging control. *Id.* When charging control is executed (that is, actual battery charging begins), Hayashi optionally teaches that “the charging time displayed on the display unit 24 should be incrementally reduced in accordance with progress in the charging process to indicate the remaining time until charging is complete.” *Id.* [0170]. A POSITA would understand that this incremental

reduction only occurs during charging itself, because it is “in accordance with progress in the charging process.” Thus, Hayashi teaches only that the displayed remaining charging time is incrementally reduced to reflect the time remaining until charging is complete due to the progress of the charging process itself—in other words, as the battery is charged the time remaining is reduced to reflect that charging has begun and progress in charging the battery is occurring. Therefore, Hayashi does not teach repeated updating of the charging time before charging begins, as required by claim 1[f] or 9[e].

70. The Petition also asserts that Fujita teaches the “repeatedly update” claim limitation. Petition, 39. Here, the Petition acknowledges that Fujita’s “repeatedly update” steps S9-S16, and specifically S12 and S13 where charging time is calculated and displayed, occur only after S8, “Start Charging.” *Id.*, 39-43; EX 1006 Figs. 4-5. This makes sense in Fujita, because it is directed to charging a vehicle’s battery directly from another vehicle while in the middle of travel; in such a case, a user would of course be very concerned with exactly when the ongoing charge will be completed so the journey can continue. *See* EX 1006, Abstract, 1:52-60. Thus, like Hayashi, Fujita teaches repeated updating of the charging time only after battery charging begins. Therefore, neither Hayashi nor Fujita teach claim 1[f] or 9[e].

71. The Petition asserts as the proposed combination modifying the Ishii-Hayashi combination described for Claim 1[e]) with “either of Hayashi’s or Fujita’s

operation of periodically renewing parameters and recalculating and displaying the updated charging time while in the delay period waiting to charge.” Petition, 43. But neither Hayashi or Fujita teach repeated updating of charging time before charging begins, or “while in the delay period waiting to charge.” Because none of the combined references actually teach updating the charging time before charging begins as required by claim 1[f] or 9[e], even once combined with Ishii the proposed combination would still not possess this claim limitation. That is, the combination is missing this claim limitation.

72. Further, Petitioner’s proposed motivations to combine with Hayashi or Fujita (Petition, 43-44) fail to acknowledge the fact that Ishii already disclosed the exact same teaching in Hayashi and Fujita (“periodically renewing parameters and recalculating and displaying the updated charging time”) that purportedly motivates the combination. *See* Petition, 43. Specifically, Ishii teaches that when a user selects the time-specified charge mode (the mapped “active charging session,” Petition, 16) and enters the charge starting time, the charger calculates the charging time and, based on battery capacity and the present time, displays the time required to charge, the charging start time, or the charging completion time. EX 1004 [0044], [0046]-[0057]. Importantly, this occurs before the time-specified charge setting operation is completed (and therefore, no “active charging session” as claimed could be said to begin). *Id.* [0058].

73. Once the time-specified charge mode setting is completed, the charger then determines if the charging start time has arrived and if so, the charge begins. *Id.* [0059]-[0064], Fig. 4. Therefore, the “standby time” in Ishii for a time-specified charge session occurs in the interim between the user’s confirmation completing the charge setting operation (Fig. 3, step A6 and Fig. 4, Step B1) and the beginning of the charge itself (Fig. 4, step B4). Once the charge begins, the charging time that was calculated before starting the time-specified charge mode, or the corresponding charge completion time, is displayed. *Id.* [0065], Fig. 4 (B5). Critically, Ishii explains that “as the charge proceeds, [the charger] calculates the charging time ... by adding charged capacity to the remaining capacity to indicate the time taken before the completion of the charge and/or charge completion time in succession.” *Id.* This indicates that, once charging begins in Ishii, the system successively recalculates the charging time and updates it to reflect the remaining time until charging is completed. That is, just as in Hayashi and Fujita, once charging begins, Ishii’s system repeatedly determines the time remaining until charging is completed. Ishii further teaches that the remaining charging time is successively indicated via its display. *Id.* [0066] (“[I]f the charge is not finished, it continues the charge in B5”), Fig. 4 (repeating B5, “Indicate time required to charge/charge completion time”). Thus, just like Hayashi and Fujita, Ishii already disclosed repeated updating and display of the time remaining to charge, but only after charging had begun as a function of the progression of the charge.

74. Because Ishii already disclosed the exact same teaching in Hayashi and Fujita, a POSITA would not have been motivated by that teaching in Hayashi or Fujita to modify Ishii as proposed in the Petition. A POSITA would have recognized that adding this teaching to Ishii was unnecessary because it was already present. Further, there is no reason a POSITA, in view of these teachings in Hayashi and Fujita, would have been motivated to modify Ishii to update the charging time before charging begins, because neither Hayashi nor Fujita taught doing so. The Petition provides no explanation for such a suggestion, and a POSITA would not find Hayashi or Fujita's disclosure to teach or suggest anything that was not already present in Ishii.

75. The Petition's asserted motivations to combine are also deficient. First, the Petition asserts that a POSITA "would have appreciated periodically recalculating and displaying an updated time required to charge would provide the user with a more accurate representation of the amount of time required to charge." Petition, 43. This is based on an alleged variance in conditions "while the charger is in Ishii's time-specified time charge mode or Hayashi's standby" that could "affect the calculated time required to charge the battery." *Id.* In support the Petition cites Hayashi as recognizing that charge time varies during standby before charging begins, specifically because "the time at which charging is completed will vary depending on the status of the other charging devices." *Id.* (citing EX 1005 [0032]).

76. There are multiple problems in the Petition's analysis here. First, Hayashi itself does not disclose the proposed modification, despite allegedly recognizing the purported need.

77. Second, this reasoning is inapplicable to Ishii. Ishii is directed at more accurately determining charging times based on analysis of remaining battery capacity. EX 1004 [0004]-[0009]. Ishii addresses this by detailing a specific apparatus for more accurately measuring the battery capacity. *Id.* [0037]-[0041]. Ishii then utilizes this apparatus in its charge modes, including time-specified charge mode. *Id.* [0044]-[0056]. In Ishii, based on the battery capacity analysis, the time required to charge is calculated and displayed before the time-specified charge mode setting is completed. *Id.* [0057]-[0058]. This makes sense, as a user would appreciate knowing how long charging will take before committing to the time-specified charge mode. But once this is done, there is no reason to repeatedly update this calculation or display before charging begins. This is because there is no reason why, in Ishii's system, the battery capacity or the charging duration would be expected to materially change before charging. This is because, in the context of charging a specific type of battery inside a single vehicle using a steady (electric-utility) supply of power, a POSITA would have understood that estimating charge duration can be accomplished with a high degree of accuracy, easily taking into account the slight environmental variations that might impact charging time. For example, a POSITA designing such a system could test it thoroughly, and use the

data to calibrate an algorithm that would work well. Possible environmental factors, such as ambient temperature or the temperature of the battery at start of charge, can be taken into account in a computation.

78. This is completely different than Hayashi's system, directed to industrial facilities for unattended charging of multiple other electric vehicles which may impact the available current for charging the individual device. EX 1005 [0005]-[0008]. The Petition does not propose, or justify, modifying Ishii with Hayashi's charging current management system. There is no reason to modify Ishii to contain such functionality, because in Hayashi the express goal is to juggle the charging schedules of multiple unattended devices based on the limit to available current for charging, which is determined by the limit on Hayashi's circuit breaker. EX 1005 [0005]-[0008]. Further, there is no reason to include such a modification in Hayashi itself, because Hayashi teaches that constantly changing current availability due to other charging devices will affect when charging will be completed, and such conditions may change before charging begins, meaning that any updating of charging duration before charging will be inaccurate. *See* EX 1005 [0102]-[0106]. Displaying inaccurate charging time estimates that will necessarily change before charging provides no benefit to the user, even if the user were present (which is not contemplated in Hayashi). This is why, in Hayashi, the charge time is only evaluated and displayed once the system begins execution of the charge—it reflects the accurate charge duration based on conditions

available at the time the charge is started. *Id.* [0095]-[0096], [0170]. For the same reasons, the Petition’s second motivation—“to provide an accurate time required to charge to improve scheduling efficiency”—is also without foundation. Petition, 44.

79. In addition, the Petition does not adequately explain why a POSITA would have looked to Fujita when considering improvements to Ishii. Petition, 43-44. Indeed, there is no express discussion of a motivation to combine with Fujita at all in the Petition itself, although Dr. Andrews’ declaration does contain some analysis about the specific teaching of periodic updating of the charge time imported into the combination. *See id.*; EX 1003 ¶ 165. But Petitioner does not explain why a POSITA would have even considered Fujita in the context of modifying Ishii. This is necessary when considering what the prior art, as whole, teaches to a POSITA. Here, a POSITA would have understood that Fujita is directed to a system for managing a sudden mid-trip emergency boost charge from a non-electric vehicle. EX 1006, Abstract, (In an emergency where the residual electric energy of the battery is less than required to run the required distance, the electric vehicle can easily be supplied with electric power from other vehicles such as a gasoline engine vehicle having a low-voltage power source and charge the battery”); 1:52-60, Fig. 1. Given this teaching, it is unclear why a POSITA would have considered Fujita’s disclosure relevant to Ishii’s system, which given its disclosure would be understood to apply to a single-vehicle, home-based charging system. EX 1004 [0001]-[0002], [0010], [0119]. The Petition does not

provide sufficient explanation for why a POSITA, in view of Fujita's entire disclosure, would have combined the systems identified in the Petition.

80. The Petition thus asserts that a POSITA would have been motivated to modify Ishii based on disclosures in Hayashi and/or Fujita, to include functionality that is not present in Hayashi or Fujita, where Ishii already contains the same disclosure that the Petition advances as motivating the combination. None of the purported motivations to combine address a problem that a POSITA would have recognized to be present in Ishii. Because none of the asserted references of Ground 1 teach or suggest the limitations of claims 1[f] or 9[e], and further because the Petition's motivation to combine is fundamentally flawed, Ground 1 does not render Claims 1 or 9 unpatentable.

D. Claims 7, 8, 13, and 14

81. The Petition's analysis of the Ground 1 challenges to dependent claims 7, 8, 13, and 14 do not separately address the limitations of the independent claims from which they depend. Petition, 45-50. Assuming that by this, the analysis of these claims was intended to incorporate the relevant analysis of the independent claims, Ground 1 likewise fails to render them unpatentable for the same reasons as discussed for Claims 1 and 9 above.

VIII. Opinions Regarding Ground 2

82. For Ground 2, the Petition asserts that claims 2-4 and 10 (depending from Claim 1), independent claim 15, and claims 17-18 (dependent from Claim 15) are

obvious over combinations of the Ground 1 references (Ishii, Hayashi, Fujita) and Kelty-078. Petition, 50.

A. Claims 2-4, 10

83. In its analysis of these claims, the Petition does not separately address the limitations of the independent claims from which these claims depend. Petition, 50-70. This makes it difficult to determine precisely which of the various combinations applied for independent claims 1 and 9 that the Petition intends to include in the challenges to the dependent claims. I assume that the Petition intends to incorporate its analysis of the same proposed combinations for the elements of the independent claims 1 and 9 in Ground 1 for these claims. Further, the Petition does not contend that the additional reference cited for Ground 2 (Kelty-078) addresses the deficiencies identified for Ground 1. Ground 2 therefore fails to render them unpatentable for the same reasons discussed above. *See* Section VII. Because of this, I have not at this time analyzed the specific analysis set forth in the Petition for these claims. I will do so should a trial on the Petition be instituted.

B. Claims 15, 17-18.

84. For claim 15, the Petition incorporates its analysis of the same proposed combinations for limitations in common with independent claims 1 and 9 in Ground 1. *See* Petition, 70-72. This includes claims 15[e] and 15[g], which correspond to claims 1[e]/9[c] and 1[f]/9[e], respectively. *Id.* The Petition's analysis of Claims 17 and 18

refers back to Claims 7 and 8 respectively. *Id.*, 72. Therefore, for the same reasons discussed for Ground 1 above, Ground 2 fails to render Claim 15, 17, and 18 unpatentable. *See* Section VII. Further, the Petition does not contend that the additional reference cited for Ground 2 (Kelty-078) addresses the deficiencies identified for Ground 1. Because of this, I have not at this time analyzed the specific analysis set forth in the Petition for these claims. I will do so should a trial on the Petition be instituted.

85. The Petition’s analysis of claim 15[b], which like claim 1[b] requires a controller coupled to the display, also refers back to claim 1[b]. Petition, 70. It further asserts that “Ishii’s *controller* alone or as modified by Hayashi and/or Fujita is configured to perform the claimed functions.” *Id.* The Petition does not identify the “controller” mapped to Ishii alone. I assume that the Petition intends to assert the same arguments presented for Ground 1, claim 1[b], with respect to the identity of that alleged controller. Therefore, in addition to the reasons above, the Petition fails to show that Ground 2 renders claim 15 unpatentable, for the same reasons discussed for claim 1[b] above. *See* Section VII.A.

IX. Opinions Regarding Grounds 3-6

86. The Petition’s analysis of Grounds 3-6, directed at dependent claims 5-6, 11-12, 16, and 19-20, does not separately address the limitations of the independent claims from which they depend. Petition, 73-85. I again assume that the Petition intended to incorporate the Ground 1 or Ground 2 analysis of the independent claims

from which they depend, while merely combining them with the additional references identified for the challenged dependent claims. *Id.* Assuming this is the case, Grounds 3-6 assert the same combinations asserted in either Ground 1 or Ground 2 directed to the independent claims. Further, the Petition does not contend that any of the additional references cited in Grounds 3-6 (Kelty-078, Sutardja, and Izuno) address the deficiencies identified for Grounds 1 or 2. Petition, 73-85. Therefore, grounds 3-6 cannot demonstrate that any of the challenged claims are unpatentable for the same reasons discussed for Grounds 1 and 2. *See* Section VII.-VIII. Because of this, I have not at this time analyzed the specific analysis set forth in the Petition for these claims. I will do so should a trial on the Petition be instituted.

X. Conclusion

87. I declare that all statements made herein of my knowledge are true, and that all statements made on information and belief are believed to be true, and that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code. I further declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated: September 23, 2026



Samuel Russ, Ph.D.

APPENDIX A

Curriculum Vitae of Dr. Samuel H. Russ

Personal

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Phone: (251) 461-1378
e-mail: sruss@southalabama.edu
Citizenship: U.S.

Education

Ph.D. in Electrical Engineering, Georgia Institute of Technology, 1991.
Thesis Title: *An Information-Theoretic Approach to Analysis of Computer Architectures and Compression of Instruction Memory Usage*
Thesis Advisor: Dr. Cecil O. Alford
Bachelor's of Electrical Engineering (with Highest Honor), Georgia Institute of Technology, 1986.

Employment

Aspect Aerospace

2023 – Present

Co-Founder and CTO: Pursue venture capital investments, work with potential customers, develop engineering plan for the company, write grant proposals, supervise patenting process. Write and obtain grant funding. Develop satellite architectures and products including power system and battery charging.

University of South Alabama

2007 – Present

Interim Chair, Department of Electrical and Computer Engineering (2015-2016)

Associate Professor, Department of Electrical and Computer Engineering (2011-present)

Assistant Professor, Department of Electrical and Computer Engineering

Developing new class in signal integrity, developing cross-disciplinary collaborative research efforts, updating labs and class materials, teaching both undergraduate and graduate classes. Pioneering coursework in embedded-system safety includes battery chemistries, chargers, and safety issues. Developed and launched a fully functional CubeSat satellite that included a power system with solar power and a battery charger, and optimized the software for minimal power consumption.

Scientific-Atlanta (Later Cisco, Now Technicolor)

2000 - 2007

Manager, Advanced Technologies R&D, Explored major new technologies including home networking and multi-room video distribution; oversaw construction of prototypes and demonstrations; demonstrated technologies at trade shows and to stock analysts; managed group of approximately 10 designing set-top boxes for the cable television industry including all phases of high-volume electronic design including layout, high-speed digital design, emissions considerations, gate array conversion, and designing with custom ASICs; supervised cross-functional team to increase hard drive reliability; wrote numerous patent applications. Products deployed widely, including Time Warner Cable and Cablevision.

IVI Checkmate (Now Ingenico)

1999 – 2000

Matrix Manager, Electrical Engineering, Supervised staff of approximately 6 electrical engineers, oversaw assignments, allocated time across multiple projects, worked to coordinate project schedules with priorities, assisted in sales and other customer communications.

Staff Electrical Engineer, Oversaw major design overhaul of touch-pad payment system including embedded-systems design, power-system design, battery-powered operation, optimization of charging including thermal issues, and system layout and schematic capture. System deployed widely at Wal-Mart, Home Depot, and others.

Mississippi State University

1994 - 1999

Thrust Leader, Computing Systems Research Thrust and Systems Integration Group, NSF Engineering Research Center -- Coordinate research plans and NSF reporting for 6 faculty and 3 full-time staff, assist in development of strategic plans and pursuit of funding opportunities, oversight of development of the ERC-wide integrated testbed. Managed multi-year research project in distributed computing that included 11 students and 5 faculty.

Assistant Professor, Department of Electrical & Computer Engineering -- Developed all-new graduate class in circuit board design, authored textbook chapter, developing new undergraduate lab, pioneered teaching classes over 2-way interactive video.

Dickerson Vision Technologies (Now Cognex)

1992 - 1994

Director of Manufacturing--Oversaw the development and implementation of a manufacturing plan for the company.

Senior Applications Engineer--Developed firmware and user-interface software for the company's proprietary hardware, Assisted in development of machine vision system hardware, Assisted in sales duties.

Georgia Institute of Technology

1987 - 1991

Graduate Research Assistant--Helped design five VLSI chips while developing two custom CPU's, Silicon-compiler-based computer chip design, including initial design, full functional simulation, size and timing optimization, and manufacturing test development.

Publications

Books

1. Samuel H. Russ, *Signal Integrity: Applied Electromagnetics and Professional Practice*, Springer, 2016. (Textbook)
2. Samuel H. Russ, *Signal Integrity: Applied Electromagnetics and Professional Practice*, Second Edition, Springer, 2022. (Textbook)

Book Chapters

1. Samuel H. Russ, "High-Speed Digital Effects", Chapter 10 of John Kraus and Daniel Fleisch, *Electromagnetics with Applications, Fifth Edition*, McGraw-Hill, 1998. (Textbook)
2. Samuel Russ, Bret Webb, Jonathan Holifield and Justin Walker (2011). "PILS: Low-Cost Water-Level Monitoring, Environmental Monitoring", Dr. E.O. Ekundayo, Ph.D., (Ed.), pp. 137-156, ISBN: 978-953-307-724-6, InTech, (Peer-reviewed)

Journal and Magazine Articles

1. Samuel Russ, "The Threat of Malicious Circuit-Board Alteration: Attack Taxonomy and Examples," *Electronic Device Failure Analysis*, Vol. 23, Issue 3, August 2021, pp. 13-22.
2. Mink DM, McDonald J, Bagui S, Glisson WB, Shropshire J, Benton R, Russ S. Near-Real-Time IDS for the U.S. FAA's NextGen ADS-B. *Big Data and Cognitive Computing*. 2021; 5(2):27. <https://doi.org/10.3390/bdcc5020027>
3. S. H. Russ and J. Gatlin, "Ways to hack a printed circuit board: PCB production is an underappreciated vulnerability in the global supply chain," *IEEE Spectrum*, vol. 57, no. 9, pp. 38-43, Sept. 2020.
4. Samuel H. Russ, Cade C. Cashen, Thomas Thomas, and Roma Hanks, "Smart Grid Architecture for Unobtrusive Home Health Monitoring," *National Social Science Journal*, Vol. 44, No. 1, 2015, pp. 62-68.
5. Samuel H. Russ, Tho D. Ha, and Jonathan H. Shapiro, "Simulation-based Optimization of Wear Leveling for Solid-State Disk Digital Video Recording," *IEEE Transactions on Consumer Electronics*, Vol. 60, No. 3, Nov. 2014, pp. 363-367.

6. Samuel H. Russ and Salim Alsharif, "Packet Loss Behavior of HomePlug AV Traffic at Video Bit Rates", *IEEE Transactions on Consumer Electronics*, Vol. 57, No. 2, May 2011, pp. 823-826.
7. Samuel H. Russ and Ramesh Nallur, "Digital Video Recording onto Solid-State Disks: Feasibility and Lifetime Estimation", *IEEE Transactions on Consumer Electronics*, Vol. 57, No. 2, May 2011, pp. 558-563.
8. Samuel H. Russ and Sasan Haghani, "802.11g Packet-Loss Behavior at High Sustained Bit Rates in the Home", *IEEE Transactions on Consumer Electronics*, Vol. 55, No. 2, May 2009, pp. 788-791.
9. Samuel H. Russ, and Ramesh Nallur, "A Framework for Calculating Fundamental DVR Performance Limits", *IEEE Transactions on Consumer Electronics*, Vol. 55, No. 1, Feb. 2009, pp. 132-138.
10. Ioana Banicescu, Sheikh Ghafoor, Vijay Velusamy, Samuel H. Russ, Mark Bilderback, "Experiences from integrating algorithmic and systemic load balancing strategies", *Concurrency and Computation: Practice and Experience*, Volume 13, Number 2, pp. 121-139 (2001).
11. Roger L. King, Samuel H. Russ, Aric B. Lambert, Donna S. Reese, "An artificial immune system model for intelligent agents", *Future Generation Computer Systems*, Volume 17, Issue 4, pp. 335 - 343 (January 2001).
12. Dr. Samuel H. Russ, Jonathan Robinson, Matt Gleeson, Brad Meyers, and Chun-Heong Tan, "Using Hector to Run MPI Programs over Networked Workstations", *Concurrency - Practice and Experience*, Vol. 11, No. 4, pp. 189-204 (1999).
13. Russ, S.H. Reece, K. Robinson, J. Meyers, B. Rajan, D. Rajagopalan, L. Chun-Heong Tan, "Hector: an agent based architecture for dynamic resource management", *IEEE Concurrency*, Vol. 7, No. 2, pp. 47-55, Apr-Jun 1999.
14. Dr. Samuel H. Russ, Jonathan Robinson, Dr. Brian K. Flachs, and Bjorn Heckel, "The Hector Distributed Run-Time Environment", *IEEE Transactions on Parallel and Distributed Systems*, Vol. 9, No. 11, pp. 1102-1114 (1998).
15. S.H. Russ and C.O. Alford, "Coupled Noise and Its Effects on Modern Packaging Technology", *IEEE Transactions on Components, Hybrids, and Manufacturing Technology*, Volume 13, Number 4, December 1990, pp. 1074-1082.

U.S. Patents

1. U.S. Patent Number 6,748,080, "Apparatus for entitling remote client devices", Samuel Russ, Michael Gaul, Anthony Wasilewski, and Howard Pinder, June 8, 2004.
2. U.S. Patent Number 7,181,010, "Apparatus for entitling remote client devices", Samuel Russ, Michael Gaul, Anthony Wasilewski, and Howard Pinder, February 20, 2007.
3. U.S. Patent Number 7,360,233, "Broadcast carousel system access for remote home communication terminal", Samuel Russ, Michael Gaul, and Anthony Wasilewski, April 15, 2008.
4. U.S. Patent Number 7,360,235, "Systems and methods for operating a peripheral record/playback device in a networked multimedia system", David Davies, Samuel Russ, and Irvan Krantzler, April 15, 2008.
5. U.S. Patent Number 7,499,822, "Analog set-top calibration patterns in manufacturing", Leo Montreuil, Wayne B. Williams, Samuel H. Russ, and Robert Kriete, March 3, 2009
6. U.S. Patent Number 7,505,592, "Apparatus for entitling and transmitting service instances to remote client devices", Samuel H. Russ, Michael Gaul, Anthony Wasilewski, and Howard Pinder, March 17, 2009
7. U.S. Patent Number 7,516,470, "Locally-updated interactive program guide", Samuel H. Russ and Michael Gaul, April 7, 2009
8. U.S. Patent Number 7,826,711, "Digital Video Disc (DVD) Player or Digital Video Recorder (DVR) Playback with Memory", Samuel H. Russ, Nov. 2, 2010.
9. U.S. Patent Number 7,849,486, "Networked subscriber television distribution", Samuel H. Russ, David Lett, Jonathan Robinson, and Michael Gaul, Dec. 7, 2010.

10. U.S. Patent Number 7,860,250, "Apparatus for entitling and transmitting service instances to remote client devices", Samuel H. Russ, Michael Gaul, Anthony Wasilewski, and Howard Pinder, Dec. 28, 2010.
11. U.S. Patent Number 7,861,272, "Networked subscriber television distribution", Samuel H. Russ, David Lett, Jonathan Robinson, and Michael Gaul, Dec. 28, 2010.
12. U.S. Patent Number 7,870,584, "Interactive program guide with selectable updating", Samuel H. Russ and Michael Gaul, Jan. 11, 2011.
13. U.S. Patent Number 7,876,998, "DVD playback over multi-room by copying to HDD", William Wall and Samuel H. Russ, Jan. 25, 2011.
14. U.S. Patent Number 7,908,625, "Networked multimedia system", Neil C. Robertson, David B. Lett, Samuel H. Russ, Bohdan S. Prus, Michael A. Gaul, and Ajith N. Nair, March 15, 2011.
15. U.S. Patent Number 7,937,737, "Field qualification of disk drives in consumer electronics devices", Samuel H. Russ and Mark R. Murray, May 3, 2011.
16. U.S. Patent Number 7,961,780, "Generated set top calibration patterns in manufacturing", Leo Montreuil, Wayne B. Williams, Samuel H. Russ, and Robert Kriete, Jun. 14, 2011.
17. U.S. Patent Number 7,978,720, "Digital media device having media content transfer capability", Samuel H. Russ, Christopher L. Stallings, July 12, 2011.
18. U.S. Patent Number 8,046,806, "Multiroom point of deployment module", William E. Wall, Samuel H. Russ, Oct. 25, 2011.
19. U.S. Patent Number 8,127,236, "Proximity detection using wireless connectivity in a communications system", Paul J. Claussen, Ajith N. Nair, and Samuel H. Russ, Feb. 28, 2012.
20. U.S. Patent Number 8,181,205, "PVR Channel and PVR IPG Information", Samuel H. Russ, Michael A. Gaul, and Dariusz S. Kaminski, May 15, 2012.
21. U.S. Patent Number 8,208,796, "Systems and methods for prioritizing the storage location of media data", Bohdan Prus and Samuel H. Russ, June 26, 2012.
22. U.S. Patent Number 8,280,229, "DVD playback over multi-room by copying to HDD", William E. Wall and Samuel H. Russ, October 2, 2012.
23. U.S. Patent Number 8,295,338, "Generated set top calibration patterns in manufacturing", Leo Montreuil, Wayne B. Williams, Samuel H. Russ, and Robert A. Kriete, October 23, 2012.
24. U.S. Patent Number 8,364,015, "Stretch and zoom bar for displaying information", Samuel H. Russ and Gary Hibbard, January 29, 2013.
25. U.S. Patent Number 8,549,567, "Media content sharing over a home network", Samuel H. Russ, David B. Lett, Jonathan Robinson, Michael A. Gaul, October 1, 2013.
26. U.S. Patent Number 8,627,385, "Systems and methods for operating a peripheral record playback device in a networked multimedia system", David B. Davies, Samuel H. Russ, Irvan J. Krantzler, January 7, 2014.
27. U.S. Patent Number 8,966,550, "Home communication systems," David B. Davies, Samuel H. Russ, Irvan J. Krantzler, February 24, 2015.
28. U.S. Patent Number 9,762,970, "Access of stored video from peer devices in a local network," David B. Davies, Samuel H. Russ, and Irvan J. Krantzler, September 12, 2017.
29. U.S. Patent Number 10,412,439, "PVR Channel and PVR IPG Information", Samuel H. Russ, Michael A. Gaul, and Dariusz S. Kaminski, Sep. 10, 2019.

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1. European Patent Number EP1543680B1, "Locally-updated interactive program guide", Samuel Russ and Michael Gaul, Feb. 17, 2010.
2. European Patent Number EP1673937B1, "Proximity detection using wireless connectivity in a communications system", Paul Claussen, Ajith Nair, and Samuel Russ, April 21, 2010.
3. European Patent Number EP1604523B1, "Method for determining the encryption of a service content depending on the fidelity of the reformatting of said content", Samuel Russ, Michael Gaul, Anthony Wasilewski, and Howard Pinder, Nov. 21, 2012.

4. European Patent Number EP1552699B1, "Networked multimedia system", Neil Robertson, David Lett, Samuel Russ, Bohdan Prus, Michael Gaul, and Ajith Nair, Dec. 18, 2013.
5. European Patent Number EP1334617B1, "Networked Subscriber Television Distribution", Samuel Russ, David Lett, Jonathan Robinson, and Michael Gaul, April 1, 2015.
6. European Patent Number EP1920601B1, "Multiroom Point of Deployment Module," William Wall and Samuel Russ, May 4, 2016.
7. European Patent Number EP1510033B1, "Apparatus for Entitling Remote Client Devices," Samuel H. Russ, Michael Gaul, Anthony Wasilewski, and Howard Pinder, April 26, 2017.
8. European Patent Number EP1540946B1, "Broadcast Carousel System Access for Remote Home Communications Terminal via a Gateway Device," Samuel Russ, Michael Gaul, and Anthony Wasilewski, April 18, 2018.
9. European Patent Number EP2008280B1, "Method and Device for Prioritizing the Storage Location of Media Data," Bohdan Prus and Samuel Russ, September 26, 2018.

Conference Papers

1. J. E. S. Dalgety and S. Russ, "Design, Implementation, and Verification of a DC-Powered Solar Cell Test Bench," *SoutheastCon 2025*, Concord, NC, USA, 2025, pp. 1328-132
2. McDonald, Jeffrey Todd, Jennifer Parnell, Todd R. Andel, and Samuel H. Russ. "Effectiveness of Adversarial Component Recovery in Protected Netlist Circuit Designs." In *SECURITY*, pp. 181-192. 2022.
3. S.H. Russ, M. Khan, S. Latif, "Surreptitiously Adding a WLAN Antenna to a Printed Circuit Board" 2022 IEEE Physical Assurance and Inspection of Electronics (PAINE), Huntsville, AL, USA, 2022.
4. J. Todd McDonald, Rebecca C. Clark, Lee M. Hively, and Samuel H. Russ. 2022. "Phase space power analysis for PC-based rootkit detection." In *Proceedings of the 2022 ACM Southeast Conference (ACM SE '22)*. Association for Computing Machinery, New York, NY, USA, 82–90. <https://doi.org/10.1145/3476883.3520212>
5. S. H. Russ, "Surreptitiously Adding a Microcontroller to a Printed Circuit Board," 2021 IEEE Physical Assurance and Inspection of Electronics (PAINE), Washington, DC, USA, 2021.
6. S.H. Russ, "Circuit Board Security Vulnerabilities and Counteractions", IPC APEX EXPO 2021.
7. S. H. Russ, "Techniques to Thwart Surreptitiously Altered PCBs," 2020 IEEE Physical Assurance and Inspection of Electronics (PAINE), Washington, DC, USA, 2020, pp. 1-4.
8. S. H. Russ, E. Spencer, T. Scroggins, and S. Latif, "Power-Efficient Software Architecture for a CubeSat System", *2020 SoutheastCon*, Raleigh, NC, USA, 2020, pp. 1-6.
9. A. Russ, S. H. Russ, E. Spencer and M. Frank, "Motor Controller and Reaction Wheel for CubeSat," *2019 SoutheastCon*, Huntsville, AL, USA, 2019, pp. 1-3.
10. F. Lorenzo, J. T. McDonald, T. R. Andel, W. B. Glisson and S. Russ, "Evaluating Side Channel Resilience in iPhone 5c Unlock Scenarios," *2019 SoutheastCon*, Huntsville, AL, USA, 2019, pp. 1-7
11. E. Spencer, D. Clark, S. Russ, *et al.*, "First results from a time domain impedance probe for measuring plasma properties in the ionosphere," 2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS), Boston, MA, 2017, pp. 1284-1287.
12. E. Spencer, D. Clark, R. Gollapalli, S. Russ and B. Kerrigan, "A System On Chip design for fast time domain impedance spectroscopy," 2017 IEEE 60th International Midwest Symposium on Circuits and Systems (MWSCAS), Boston, MA, 2017, pp. 124-127.
13. Ramya Manikyam, J. Todd McDonald, William R. Mahoney, Todd R. Andel, and Samuel H. Russ, "Comparing the effectiveness of commercial obfuscators against MATE attacks," *Proceedings of the 6th Workshop on Software Security, Protection, and Reverse Engineering (SSPREW '16)*, 2016, Article 8. DOI: <https://doi.org/10.1145/3015135.3015143>
14. Samuel Russ, Tho Ha, and Jonathan Shapiro, "Simulation of Digital Video Recording to

- Maximize Solid-State Disk Lifetime,” *Proceedings of the 2014 International Conference on Consumer Electronics*, Jan. 10-13, 2014, pp. 562-563.
15. Thomas Thomas, Cade Cashen, and Samuel Russ, “Leveraging Smart Grid Technology for Home Health Care”, *Proceedings of the 2013 International Conference on Consumer Electronics*, Jan. 11-14, 2013, pp. 276-277.
 16. Cade Cashen, Samuel Russ, and Thomas Thomas, “Using a Wireless LAN to Perform Motion Detection”, *Proceedings of the 2013 International Conference on Consumer Electronics*, Jan. 11-14, 2013, pp. 63-64.
 17. Nicklaus Thomas, David Evans, and Samuel Russ, “A Markovian Algorithm for Creating Immersive Public-Speaking Audiences”, *Proceedings of the 2013 International Conference on Consumer Electronics*, Jan. 11-14, 2013, pp. 384-385.
 18. Samuel H. Russ, “Podcasting to Improve Software Usage”, *Proceedings of the 2012 ASEE Southeastern Section Conference*, April 1-3 2012, Starkville, MS, Paper ID 605.
 19. Samuel H. Russ, “Using Student ID Numbers to Create Customized Homework Problems”, *Proceedings of the 2012 ASEE Southeastern Section Conference*, April 1-3 2012, Starkville, MS, Paper ID 606.
 20. Samuel H. Russ and Ramesh Nallur, “Digital Video Recording Onto Solid-State Disks”, *2011 Digest of Technical Papers, 2011 International Conference on Consumer Electronics*, pp. 495-496. (2nd place in best paper contest, 2011.)
 21. Mohammad Mushtaq, Samuel H. Russ, and Mohammad S. Alam, “Variable FEC to Reduce ECC Overhead in Digital Video Transmission”, *2011 Digest of Technical Papers, 2011 International Conference on Consumer Electronics*, pp. 215-216.
 22. Samuel H. Russ and Salim Alsharif, “Behavior of HomePlug AV Traffic At High Sustained Bit Rates in the Home”, *2011 Digest of Technical Papers, 2011 International Conference on Consumer Electronics*, pp. 682-683.
 23. Samuel H. Russ, Viswakalyan Perepa, Silas Leavesly, and Bret Webb, “Novel Low-Cost Salinity Sensor for Embedded Environmental Monitoring”, *Proceedings of IEEE Southeastcon 2010*, March 18-21, 2010, pp. 53-56.
 24. Samuel H. Russ and Kung-Hsien Chen, “Thermally Conductive Circuit Boards”, *Proceedings of the 59th Electronic Components and Technology Conference (ECTC 2009)*, May 2009, pp. 465-468.
 25. Samuel H. Russ and Sasan Haghani, “Behavior of 802.11g Traffic at High Sustained Bit Rates in the Home”, *2009 Digest of Technical Papers, 2009 International Conference on Consumer Electronics, Jan. 2009*, pp. 423-424.
 26. Samuel H. Russ, and Ramesh Nallur, “A Framework for Calculating Fundamental DVR Performance Limits”, *2009 Digest of Technical Papers, 2009 International Conference on Consumer Electronics, Jan. 2009*, pp. 51-52.
 27. Samuel H. Russ, “Home Networking: Extending Cable’s Reach”, *The Complete Technical Paper Proceedings from NCTA*, 2001, pp. 160-165.
 28. Samuel H. Russ, Rashid Jean-Baptiste, Tangirala Shailendra Krishna Kumar, and Marion G. Harmon, “Transparent Real-Time Monitoring in MPI”, *IPPS/SPDP Workshops 1999*, in *Parallel and Distributed Processing*, Lecture Notes in Computer Science, vol. 1586, Springer-Verlag, 1999, pp. 1327-1334.
 29. Roger L. King, Aric B. Lambert, Samuel H. Russ, and Donna S. Reese, “The Biological Basis of the Immune System as a Model for Intelligent Agents”, *IPPS/SPDP Workshops 1999*, in *Parallel and Distributed Processing*, Lecture Notes in Computer Science, vol. 1586, Springer-Verlag, 1999, pp. 156-164.
 30. Aric Lambert, Roger King, Sam Russ, and Donna Reese, “Intelligent Control Agents for Resource Management of Heterogeneous Parallel Computing”, *Computational Intelligence for*

Modeling, Control, and Automation (CIMCA 98) in Concurrent Systems Series, vol. 55, IOS Press, 1999, pp. 116-121.

31. Samuel H. Russ and Adam Gaither, “Developing An Integrated Environment for Computational Field Simulation”, *Object-Oriented Methods for Inter-Operable Scientific and Engineering Computing: Proceedings of the 1998 SIAM Workshop*, pp. 50-57.
32. Samuel H. Russ, Ioana Banicescu, Sheikh Ghafoor, Bharathi Janapareddi, Jonathan Robinson, and Rong Lu, “Hectiling: An Integration of Fine and Coarse-Grained Load-Balancing Strategies”, *Proceedings of the Seventh International Symposium on High Performance Distributed Computing*, August 1998, IEEE Computer Society, pp. 106-113.
33. Samuel H. Russ, “An Architecture for Rapid Distributed Fault Tolerance”, 3rd International Workshop on Embedded High-Performance Computing, in J. Rolim, Editor, *Parallel and Distributed Processing*, Lecture Notes in Computer Science, vol. 1388, Springer-Verlag, 1998, pp. 925-930.
34. Dr. Samuel H. Russ, Brad Meyers, Jonathan Robinson, Matt Gleeson, Laxman Rajagopalan, Chun-Heong Tan, and Bjørn Heckel, “User-Transparent Run-Time Performance Optimization”, *Proceedings of the 2nd International Workshop on Embedded HPC Systems and Applications*, Geneva, April 1997.
35. J. Robinson, S.H. Russ, B. Flachs, and B. Heckel, “A Task Migration Implementation of the Message-Passing Interface”, *Proceedings of the 5th High Performance Distributed Computing Conference (HPDC-5)*, August 1996, IEEE Computer Society, pp. 61-68.
36. S.H. Russ, B. Flachs, J. Robinson, and B. Heckel, “Hector: Automated Task Allocation for MPI”, *Proceedings of the 10th International Parallel Processing Symposium*, April, 1996, IEEE Computer Society, pp. 344-348.
37. W.S. Tan, C.O. Alford, and S.H. Russ, “GT-EP: A Novel High-Performance Real-Time Architecture”, *Proceedings of the 18th International Symposium on Computer Architecture*, May 1991, pp. 12-21.

Reports

1. Aric B. Lambert, Roger L. King, Samuel H. Russ, Donna S. Reese, “Adaptive Analysis for the Design of Hardware Agents Using the Artificial Immune System Model for Resource Management of Heterogeneous Systems”, Miss. State Technical Report No. MSSU-COE-ERC-98-10, Aug. 1998.
2. Daniel H. Linder, Robert B. Reese, Jon Robinson, and Samuel H. Russ, “JavaCADD: A Java-based Server and GUI for Providing Distributed ECAD Services”, Mississippi State University Technical Report No. MSSU-COE-ERC-98-07, May 1998.
3. Samuel H. Russ, “Using Hector in an Architecture for Rapid Distributed Fault Tolerance”, Mississippi State Technical Report No. MSSU-EIRS-ERC-97-17, December 1997.
4. Samuel H. Russ, Jonathan Robinson, Matt Gleeson, and Jose Figueroa, “Dynamic Communication Mechanism Switching in Hector”, Mississippi State Technical Report No. MSSU-EIRS-ERC-97-8, September 1997.
5. Samuel H. Russ, Brian Flachs, Jonathan Robinson, and Bjorn Heckel, “Hector: Automated Task Allocation for MPI”, Mississippi State Technical Report No. MSSU-EIRS-ERC-95-6, September, 1995.

Funded Grants and Contracts

University of South Alabama

1. National Space Grant Foundation, Aug. 2018-May 2019, “Automation Infrastructure for Gateway Biological Laboratory,” PI, \$28,062.
2. Nfina (Local Mobile Company), March 2018 – March 2019, “Redhawk”, PI, \$119,881.

3. NASA, May 2016 – Present, “Spatially Resolved Measurements Of Plasma Density Irregularities In The Ionosphere F Region For Scintillation Studies”, Co-I, \$100,000.
4. Marine Environmental Science Consortium (GRI), Jan. 2011-Dec. 2011, “Conductivity Based In-Situ Hydrocarbon Sensor”, PI, \$9,338.
5. University of South Alabama Research Council (USARC), Feb. 2008 – Feb. 2009, “Instrumentation of Hurricane Forecast Models for Performance Optimization”, \$5,000 for one year.

Mississippi State University

1. National Science Foundation, April 1998-March 1999, “An ERC-CREST Partnership in Distributed and Computational Systems”, PI, \$100,000/year, renewable for 5 years.
2. Office of Naval Research, Nov. 1996-Nov. 1998, “Distributed Visualization and Virtual Environments for Oceanography and Meteorology”, Co-PI, \$200,000.
3. U.S. Army Waterways Experiment Station, July 1996-July 1999, “Efficient Parallel Wave Modeling”, PI, \$200,000, Funded under CHSSI (Common HPC Scalable Software Initiative) of the DoD. (\$50,000 actually funded.)
4. NSF Engineering Research Center for Computational Field Simulation, April 1995- May 1999, “Heterogeneous Computing Testbed (CA 8)”, PI, By year: \$34,983/\$70,111/\$55,916. Funded through NSF Engineering Research Center.

Dickerson Vision Technology

1. Small Business Innovations Research Program of the NSF, Division of Industrial Interface, September 1993 - February 1994, Award No. III-9260914. (\$50,000 Phase I contract conducted at Dickerson Vision Technologies.)

Technology Transfer and Licensing

Hector Distributed Run-Time Environment licensed by MPI Software Technology, Inc., Starkville, MS in June 1998 (while at Mississippi State University)

Students Advised (Major Professor)

Level	At USA	At MSU
Ph.D.	--	0
Masters	3	9

Courses Created and Enhanced

University of South Alabama

EE 264 Microprocessor Systems and Interfacing – Replaced 68HC11 with Freescale 9S12 architecture and redesigned the entire course, Introduced use of 68HC11 simulator and accompanying podcast to enhance student’s ability to visualize microprocessor operation

EE 268 Digital Logic Design Lab – Updated one lab experiment

EE 368 Microprocessor Systems Lab – Developed all-new sequence to tie EE 368 to senior projects with hands-on experiments like motors, photocells, and servomotors.

EE 401 Introduction to ECE Design – Completely overhauled the first-semester senior project course. Added lectures on professionalism, career development, and legal aspects of engineering. Structured the course so that reports would lead up to their senior-project reports.

EE 404 ECE Design – Completely overhauled the second-semester senior project course by requiring better projects and adding material on giving effective presentations. Obtained very enthusiastic response from the department’s Industrial Advisory Board.

EE 446 – Obtained donation of boards from Freescale and redesigned all of the experiments to develop more interesting demonstrations and to switch from assembly language to C.

EE 457/557 – Developing series of podcasts to augment in-class lectures with materials related to embedded systems and professional development.

EE 469/569 Advanced Digital System Design – Developed all-new course in high-speed circuit board design from an electromagnetics perspective, and authored a textbook for the course. Added a lab experience in 2009.

EE 560 Advanced Computer Architecture – Selected new textbook for the class and developed lecture materials to match

EG 101 – Developed systematic curriculum shared by all sections including “checklists” for instructors, handouts, and lecture materials. Introduced motors project, which has become the most popular EG 101 project.

Mississippi State University

EE 8993 High Speed Digital Design -- Offered on video nationwide, it features pioneering treatment of high-speed circuit board design from an electromagnetics perspective. Material from the class has been included in one of the best-known electromagnetics textbooks, and it continues to be one of the most popular graduate classes in the department.

EE 4743 Computer Aided Digital Design -- Added breakthrough educational technology to permit remote access to logic synthesis capabilities. Offered on live two-way video starting Fall 1998.

Courses Taught

University of South Alabama

EE 220, Circuit Analysis I, 1 course.

EE 263, Digital Logic Design, 2 courses.

EE 264, Microprocessor Sys-Interfacing, 4 courses.

EE 268, Digital Logic Design Lab, 1 course.

EE 368, Microprocessor Sys Interf Lab, 14 courses.

EE 401, Intro Elec and CpE Design - W, 7 courses.

EE 404, Elec and Comp Eng Designs-W, 7 courses.

EE 440, HDL Logic Synthesis, 1 course.

EE 446, Embedded System Design Lab, 2 courses.

EE 457, Embedded System Design, 10 courses.

EE 469, Signal Integrity, 5 courses.

EE 534, VLSI Design Systems, 1 course.

EE 540, HDL Logic Synthesis, 1 course.

EE 548, Computer-Network Security, 5 courses.

EE 557, Adv. Embedded System Design, 8 courses.

EE 560, Adv Computer Architecture, 3 courses.

EE 569, Signal Integrity, 5 courses.

EG 101, Intro to Engineering & Design, 5 courses.

EG 231, Intro to Ethics and Economics, 2 courses.

Mississippi State University

Number Description

EE 2111 Electrical Lab I

Class Description

Accompanies introductory digital class

EE 2713 Digital Devices
 EE 4723 Microcomputers II
 EE 4743 Computer Aided Digital Design
 EE 8993 High-Speed Digital Design

Introductory digital class
 Microcontroller interfacing
 VHDL, logic design, and synthesis
 Signal integrity and high-speed design

Honors and Awards

University of South Alabama College of Engineering “Teacher of the Year” 2015

Mobile Area Council on Engineering “Engineering Educator of the Year” 2015

Technology and Engineering Emmy® Award, 2012, for “Pioneering Development of Multi-Room DVR.” Awarded to Cisco. I managed the groups that built the first prototypes, gave public demonstrations, wrote numerous patent applications, and developed the first mass-production set-top containing Multi-Room DVR.

2nd Place in “Best Paper – Storage Category” at ICCE 2011. The paper is “Digital Video Recording Onto Solid-State Disks” as noted in Conference publications above.

Attendee, “Top Prof” Banquet – University of South Alabama chapter of Mortar Board, 2009,2010

Tau Beta Pi Engineering Professor of the Year – University of South Alabama chapter of Tau Beta Pi, 2008. One of two highest awards in the College of Engineering for teaching, and the only award voted on by honor students in the College.

Finalist, 53rd International Science and Engineering Fair, 1983, Albuquerque, NM.

Professional Activities

Expert Witness Engagements

Case	Jurisdiction and Case Number	Year(s)	Witness for	Expert Reports	Dep.	Trial	IPR* Rep.
WNE Holdings v. Rockwell Automat.	Southern District of Alabama	2011	Plaintiff	1	0	0	0
Personalized Media Corp. (PMC) v. Echostar	Eastern District of Texas	2010-2015	Plaintiff	2	3	0	0
Pegasus v. DirecTV et al.	Delaware	2011-13	Plaintiff	1	0	0	0
Apple v. Samsung	Int’l Trade Commission 337-TA-796	2012	Respondent	4	1	1	0
EON v. MobiTV et al.	Delaware	2013	Defendant	1	1	0	0
PMC v. Zynga	Eastern District of Texas	2013	Plaintiff	1	5	0	4
OpenTV v. Netflix	Delaware	2014	Defendant	0	0	0	0
Kaplan v. OnForce	N.D. California	2014	Defendant	0	0	0	1
Intellectual Ventures v. J.P. Morgan Chase	Southern District of New York	2013-2019	Defendant	2	2	0	0
PMC v. Amazon	Delaware	2014-2015	Plaintiff	1	9	0	5
Better Mouse Corp. v. Steelseries et al.	Eastern District of Texas	2015-2016	Plaintiff	2	0	1	0

Case	Jurisdiction and Case Number	Year(s)	Witness for	Expert Reports	Dep.	Trial	IPR* Rep.
SyncPoint v. Nintendo et al.	Eastern District of Texas	2015	Plaintiff	2	1	0	0
TQ Beta v. Dish	USPTO (IPR)	2016	Defendant	1	1	0	0
Script v. ADT et al.	Eastern District of Texas	2016	Plaintiff	2	2	0	0
Sony v. Pace	USPTO (IPR)	2016	Defendant	0	1	0	4
PMC v. Apple	EDTX and USPTO (IPR)	2016-2021	Patent Owner	2	1	1	2
PMC v. Samsung	Eastern District of Texas	2016	Patent Owner	2	0	0	0
Music Choice v. Stingray	Eastern District of Texas	2016-2019	Plaintiff	2	2	0	4
Broadcom v. AMD	USPTO (IPR)	2016	Petitioner	0	0	0	1
Tech Pharmacy v. Alixa et al.	Eastern District of Texas	2017	Plaintiff	2	2	1	0
Rovi v. PMC	Eastern District of Texas, Arbitration	2017	Defendant	0	1	0	0
Implicit v. Trend Micro	Eastern District of Texas	2017	Defendant	2	1	0	0
Implicit v. Palo Alto	Eastern District of Texas	2018	Defendant	1	1	0	0
Invensas v. Samsung	Eastern District of Texas	2018	Plaintiff	2	1	0	0
Selective Signals v. Palo Alto	USPTO (IPR)	2018	Petitioner	0	1	0	1
Rovi Tivo v. Various	Canada	2018	Plaintiff	0	0	0	0
Implicit v. Netscout	Eastern District of Texas	2018	Defendant	0	0	0	0
Rovi Tivo v. Comcast	USPTO (IPR)	2019-2020	Plaintiff	0	4	0	5
Rovi Tivo v. Comcast	ITC	2019-2020	Petitioner	2	1	1	0
BBitv v. OpenTV	California	2019	Defendant	0	0	0	0
Roku v UEI	USPTO (IPR)	2019-Now	Petitioner	0	6	0	8
MV3 v Roku	Western District of Texas	2019-2020	Defendant	2	2	1	0
BBitv v Dish	USPTO (IPR)	2019-2020	Petitioner	0	3	0	6
PMC v Google	Eastern District of Texas	2020	Plaintiff	1	1	0	0
PMC v Netflix	Southern District of New York	2020	Plaintiff	2	0	0	0
UEI v Roku <i>et al.</i>	ITC	2020-2021	Respondent	1	1	1	0
BBitv v Dish	Western District of	2020-	Defendant	1	5	0	6

Case	Jurisdiction and Case Number	Year(s)	Witness for	Expert Reports	Dep.	Trial	IPR* Rep.
	Texas	2021					
Flexiworld v Amazon <i>et al.</i>	Western District of Texas	2020-Now	Defendant	0	0	0	0
Flexiworld v Roku	Western District of Texas	2021-2022	Defendant	2	0	0	0
Roku v UEI <i>et al.</i>	ITC	2021-2022	Complain.	1	0	1	0
Roku v DivX	USPTO (IPR)	2021	Petitioner	0	0	0	1
Apple v Identity	USPTO (IPR), Ex Parte Re-Exam, Western District of Texas	2022-2024	Patent Owner	2	1	1	6
Audi v Aprese	USPTO (IPR)	2022	Petitioner	0	0	0	2
paSafeShare	Ex Parte Re-Exam, Western District of Texas	2021-Now	Patent Owner, Plaintiff	1	0	0	3
PerfectVision v PPC Broadband	USPTO (IPR)	2022-Now	Petitioner	0	0	0	1
Google v Nobots	USPTO (IPR)	2022	Patent Owner	0	2	0	4
Fall Line v Various	Eastern District of Texas	2022-Now	Plaintiff	6	2	1	0
Assa Abloy v CPC	USPTO (IPR)	2023-2024	Patent Owner	0	2	0	4
IOENGINE v Roku	Western District of Texas	2023-2024	Defendant	5	2	1	0
Gratuity v Toast	USPTO (IPR)	2023-2024	Petitioner	0	1	0	1
Lexos v Ebay	USPTO (IPR)	2024	Patent Owner	0	1	0	1
Entropic v Various	USPTO (IPR) Eastern District of Texas	2024-Now	Patent Owner / Plaintiff	3	6	0	7
Roku v Anonymous	USPTO (IPR)	2024	Petitioner	0	0	0	6
Adeia v Videotron	Fed. Court of Canada	2024-2025	Plaintiff	2	0	1	0
AMD v Concurrent	USPTO (IPR)	2024-Now	Petitioner	1	0	0	0
TrueSight v Samsung	Eastern District of Texas	2025	Defendant	2	1	0	0
Sandpiper v Various	USPTO (IPR)	2025-Now	Patent Owner	0	0	0	1
Mood v Eglä	USPTO (EPR)	2026	Petitioner	0	0	0	1

* Includes reports submitted for IPRs, CBMRs, and Re-Exams

Invited Lectures

“Real-time Monitoring in MPI”, Florida A&M University, Tallahassee, FL, August 1998

Consulting

Consulted with various investment firms concerning telecommunications market, 2007 – 2011.
Cox Communications – DVR Reliability – 2015

Society Memberships

Institute of Electrical and Electronic Engineers (Senior Member), IEEE Consumer Electronics Society, IEEE Computer Society, Eta Kappa Nu, Tau Beta Pi, Phi Kappa Phi, Gamma Beta Phi
Secretary, Northeast Mississippi Subsection of the IEEE, 1994-95

Article Reviewer

Computers and Electrical Engineering, Supercomputing '94, IEE Transactions, Concurrency: Practice and Experience, International Parallel Processing Symposium, IEEE Transactions on Education, IEEE Transactions on Parallel and Distributed Systems, ICT 2012, ICAEE 2012

Proposal Reviewer

Army Research Office, National Science Foundation, U.S. Department of Energy

University Service

Chair, Search Committee, ECE Department – Search for Assistant Professor positions, 2008-now (chair since 2011)

Member, ECE Department Undergraduate Affairs Committee, 2015-now

Member, College of Engineering Academic Standards Committee, 2016-now

Member, Search Committee, College of Engineering – Search for 2 Associate Dean positions, 2015

Member, Search Committee, College of Engineering – Search for Associate Dean positions, 2008-09

Member, University of South Alabama Council on International Education, 2008-15

Chairman, ECE Department “Open House” Committee, 2008-09

Conducted open house and other demonstrations for the department, 2008-now

Chairman, ECE Department Recruiting and Retention Committee, 2007-08

Updated and conducted experiment for ACE program, 2007

Member, Hearin Undergraduate Committee, 1998

Department Coordinator, United Way Campaign, 1995

Award Referee, 1995 Instructional Paper Award, MSU College of Engineering