

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

GUANGZHOU EKO TRADING DEVELOPMENT CO., LTD.

Petitioner,

v.

NINE STARS GROUP (U.S.A.) INC.,

Patent Owner.

Case No. IPR2025-01369

U.S. Patent No. 10,928,796

DECLARATION OF MIGUEL GOMEZ

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I, Miguel Gomez, declare as follows:

I. INTRODUCTION

1. I have been retained Guangzhou EKO Trading Development Co., Ltd. (“EKO”) as an independent expert consultant in this proceeding before the United States Patent and Trademark Office (“PTO”). I am not an employee of EKO or any affiliate or subsidiary of EKO.

2. I have been asked to assess and offer certain opinions regarding the subject matter of U.S. Patent No. 10,928,796 B2, which I refer to herein as the ’796 patent.

3. My opinions and the bases for my opinions are set forth below.

4. I am being compensated at my usual consulting rate for my work, plus reimbursement for any reasonable expenses. My compensation is based solely on the amount of time that I devote to activity related to this case and is in no way contingent on the nature of my findings, the presentation of my findings in testimony, or the outcome of this or any other proceeding. I have no other financial interest in this proceeding.

II. EDUCATION BACKGROUND, PROFESSIONAL EXPERIENCE, AND OTHER QUALIFICATIONS

5. My curriculum vitae (“CV”) is attached hereto as Attachment A and provides an accurate identification of my background and experience.

6. I received a Bachelor of Science in Electrical Engineering degree from Yale University in 1983. I have thirty-five years of experience in the design and development of hardware and software technology used in computer systems, communications systems, networking and storage infrastructure, and database systems.

7. I am currently employed as a consultant. My experience as a consultant, and in my prior industry career, includes extensive knowledge of computer operating systems, programming languages, and mobile and embedded applications. I am also highly skilled in the use of microelectronics simulation software, ASIC and FPGA coding, in hardware design languages, including Verilog and VHDL. I'm also skilled at programming for embedded systems and applications in C, C++ and C#.

8. From August 2006 to March 2009, I was VP of engineering for ActSolar. ActSolar was a solar power converter and instrumentation company where I developed the system architecture that defined the hardware and software for a solar inverter and a data gathering and control sub-system. I wrote a control program in the C programming language to manage power conversion for the solar inverter. I also managed a small team of engineers that built the software defined radio responsible for retrieving solar panel data. The data gatherer utilized the IEEE 802.15.4 low-rate wireless personal area network (WPAN) standard to

retrieve power and temperature readings from each solar panel and aggregate that data at a server. This information was used to maximize the solar array output.

9. In 2009, ActSolar was sold to National Semiconductor. The transfer of technology included the software radio for data collection, the inverter and a variant of the power converter hardware that performed shading compensation.

10. From September 2004 to August 2005, I was a consultant for BridgeWave Inc. I built a 10 Gbps Ethernet test platform to facilitate manufacturing tests of BridgeWave's high speed wireless network system. This system replaced the Smart Bits Ethernet test analyzer used in the manufacturing test environment. I also built a test generator, specifically an Ethernet packet generator, which generated packets of various sizes, address spaces, payload and checksums. I built a test receiver and analyzer which detected various failure mechanisms, maintained statistics and reported them to a user interface written in Lab View. A Xilinx Vertex II FPGA was employed in the first version of the test platform and a Xilinx Spartan 3e in the second version.

11. From September 2003 to March 2004, I was a consultant for PA Consulting Group. I provided hardware evaluation services for corporate mergers and acquisitions. These services included systems and hardware reviews in the following areas: (1) Analysis of system performance to the cost of the hardware implementation; (2) Review of the VHDL and Verilog code implementations,

documentation and development strategies; (3) VHDL and Verilog code management including compilation processes, simulation, test coverage, bug tracking and source code control; (4) FPGA and ASIC tool chain management; (5) Circuit board design and layout for production environments; (6) Circuit board certification testing for FCC, UL, and Environmental tests; (7) Review of production line management including assembly and test processes; and (8) Review of hardware code for copyright or license violations.

12. From January 2003 to May 2003, I was a consultant for Santel Networks. There I developed an optical duo-binary (ODB) encoder. Operating at 10.7 Giga bits per second (GBps), ODB reduces the spectral spread to $\frac{1}{2}$ of the ordinary NRZ format. This format allows high spectral efficiency over long distances by reducing nonlinear penalties due to narrower channel spacing and allows a higher bit rate or increases transmission distances. The project was implemented in a Xilinx FPGA running at 667 Mhz with a 10.7 GHz Mux/Demux feeding 32 LVDS streams to the FPGA. The ODB behavior was simulated in a C-coded simulation. The circuit board's highest clock speed was 10.7 Gigahertz and was modeled in HSPICE. Board level simulation was performed using NCVerilog. Several patents were applied for and the board was shown at the Optical Fiber Communication Conference & Exposition in March of 2003.

13. From March 2001 to December 2002, I was Director of Hardware, Content Networking Division for Extreme Networks, Inc. I managed a team of hardware and software engineers that developed and maintained a Layer 2-5 Content Addressable Switch. The switch was capable of L2, L3, L4 switching as well as L5 switching. In the L5 mode, the SLB used HTTP and HTML headers to make routing decisions. All routing decisions were made in real time (1 GBPs) by hardware logic in FPGAs while a Power PC provided a user interface, configuration management and housekeeping diagnostics. Communications between the hardware elements and the PowerPC CPU was via a PCI bus. I was responsible for the system design as well as for managing the product manufacturing process.

14. From January 2000 to March 2001, I was Director of Hardware for Webstacks, Inc. (now Extreme Networks, Inc.). Extreme Networks and several venture founding partners commissioned Webstacks to build a Content Addressable Switch which would operate as a L2-5 server load balancer. This switch included content routing, load balancing, firewall and security capabilities utilizing Secure Sockets Layers (SSL). I was hired to be the system architect. My responsibilities included hiring the hardware and software engineers that would implement the server load balancer as well as set up the manufacturing process. I hired 13 ASIC, FPGA and software engineers into my department and

managed them for the duration of the project. Within one year, our team had developed the product and met Extreme Networks' acquisition criteria. Extreme Networks purchased Webstacks for \$68MM cash and stock.

15. From February 1997 to December 1999, I was a consultant for Philips Semiconductor. I developed Philips Semiconductors' portion of a certification environment used by Philips Semiconductor and Microsoft to verify operation of Philips' Poseidon handheld chipset running Windows CE. This included board development, C coding, FPGA coding and simulation as well as porting to Windows CE. Later, I supported the development of Philips' version of the MIPS 4000 with communications and storage devices to emulate a system on a chip. I also designed ASIC logic and board level hardware for a 56Kbs software modem while at Philips.

16. From September 1994 to January 1997, I was President and Founder of Minden Group, Inc. The Minden Group developed and sold several types of memory adapters and a video conferencing system. The adapters were designed to expand the memory capacity of Personal Computers while saving the customer money. Both the adapters and the video conferencing system were sold through retail stores throughout the United States and Canada. Over 250,000 memory adapters were sold at stores such as Fry's, CompUSA, Computer City and Future Shop. After developing these products, I organized and managed a team of 10 to

15 employees focused on sales, marketing, finance and production. Manufacturing of the primary components was performed through contract manufacturing in Taiwan with final assembly and distribution in the United States. Distribution included order fulfillment, contracted sales channel distribution networks and end-point retail management.

17. From August 1992 to September 1994, I was Senior Hardware Manager of RAID Product Development for MTI, Inc. In this capacity, I was responsible for architectural development of the next generation RAID 1-5 systems and for managing the product development group. I introduced several design approaches that resulted in lower product costs as well as methods for interfacing with the company's other hierarchical storage components.

18. From April 1989 to August 1992, I was Founder and President of Spectrum Analysis, Inc., a consulting services company. I founded and operated Spectrum Analysis, Inc. with three other partners. Spectrum Analysis, Inc. specialized in electrical circuit design with emphasis on FPGA and ASIC emulation and complex PCB level designs.

19. From September 1988 to March 1989, I was Applications Manager for Quickturn Systems, Inc. Quickturn developed an ASIC emulator using Xilinx FPGAs. I was hired as Quickturn's first applications engineer, and was initially responsible for developing the training and demonstration systems for Quickturn's

initial customers. Later, as the company matured, I managed the customer support team. Because this ASIC emulator worked at a fraction of clock speed, I developed a methodology of slowing board designs to a fraction of the original clock speed, (on the order of 100s of KHz) while maintaining clock and memory (DRAM) integrity.

20. From July 1987 to August 1988, I was an Applications Engineer for Telestream Corporation and was responsible for demonstration system development, training and sales support for a software based communications protocol converter product. From March 1985 to July 1987 I was a design engineer for StrataCom Inc., an early voice and data network equipment manufacture. StrataCom developed the IPX, a packet over leased T1 transmission and management system. I was responsible for the voice compression card as well as designing a way to include data over a primarily voice solution. The hardware I developed eventually evolved into the Frame Relay protocol. Cisco bought StrataCom in 1996.

21. From June 1983 to March 1985, I was a Design Engineer for ROLM Corporation. I was responsible for the development of a multiplex/demultiplex hardware board used in the ROLM BUS 295 telephone switch. A novel elastic buffer was used to automatically determine the length of an inter-cabinet data bus,

whose length varied based on the customer's requirements. This eliminated the need for manufacturing technicians to manually adjust clock skew.

22. A more detailed account of my work experience and other qualifications is listed in my Curriculum Vitae which accompanies this declaration as Attachment A.

III. ASSIGNMENT AND MATERIALS CONSIDERED

23. I have been asked to review the '796 patent, the '796 patent's prosecution history, and certain prior art to the '796 patent.

24. Next, I have been asked to offer opinions regarding the state of the art at the time the '796 patent was filed, the background knowledge that would have been possessed by a person having ordinary skill in the art (a "POSITA"), and how that background knowledge bears on the obviousness of the '796 patent's claims.

25. The opinions expressed in this declaration are not exhaustive of opinions I may offer in the future regarding the unpatentability of the claims of the '796 patent. Therefore, the fact that I do not address a particular point should not be understood to indicate an agreement on my part that any claim complies with the requirements of any applicable patent or other rule.

26. I reserve the right to amend and supplement this declaration in light of additional evidence, arguments, or testimony presented during this IPR or related proceedings on the '796 patent.

27. In forming the opinions set forth in this declaration, I have considered and relied upon my education, knowledge of the relevant field, knowledge of relevant technical principles, and my experience. I have also reviewed and considered the '796 patent (Exhibit 1001), its prosecution history (Exhibit 1002), and the following additional materials:

Exhibit	Description
1004	Certified translation of CN 105425665 A (“Zheng”)
1006	U.S. Patent No. 9,382,067 B2 (“Gropper”)
1007	U.S. Patent No. 7,896,196 B2 (“Wegelin”).
1008	U.S. Patent No. 7,690,623 B2 (“Parsons”).
1010	Certified translation of CN 203740427U (“Wang”)
1011	U.S. Patent No. 8,766,195 B2 (“Tang”)
1012	U.S. Patent No. 8,421,020 B2 to Chen et al. (“Chen”)

IV. UNDERSTANDING OF THE LAW

28. I am not an attorney but have been instructed in and applied the law as described in this section.

29. I understand that the first step in comparing an asserted claim to the prior art is for the claim to be properly construed. I address how a person of ordinary skill in the art (POSITA) would have understood the claims of the alleged invention in Section VII below.

30. I have been further instructed and understand that a patent claim is unpatentable and invalid as obvious if the subject matter of the claim as a whole would have been obvious to a POSITA of the claimed subject matter as of the time of the invention at issue. I understand that when assessing the obviousness of claimed subject matter, the following factors are evaluated: (1) the scope and content of the prior art; (2) the difference or differences between each claim of the patent and the prior art; and (3) the level of ordinary skill in the art at the time the patent was filed.

31. I understand that claimed subject matter may be obvious in view of more than one item of prior art. I understand, however, that it is not enough to show simply that all the limitations of the claimed subject matter are spread throughout the prior art. Instead, for claimed subject matter to be obvious over multiple references, there must be some reason or motivation for a POSITA to combine the prior art references to arrive at the claimed subject matter.

32. I have been informed that, in seeking to determine whether an invention that is a combination of known elements would have been obvious to a POSITA at the time of the invention, one must consider the references in their entirety to ascertain whether the disclosures in those references render the combination obvious to such a person.

33. I have been informed and understand that, while not required, the prior art references themselves may provide a teaching, suggestion, motivation, or reason to combine, but other times the motivation linking two or more prior art references is common sense to a POSITA at the time of the invention.

34. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. I have been informed that, if a technique has been used to improve one device, and a POSITA would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

35. I further understand that an obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references also may be supplied by the direction of the marketplace. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a POSITA has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation but of ordinary skill and common sense.

36. I have been informed that the combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. Thus, where all the elements of a claim are used in

substantially the same manner, in devices in the same field of endeavor, the claim is likely obvious.

37. Additionally, I understand that a patent is likely to be invalid for obviousness if a POSITA can implement a predictable variation or if there existed at the time of the invention a known problem for which there was an obvious solution encompassed by the patent's claims. Therefore, when a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one.

38. I further understand that combining embodiments related to each other in a single prior art reference would not ordinarily require a leap of inventiveness.

39. I also understand that a POSITA must have had a reasonable expectation of success when combining references for claimed subject matter to be obvious.

40. I have been informed and I understand that factors referred to as "objective indicia of non-obviousness" or "secondary considerations" are also to be considered when assessing obviousness when such evidence is available. I understand that these factors can include: (1) commercial success; (2) long-felt but unresolved needs; (3) copying of the invention by others in the field; (4) initial expressions of disbelief by experts in the field; (5) failure of others to solve the problem the claimed subject matter solved; and (6) unexpected results.

41. I also understand that evidence of objective indicia of non-obviousness must be commensurate in scope with the claimed subject matter. I further understand that there must be a relationship, sometimes referred to as a “nexus,” between any such secondary indicia and the claimed invention.

42. Finally, I have been informed that one cannot use hindsight to determine that an invention was obvious.

43. I provide my opinions in this declaration based on the guidelines set forth above.

V. LEVEL OF SKILL IN THE ART

44. I have been informed and understand that the level of ordinary skill in the relevant art at the time of the invention is relevant to inquiries such as the meaning of claim terms, the meaning of disclosures found in the prior art, and the reasons a POSITA may have for combining references.

45. I have been informed and understand that factors that may be considered in determining the level of ordinary skill include: (1) the education of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the relevant field. I have been further informed and understand that a POSITA is also a person of ordinary creativity.

46. A POSITA in the field of the '796 patent would have had a degree in electrical engineering or an equivalent field, along with 2 years of electronic product design experience. This POSITA would have been aware of and generally knowledgeable about the types of materials (including microcontrollers, sensors, circuits, and timers) employed in typical electronic products.

47. Based on my education, training, and professional experience in the field of the claimed invention, as discussed in Section II, I was a person of more than the ordinary level of skill in the art as of April 2017.

48. In forming my opinion, I have drawn on my academic background and professional experience. My opinions herein, however, were formed taking into account the perspective of an ordinarily skilled artisan.

VI. THE '796 PATENT

A. Effective Filing Date

49. I understand that the '796 patent was filed as a PCT application on July 1, 2017. The patent also identifies an earlier April 7, 2017 foreign filing on its face. *See* Ex. 1001, Cover. I have assumed that the patent is entitled to the benefit of this April 2017 date for purposes of this declaration.

50. My opinions in this declaration were formed from the perspective of a POSITA as of April 2017 including both the knowledge of a POSITA at that time as well as how a POSITA would have understood the prior art.

B. General Overview

51. The '796 patent explains that it “relates to a power-saving method for a standby circuit of an induction trash can.” Ex. 1001, 1:20-21.

52. The patent explains that “[t]he power consumption of an induction trash can consists of two parts[.]” *Id.*, 1:26-27. This includes “standby power consumption (when lid is motionless)” and “action power consumption (when lid moves).” *Id.*, 1:28-30. “[T]he daily standby power consumption is much greater than the daily action power consumption.” *Id.*, 1:54-55.

53. The patent goes on to “provide a standby power-saving method” that aims to “greatly reduce the standby current of the induction trash can, extend battery life, achieve an excellent power saving effect, reduce the use cost for the users, and decrease pollution caused by used batteries.” *Id.*, 1:62-67.

54. The patent’s trashcan includes “an active infrared sensor 1,” “a microcontroller 2,” and “motor 4.” *Id.*, 5:20-25; Fig. 1.

55. The trashcan’s “microcontroller has a sleep function and a watchdog timer.” *Id.*, 2:7-9.

56. The trashcan’s “active infrared sensor” is able to detect an “obstacle” (like a user’s hand) in the sensor’s “induction area.” *Id.*, 2:12-14, 22-24. If an “obstacle” is detected, the trashcan’s lid will be “driven ... to open” by the motor.

Id., 2:22-30. If no “obstacle” is detected, the microcontroller “will enter a sleep state.” *Id.*, 2:14-18.

57. “After it has slept for a preset time, the watchdog timer disposed in the microcontroller will wake up the microcontroller” allowing it to “reenter” a “working state.” *Id.*, 2:18-22.

58. To save power, “the microcontroller will cut off the power supply of the active infrared sensor when the microcontroller enters the sleep state.” *Id.*, 2:31-35.

59. “When the microcontroller is woken by the watchdog timer ..., the microcontroller [will] first restore the power supply of the active infrared sensor and delay for a preset time for the active infrared sensor to enter a stable working state” before emitting and then detecting “an infrared pulse signal.” *Id.*, 2:35-42.

60. The patent explains that because “the active infrared sensor” is only “in the working state intermittently,” the trashcan’s battery life is extended compared to that of a trashcan that constantly powers its sensor. *Id.*, 4:1-26, 4:49-5.

61. This operation—including the “working,” “standby,” and “sleep” states—is also shown in Figure 2 of the ’796 patent:

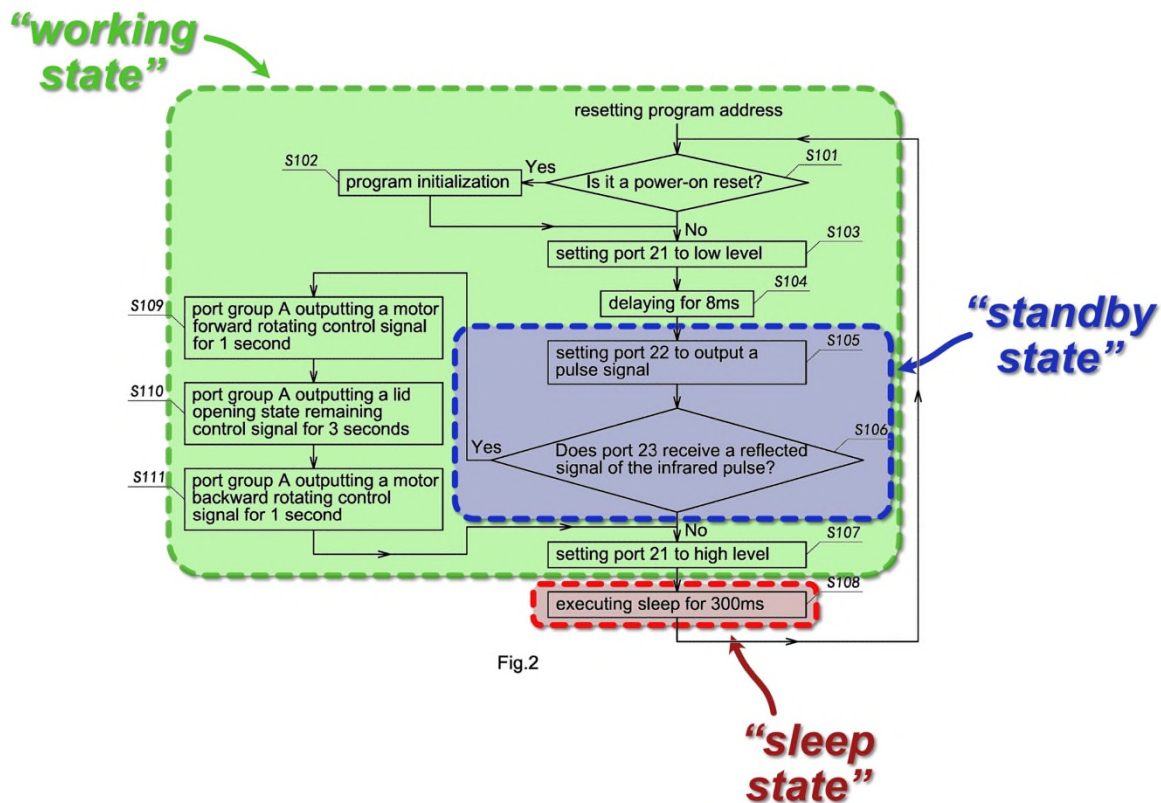


Fig.2

Id., Fig. 2 (annotated).

62. The “working” state includes the sensor power-on procedure, including delay step S104. *See id.* The “standby” state includes the steps S105 and S106 where infrared signals are output and received for purposes of opening the bin lid. *See id.* The “sleep” state includes step S108 where power for the sensor is cut off. *See id.*

C. Claims

63. For reference, claims 1-12 of the '796 patent are reproduced below. Of these, only claim 1 is independent.

1. A power-saving method for an induction trash can circuit, comprising the steps of:

controlling an active infrared sensor to emit an infrared pulse signal to an induction area by a microcontroller in a standby state;

setting a microcontroller into a sleep state if no reflection output signal is received from the active infrared sensor, wherein in the standby state, the microcontroller controls the active infrared sensor to emit the infrared pulse signal, wherein in the sleep state, the microcontroller cuts off a power of the active infrared sensor; or

remaining the microcontroller in a working state if a reflection output signal is received from the active infrared sensor and controlling a driving circuit to drive a motor to rotate forward to open a lid of the induction trash can, delaying for a few seconds after the motor has driven the lid to open, controlling the driving circuit to drive the motor to rotate backward to close the lid, and setting the microcontroller into the sleep state after the lid is closed; and

after a preset time, via a watchdog timer, waking up the microcontroller from the sleep state to the working state, so as to have the microcontroller

reenter the working state and repeat the above steps under the standby state.

2. The power-saving method, as recited in claim 1, further comprising the steps of:

cutting off the power supply of the active infrared sensor when the microcontroller enters the sleep state; and

restoring the power supply of the active infrared sensor, delaying for a preset threshold time for the active infrared sensor to enter a stable working state, and controlling the active infrared sensor to emit the infrared pulse signal to the induction area when the microcontroller is in the standby state.

3. The power-saving method, as recited in claim 1, wherein the preset time is between 100 ms and 500 ms.

4. The power-saving method, as recited in claim 2, wherein the preset time is between 100 ms and 500 ms.

5. The power-saving method, as recited in claim 2, wherein the preset threshold time is between 2 ms and 50 ms.

6. The power-saving method, as recited in claim 4, wherein the preset threshold time is between 2 ms and 50 ms.

7. The power-saving method, as recited in claim 1, wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.

8. The power-saving method, as recited in claim 2, wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.

9. The power-saving method, as recited in claim 3, wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.

10. The power-saving method, as recited in claim 4, wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.

11. The power-saving method, as recited in claim 5, wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.

12. The power-saving method, as recited in claim 6, wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.

VII. CLAIM CONSTRUCTION

64. I am not a legal expert or an attorney and offer no opinions on the law. I understand that claim construction is a matter of law. However, I have been informed by counsel of the legal standards that apply to claim construction in an *inter partes* review, and I have applied them in forming my opinions. I understand that during an *inter partes* review, the same claim construction standard used in federal district court is applied when addressing the meaning of claim terms.

65. I have been informed that the words of a claim are generally given the ordinary and customary meaning that the term or phrase would have to POSITA at the time of the invention in view of the surrounding claim language, the specification and the file history (collectively, the “intrinsic evidence” or “intrinsic record”).

66. I also understand that courts may consider extrinsic evidence, such as expert and inventor testimony, dictionaries, and learned treatises (collectively, the “extrinsic evidence” or the “extrinsic record”), but that such extrinsic evidence should be given less weight than the intrinsic evidence.

67. Independent claim 1 requires that the claimed “**microcontroller**” have a “**sleep state**,” “**working state**,” and “**standby state**.”

68. I have applied the following constructions of the three “state” terms in this declaration:

- **“sleep state”**: the state in which the microcontroller cuts off power to the active infrared sensor;
- **“working state”**: the state in which the microcontroller is not sleeping and supplies power to the active infrared sensor; and
- **“standby state”**: the state in which the microcontroller causes the active infrared sensor to emit a signal for detection.

69. In my opinion, the constructions listed above are consistent with the claim language, the specification, and the prosecution history of the '796 patent.

70. In particular, regarding the claim language, claim 1 specifies that in “the sleep state, the microcontroller cuts off a power to the active infrared sensor.” Ex. 1001, 8:23-24.

71. The claim then notes that the “working state” is the inverse of the “sleep state”: it is state into which the “microcontroller” “wak[es] up” when exiting the “sleep state.” *Id.*, 8:34-38. Further, the “microcontroller” “remain[s]” in this “working state” if the “active infrared sensor” receives a “reflection output signal” for purposes of opening/closing the trash can cover. *Id.*, 8:25-27. So, the “working state” is the state the microcontroller enters upon waking from sleep. It is also the state in which the microcontroller remains as it performs various actions, including powering the sensors and opening/closing the trash can.

72. Claim 1 also explains that the “standby state” is the state in which the “microcontroller” “controls the active infrared sensor to emit the infrared pulse signal.” *Id.*, 8:21-23.

73. Given the way claim 1 is written, a POSITA would have understood that the “working state” and “standby state” overlap. As explained above, upon waking the “microcontroller” enters the “working state” and powers on the “active infrared sensor.” The “microcontroller” is in the “standby state” when the “active infrared sensor” is not only powered on but is also emitting a signal for purposes of detection. And the claim specifies that the “microcontroller” “remain[s]” in the “working state” if a reflected infrared signal is detected. This allows the trash can cover to open/close. Because the “microcontroller” wakes into the “working state” and then must “remain” in this state (including after reflection signal detection and cover opening/closing), the “working state” covers the entirety of the period in which the microcontroller is awake and supplying power to the sensor. The “standby state” is a sub-set of this state where the microcontroller causes the infrared sensor to emit a signal for purposes of detection. I have provided further details regarding how a POSITA would have understood this overlapping operation to be effectuated when discussing the Zheng reference below.

74. Next, based on my review, the ’796 patent’s specification uses the terms the same way.

75. In particular, the specification explains that in the “sleep state,” “[t]he microcontroller will cut off the power supply of the active infrared sensor.” *Id.*, 2:33-35. No sensor “output signal” is received by the microcontroller during this “sleep” state. *Id.*, 3:46-48.

76. Next, after being “woken up by the watchdog timer” from the sleep state, “the microcontroller will first restore the power supply of the active infrared sensor” allowing it to “enter a stable working state.” *Id.*, 2:35-42. The patent likewise notes that “[a]fter a preset time of sleeping, the watchdog timer disposed in the microcontroller will wake up the microcontroller and turn it back into the working state.” *Id.*, 2:47-51.

77. In sum, in the specification (as in the claims as I discuss above) the sleep state is the state where the active infrared sensor is powered off by the microcontroller.

78. The working state is the opposite of the sleep state: it is the state into which the microcontroller wakes from sleep (causing power to be restored to the sensor). The microcontroller remains in this state through the remainder of its operation. *See id.*, 2:24-30 (noting that the trash can “remain[s] in the working state”); 5:63-6:5 (similar).

79. With regard to the “standby state,” the specification explains that “[w]hen the induction trash can circuit is in a standby state, the microcontroller

controls the active infrared sensor to emit an infrared pulse signal to the induction area.” *Id.*, 2:12-14; *see also id.*, 3:42-44 (similar).

80. In other words, the “standby state” refers to the state in which the microcontroller is not only awake and powering on the sensor, but the microcontroller is also instructing the sensor to emit a signal for purposes of detection.

81. As noted, I have also reviewed the prosecution history of the ’796 patent.

82. During prosecution, the applicant characterized the claims the same way I discuss above.

83. In particular, the applicant stated that in “sleep state,” “the microcontroller cuts off a power of the active infrared sensor.” Ex. 1002, p. 171.

84. The applicant also stated that the “working state” is the state into which the “microcontroller” “wakes up” after “the sleep mode.” *Id.* It is also the “normal mode” of trash can operation when not sleeping. *Id.*, p. 170.

85. And the applicant explained that in the “standby state,” “the microcontroller controls the active infrared sensor to emit the infrared pulse signal.” *Id.*

86. The applicant also contrasted the claimed control method’s three states with prior art methods that purportedly only switched between two states.

87. In particular, rather than “three modes” as the ’796 patent’s claims require, the applicant explained during prosecution that the prior art included only “two modes”: a “working mode” when “the light emitter ... will emit the light signal” and a “nap mode” when “the light emitter ... will not emit the light signal.” *Id.*, pp. 169-170.

88. According to the applicant, these prior art “conventional trash cans ... are ONLY configured to set the microprocessor between a normal mode (working mode) and a sleep mode. That is, the signal receiver module is activated in the normal mode for detection and is deactivated in the sleep mode for energy saving. None of the cited arts include three different states of the microcontroller as claimed in the instant invention.” *Id.* There was no state in which the microcontroller “initially power[s] the active infrared sensor while no infrared pulse signal is generated yet.” *Id.*, p. 172.

89. This, in my opinion, is consistent with both the claims and specification. Once again, the microcontroller impacts operation as follows: (1) in the sleep state the sensor is not powered, (2) in the working state the sensor is powered but not transmitting/receiving, and (3) in the standby state the sensor is powered and transmitting/receiving

90. In my opinion, the remaining terms of the '796 patent's claims do not require further construction and can be afforded their plain and ordinary meaning for purposes of the analysis of the prior art that I am conducting in this declaration.

VIII. UNPATENTABILITY ANALYSIS

91. For the reasons I explain in greater detail below, it is my opinion that as of the effective filing date of the '796 patent, a POSITA would have considered claims 1-12 to be obvious.

A. Overview of Prior Art

1. Zheng

92. Zheng (Ex. 1004) indicated on its face that it published March 23, 2016. Zheng, Cover. This is more than a year before the '796 patent's April 2017 filing.

93. Zheng states that it relates to a “smart environmentally-friendly trash bin control method and apparatus.” *Id.*, [0001].

94. Zheng begins by discussing existing, known trash bins.

95. According to Zheng, these known bins require “users” to “open[] the upper cover” of the bin by “treading on a pedal or manually opening the upper cover.” *Id.*, [0002]. According to Zheng, manually opening of the bin “may be inconvenient.” *Id.*, [0003].

96. To address this concern with manually opening trash bins, Zheng discloses a bin with an “upper cover” that “can be automatically opened when a

person carrying garbage walks up to the smart environmentally-friendly trash bin....” *Id.*, [0004].

97. Zheng’s “trash bin” includes a “microcontroller unit,” “an infrared transmitting tube” and an “infrared receiving tube” that are “connected to the microcontroller unit,” a “motor,” and an openable “upper cover.” *Id.*, [0036]-[0037].

98. The “infrared transmitting tube” and “infrared receiving tube” are “located close to each other” and “arranged on” the “trash bin” to “face the same direction” to allow for detection of “a reflected infrared signal.” *Id.*, [0103].

99. Zheng also discusses a control method that automatically opens the trash bin only when “[a] person or object passes by” the bin and “keeps blocking the” transmitted “infrared signal” for a period of time. *Id.*, [0043].

100. Zheng’s control method is intended to open the bin when a user approaches, while avoiding “interference ... from a transparent plastic bag, ambient light, and a remote object.” *Id.*, [0072], [0075].

101. Zheng explains that its control method is designed to “reduce[]” “energy consumption” and “sav[e] ... power[.]” *Id.*, [0066], [0113].

102. Before opening the bin cover, reflected infrared signals must be detected during two periods of operation (which Zheng calls a “first preset time” and a “second present time”).

103. During the first period (or “first preset time”), Zheng’s microcontroller causes the “infrared transmitting tube to transmit an infrared signal of a first pulse waveform once” “every first preset time.” *Id.*, [0051]. “[T]he first preset time is 200 milliseconds.” *Id.*, [0052]. According to Zheng, the “time required by the infrared transmitting tube to transmit the infrared signal of the first pulse waveform once is $T = \dots 0.526$ milliseconds.” *Id.* This is Zheng’s “Step S101.” *Id.*, [0051].

104. After transmitting this single infrared signal with a “first pulse waveform” in Step S101, Zheng’s microcontroller uses the “infrared receiving tube” to detect a reflected infrared signal “blocked by a person or an object.” *Id.*, [0053]-[0054].

105. If no infrared signal is detected, Zheng will not transmit another “first pulse waveform” until the expiration of the “first preset time” 200 milliseconds later. *See id.*, [0051]-[0054].

106. If a reflected infrared signal is “receive[d]” by the “infrared receiving tube[,]” “the receiving tube may automatically output a low-level pulse....” *Id.*, [0054]. This is Zheng’s “Step S102.” *Id.*, [0053]; *see also id.*, [0105]-[0107].

107. When the “infrared receiving tube” indicates receipt of a reflection signal in Step S102, Zheng’s microcontroller proceeds to its second period of operation (or “second preset time”).

108. During this second period, the microcontroller “control[s], every second preset time, the infrared transmitting tube to transmit an infrared signal of a second pulse waveform once” and then “continuously transmit” this signal “for a first preset number of times.” *Id.*, [0058].

109. According to Zheng, “the second preset time is 25 milliseconds, and the first preset number of times is 20.” *Id.*, [0059]. This takes a total of “500 milliseconds.” *Id.* Zheng explains that each “waveform” lasts “ $T = \dots 0.526$ milliseconds.” *Id.*, [0060]. Because of this timing, during this “second preset time” period, Zheng emits a “second pulse waveform” once every 25 milliseconds. It repeats this 20 times (leading to the 500 millisecond long second period). *Id.*, [0059]-[0060]. This is Zheng’s “Step S103.” *Id.*, [0058].

110. Next, when transmitting signals Zheng’s microcontroller monitors the “infrared receiving tube” to determine if it “continuously ... detect[s]” reflected signals “for a second preset number of times.” *Id.*, [0061]. This “preset number of times” can be “5.” *Id.*, [0062].

111. If five consecutive reflections are not detected, Zheng enters a standby state and “continu[es]” back to the beginning of its control process to transmit another “first pulse waveform” 200 milliseconds later. *Id.*, [0074]-[0075].

112. If five consecutive reflections are detected, the “motor” is “control[led] ... to start to act ... to open an upper cover of an environmentally-

friendly trash bin.” *Id.*, [0061]. The motor is then reversed to close the cover. *Id.*, [0104]. This is Zheng’s “Step S104.” *Id.*; *see also id.*, [0111]-[0112].

113. According to Zheng, by requiring five consecutive detections, its trash bin is able to distinguish between a user actually “walk[ing] up to the trash bin to throw garbage” from “interference.” *Id.*, [0061].

114. Steps S101-S104 are shown in Figure 1 of Zheng below:

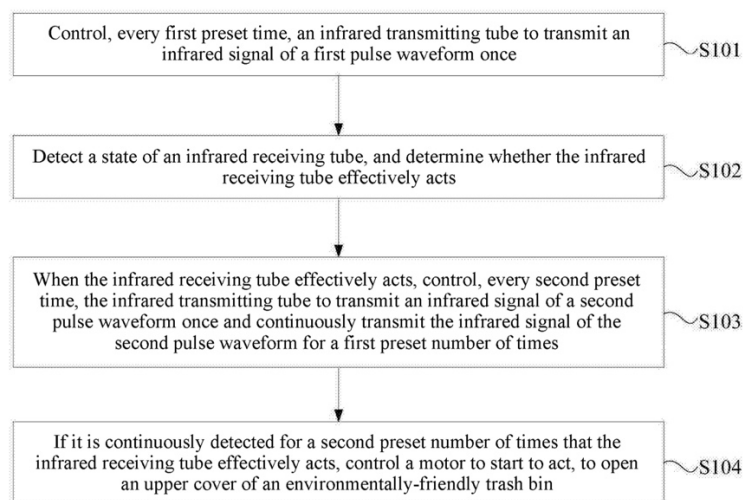


FIG. 1

Id., Fig. 1; *see also id.*, [0063], [0095]-[0100].

115. Zheng also discusses a series of other optional steps that can also be performed along with steps S101-S104.

116. For instance, “each time” “before” Zheng’s microcontroller performs “step S101[,]” “the infrared receiving tube” is initially “powered on in advance of a third preset time.” *Id.*, [0065]. This “third preset time” can be “2T” or “1.502 milliseconds[.]” *Id.*, [0066].

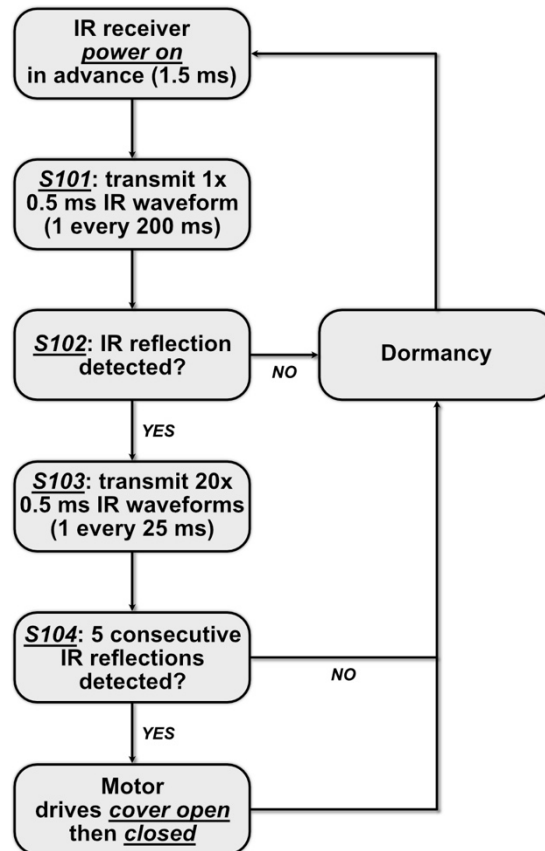
117. Next, after the “third preset time,” the IR receiving tube can be “maintain[ed] ... powered on for” a “fourth preset time” for purposes of emitting/detecting infrared signals. *Id.*, [0065]. This “fourth preset time” during which signals are emitted/detected can be “4T” or “2.104 milliseconds.” *Id.*, [0066].

118. Zheng explains that when not powered on, the infrared sensor is “turned off” allowing “energy consumption” to “be reduced.” *Id.*; *see also id.*, [0101]-[0102].

119. So, in sum, in Zheng’s method the infrared sensor starts powered off before step S101, is powered up for 1.5 ms before use (the “third preset time”), remains powered on for at least a period of time (the “fourth preset time”), and then powers off when not needed. *See generally id.*

120. Next, Zheng explains its system includes a “dormancy mode” that is “automatically enter[ed]” by the “microcontroller unit” “when the infrared transmitting tube and the infrared receiving tube do not work” for purposes of “saving more power.” *Id.*, [0113].

121. This collective operation is summarized in the demonstrative figure below. This figure adds the 1.5 second power on procedure and sensor power off dormancy mode discussed above to Zheng’s existing steps S101-S104:



2. Wang

122. Wang (Ex. 1010) indicated on its face that it published July 30, 2014. Wang, Cover. This is more than two years before the '796 patent's April 2017 filing.

123. Wang explains that it relates generally to the field of "[i]ntelligent [a]utomatic" trashcans. Wang, [0002].

124. Wang's "trash can" employs a "sensing opening-closing apparatus" that "detect[s]" when a "hand approaches the sensing trash can" and automatically opens/closes the can. *Id.*, [0018]-[0023].

125. The “sensing opening-closing apparatus” includes, among other things, “a sensor 20...” *Id.*, [0018]; *see also* Abstract, [004].

126. According to Wang, the “sensor 20 is disposed on a front side of the middle body seat 12” of the trashcan body. *Id.*, [0019]

B. Ground 1: Obviousness over Zheng

127. In my opinion, a POSITA would have considered Zheng to be in the same field of endeavor as the ’796 patent (both relate to methods for controlling trash bins, and both propose various power saving approaches for use during those control methods).

128. A POSITA would also have considered Zheng to be highly pertinent to the patentability of the ’796 patent’s claims.

129. As explained below, in my opinion when considered in its totality and in view of the background knowledge possessed by a POSITA, Zheng discloses and renders obvious claims 1-12 of the ’796 patent.

1. Claim 1

[1-p] “1. A power-saving method for an induction trash can circuit, comprising the steps of:”

130. To the extent this preamble language is limiting, it is taught by Zheng.

131. Zheng explains that it relates to a “smart environmentally-friendly trash bin control method and apparatus.” Zheng, Abstract; *see also id.*, [0001].

132. According to Zheng, its trash bin control method is designed to “reduce energy consumption” and “sav[e] ... power.” *Id.*, [0059], [0066], [0113]. Thus, Zheng teaches a “**power-saving method.**”

133. Next, Zheng’s method also causes the trash bin to transmit—and then detect—“infrared” signals to determine if a “person walks up to the smart environmentally-friendly trash bin” to throw away garbage. *Id.*, [0063].

134. Detection of a reflected infrared signal results in the bin being “automatically controlled” to open. *Id.*

135. Because it employs an infrared sensor to automatically control bin opening, Zheng’s trash bin is an “**induction trash can.**” This is exactly how the ’769 patent uses the term. According to the ’796 patent, its trashcan is an “induction” trashcan because it “comprises an active infrared sensor, a microcontroller, a driving circuit, [and] a motor to open and close the lid.” Ex. 1001, 2:4-6. Zheng includes the same components.

136. Zheng also explains that its method is performed by a “microcontroller unit” that is “connected to” an “infrared transmitting tube[,]” “infrared receiving tube[,]” and “motor.” Zheng, [0037].

137. Thus, Zheng obviously employs a “**circuit**”: it includes various powered and interconnected electrical components that operate together for

purposes of detecting a hand, and then driving open the trash bin cover when appropriate.

[1-1] “controlling an active infrared sensor to emit an infrared pulse signal to an induction area by a microcontroller in a standby state;”

138. In my opinion, this is all taught by Zheng.

139. Zheng’s “trash bin” includes a “microcontroller unit” that is connected to and “control[s]” “an infrared transmitting tube” and an “infrared receiving tube.” Zheng, [0036]-[0042], [0050]-[0063].

140. Per Zheng, the “infrared transmitting tube” operates to “transmit an infrared signal.” *Id.*, [0043].

141. Zheng also explains that the “infrared receiving tube ... receive[s]” a “reflected” version of this “infrared signal” if “a person or object” approaches the trash bin. *Id.*

142. According to Zheng, the “infrared transmitting tube and the infrared receiving tube” are both “arranged” on the “trash bin” to “face the same direction ... and are located close to each other.” *Id.*, [0103]. This co-location (and orientation) of the transmitting and receiving tubes allows a “reflected” infrared signal to be “received by the infrared receiving tube.” *Id.*

143. While Zheng does not use the term “sensor,” in my opinion POSITA would nonetheless have understood that this is what Zheng’s infrared transmitting

and infrared receiving tubes are. Together, the transmitting and receiving tube form an infrared sensor that transmits (and then detects) an infrared signal.

144. At the time the '796 patent was filed, “infrared sensor[s]” had “been widely used in” a variety of household “sanitary apparatus.” Ex. 1011, 1:27-31.

145. It was also “common” for such sensors to include an “infrared transmitting tube and ... infrared receiving tube ... welded directly on” a “traditional circuit board....” *Id.*, 2:25-29.

146. The below figure shows an exemplary infrared sensor:

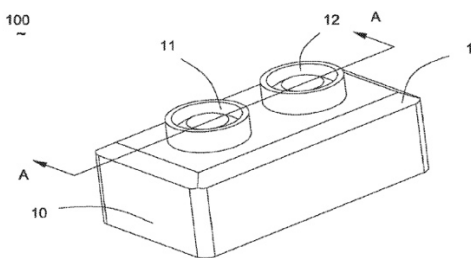


FIG. 1A

Id., Fig. 1A. As shown, the “sensor 100” includes a “housing 1” that contains both a “transmitter device 4” (the transmitting tube) and a “receiver device 5” (the receiving tube). *Id.*, 4:40-57.

147. Transmitted “infrared light rays” exit the housing through a “circular aperture[]” 11, while reflected rays re-enter the housing through another aperture 12. *Id.*, 4:59-5:28.

148. Other references discuss analogous sensors. For example, one prior art reference details an “infrared sensing device 100” that includes both an

“infrared emitting tube 4” and an “infrared receiving tube 5” located within the same “housing 3.” Ex. 1012, 2:61-3:4.

149. In my opinion, a POSITA would have understood Zheng to include just this type of infrared sensor: its infrared transmitting tube and infrared receiving tube would be located in a single housing and together constitute an infrared sensing device or sensor. Just as Zheng teaches, the transmitting and receiving tubes would face in the same direction for purposes of detecting reflected infrared signals.

150. In sum, Zheng includes a “**microcontroller**” (its microcontroller unit) that operates to “**control**” (perform Zheng’s control method) an “**active infrared sensor**” (the combination of the infrared transmitting tube and co-located receiving tube that detects an approaching person/object).

151. Moreover, Zheng’s “**active infrared sensor**” includes an “**induction area**” (the infrared receiving tube faces in the same direction as the transmitting tube to receive a reflected infrared signal from a particular area of detection in the direction the receiving tube is facing).

152. Zheng also teaches that its “**microcontroller**” operates in a “**standby state.**”

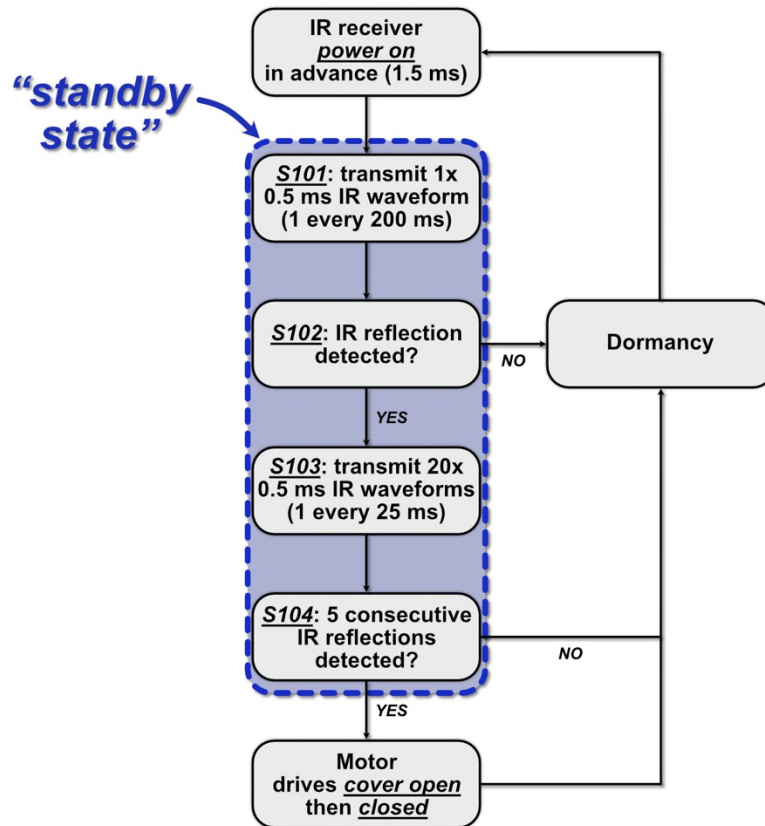
153. As explained above, a POSITA would have understood the claimed “**standby state**” to be the state in which the microcontroller causes the active infrared sensor to emit a signal for detection. *See supra* Section VII.

154. According to Zheng, its microcontroller unit causes the “infrared receiving tube” to “transmit” one “first pulse waveform” during a “first preset time” as part of “Step S101.” *Id.*, [0051].

155. Zheng’s microcontroller unit also causes the “infrared receiving tube” to “continuously transmit” an “infrared signal of [a] second pulse waveform” 20 times during a “second preset time” as part of “Step S103.” *Id.*, [0058]-[0059]; *see also id.*, Abstract, [0006]-[0010], [0038]-[0043].

156. These periods of infrared transmission—and the surrounding periods where reflected infrared signal is detected by Zheng’s infrared receiving tube—are the claimed “**standby state.**”

157. The standby state is highlighted in the demonstrative figure below:



[1-2] “setting a microcontroller into a sleep state if no reflection output signal is received from the active infrared sensor, wherein in the standby state, the microcontroller controls the active infrared sensor to emit the infrared pulse signal, wherein in the sleep state, the microcontroller cuts off a power of the active infrared sensor; or”

158. This, in my opinion, is also taught by Zheng.

159. As noted above, a POSITA would have understood the claimed “**sleep state**” is the state in which the microcontroller cuts off power to the active infrared sensor. See *supra* Section VII.

160. Zheng explains that its “infrared receiving tube” is not “turned on all the time.” Zheng, [0066]. Instead, it is “controlled to be periodically turned on, and is turned off after being turned on for a period of time.” *Id.*

161. Zheng also explains that its “microcontroller unit” “automatically enters a dormancy mode when the infrared transmitting tube and the infrared receiving tube do not work” (*i.e.*, when the sensor is not powered) for purposes of “saving more power.” *Id.*, [0113].

162. More specifically, Zheng explains that “each time” “before” Zheng’s microcontroller performs “step S101” (the first step in which an infrared signal is transmitted for detection purposes), “the infrared receiving tube” is initially “powered on in advance of a third preset time.” *Id.*, [0065]. This “third preset time” can be “2T” or “1.502 milliseconds[.]” *Id.*, [0066].

163. Thus, before emitting a signal in step S101, Zheng performs a 1.502 millisecond power-up step.

164. After the 1.5 millisecond power up step, the receiving tube is “maintain[ed] ... powered on for” “2.104 milliseconds” for purposes of transmitting an infrared signal in step S101 and detecting a reflected version of the infrared signal during step S102. *Id.*, [0065]-[0066].

165. Only a single “first pulse waveform” is transmitted by the infrared transmitting tube during the initial “first preset time” of step S101 after the infrared receiving tube is powered on. *Id.*, [0051]-[0052].

166. Zheng then goes on to teach two alternate paths its system can follow.

167. In the first path, if a reflected infrared signal is detected at step S102, Zheng proceeds to step S103 where it “control[s], every second preset time, the infrared transmitting tube to transmit an infrared signal of a second pulse waveform once” and then “continuously transmit” this signal once every 25 milliseconds 20 times. *Id.*, [0058]-[0059].

168. Zheng only discusses performance of its power on procedure in advance of step S101. *See id.*, [0064]-[0066]. No separate power on procedure occurs before any other step.

169. Because of this, in my opinion a POSITA would have understood (or at least considered it obvious) that Zheng’s infrared sensor would remain powered as Zheng proceeds through steps S101, S102, S103, and S104.

170. Indeed, this makes practical sense. In steps S103 and S104 Zheng repeatedly emits (and then attempts to detect) infrared signals at regular, short intervals for purposes of determining if a person maintains his or her hand in front of the trash bin. Because signals must be repeatedly emitted and detected at relatively short intervals, the infrared transmitting and receiving tube would remain on to facilitate this process.

171. In the second path, if no reflected infrared signal is detected at step S102, Zheng’s system will not proceed to step S103. Another “first pulse

waveform” will be transmitted after the expiration of the “first preset time” (or 200 milliseconds). Zheng, [0051]-[0052].

172. In such circumstances, the receiving tube will not stay powered on (as Zheng does not proceed to step S103). Instead, per Zheng, the receiving tube will be “turned off” allowing “energy consumption” to “be reduced.” *Id.*, [0066]; *see also id.*, [0101]-[0102].

173. The tube will be turned back on again before step S101 is repeated in 200 milliseconds. *See, e.g., id.*, [0064] (explaining that the receiving tube is “powered on” “each time” “before step S101” is performed).

174. This also makes sense: as there is no need to continue emitting or detecting signals until the end of the 200 millisecond period, it is not necessary to keep the infrared sensor powered on.

175. This, in my opinion, teaches what this limitation requires.

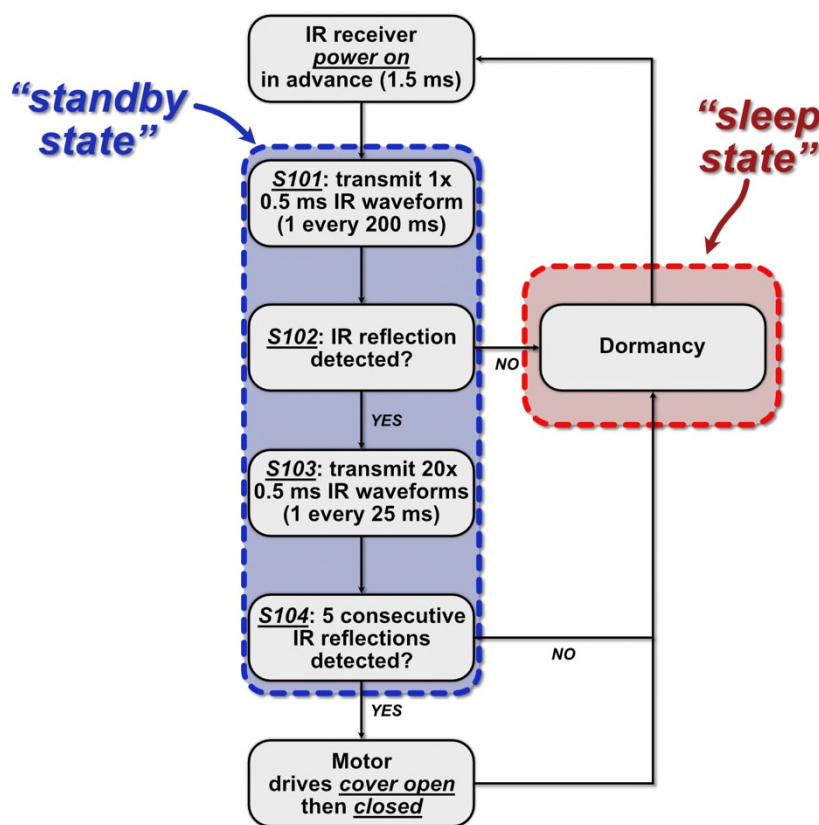
176. To begin, Zheng’s “**microcontroller**” is set “**into a sleep state if no reflection output signal is received from the active infrared sensor**” (Zheng’s microcontroller unit enters a dormancy/sensor power-off mode if no infrared reflection is detected by the receiving tube in step S102).

177. Next, “**in the standby state, the microcontroller controls the active infrared sensor to emit the infrared pulse signal**” (Zheng’s microcontroller unit

causes the infrared transmitting tube to transmit infrared signals during steps S101 and S103).

178. And ***“in the sleep state, the microcontroller cuts off a power of the active infrared sensor”*** (if no reflected signal is detected at step S102, Zheng powers off the infrared receiving tube until it is necessary to repeat step S101—and the 1.5 millisecond power on step that precedes it—200 milliseconds later).

179. This ***“sleep state”*** is shown below demonstrative:



[1-3] ***“remaining the microcontroller in a working state if a reflection output signal is received from the active infrared sensor and controlling a driving circuit to drive a motor to rotate forward to open a lid of the induction trash can, delaying for a few seconds after the motor has driven the lid to open, controlling***

the driving circuit to drive the motor to rotate backward to close the lid, and setting the microcontroller into the sleep state after the lid is closed; and”

180. In my opinion, this is all taught by Zheng.

181. Zheng’s bin will maintain power to its infrared sensor—and not put the microcontroller into dormancy mode—if a reflected infrared signal is detected at step S102.

182. If a user maintains their hand in front of the trash bin such that further reflected infrared signals are detected, the bin will then be opened after step S104.

183. More particularly, according to Zheng, its microcontroller “periodically” supplies power to its “infrared receiving tube” during operation. Zheng, [0064]-[0066].

184. The receiving tube is powered on in advance of step S101. *See id.* The infrared transmitting tube transmits one “infrared signal of a first pulse waveform” during step S101. *Id.*, [0051]-[0052].

185. If a “reflected infrared signal” is detected during step S102, Zheng proceeds to step S103. *Id.*, [0053]-[0057].

186. During step S103, the infrared transmitting tube “continuously transmits” an “infrared signal of the second pulse waveform” every 25 milliseconds 20 times. *Id.*, [0058]-[0059].

187. Then, in the following step S104, if reflected infrared signals are “continuously detected” 5 times, the bin cover is “control[led] to start to act” for

purposes of “open[ing] an upper cover of” the “environmentally-friendly trash bin.” *Id.*, [0061]-[0062].

188. If no (or fewer than 5 sequential) reflected signals are detected at step S104, Zheng will return back to the beginning of its process and “continu[e] to control, every ... first preset time, the infrared transmitting tube to transmit the first pulse waveform once” in step S101. *Id.*, [0073]-[0075].

189. As I have noted above, Zheng states that it performs a “power[] on” procedure in advance of step S101. *Id.*, [0064]-[0066]. No similar procedure occurs in advance of any other step. Because Zheng only performs the power-on procedure before step S101, a POSITA would have understood that Zheng’s infrared sensor remains powered as it proceeds through steps S101 through S104.

190. This renders this claim limitation obvious.

191. As explained above, the claimed “**working state**” is the state in which the microcontroller is not sleeping and supplies power to the active infrared sensor. *See supra* Section VII.

192. Zheng’s microcontroller operates to “**remain[] the microcontroller in a working state if a reflection output signal is received from the active infrared sensor**” (the microcontroller only performs a power off / power on procedure in advance of step S101, but will remain awake with power supplied to the sensor if a

reflected infrared signal is detected at step S102 to allow for further detection of a person's hand in subsequent steps, or step S104 to allow the bin cover to open).

193. Next, in this **“working state,”** the **“microcontroller” “control[s] a driving circuit to drive a motor to rotate forward to open a lid of the induction trash can.”** In Zheng, if reflected infrared signals are detected at step S104, the bin cover is driven open by a motor.

194. Zheng's control method also includes the required three separate states: a **“working state,” “standby state,”** and **“sleep state.”**

195. Per Zheng, its microcontroller controls the “infrared receiving tube to be powered on in advance” of a “third preset time” of “1.502 milliseconds.” Zheng, [0064]-[0066]. This “power[] on” step occurs “before step S101” where an infrared signal of a “first pulse waveform” is transmitted. *Id.* It follows that in Zheng, there is a time period (Zheng's “third preset time” of “1.502 milliseconds”) where Zheng's infrared sensor is powered on but not yet transmitting infrared signals. This power-on step is Zheng's **“working state.”**

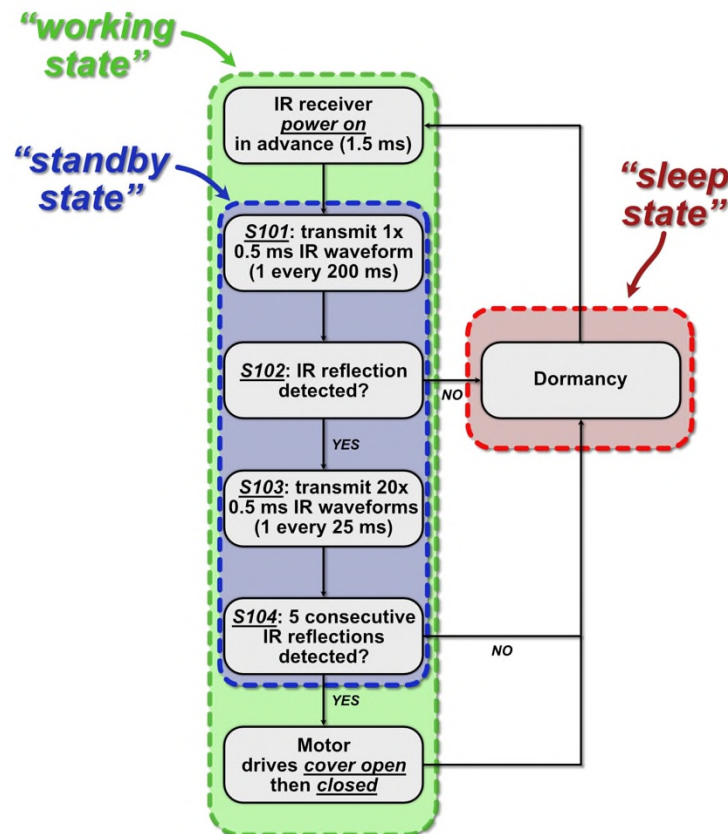
196. Next, as explained, Zheng's **“standby state”** includes the periods of time—steps S101-S104—where infrared signals are transmitted for detection.

197. According to Zheng, it maintains power to its infrared sensor for at least 2.104 milliseconds seconds. *See id.* Zheng also provides that it takes 0.526 milliseconds to transmit the “first pulse waveform.” *Id.*, [0052].

198. Thus, Zheng's microcontroller is awake with the infrared sensor powered for a longer time period (the **"working state"**) than the period in which microcontroller actually causes the sensor to transmit/detect a signal (the **"standby state"**).

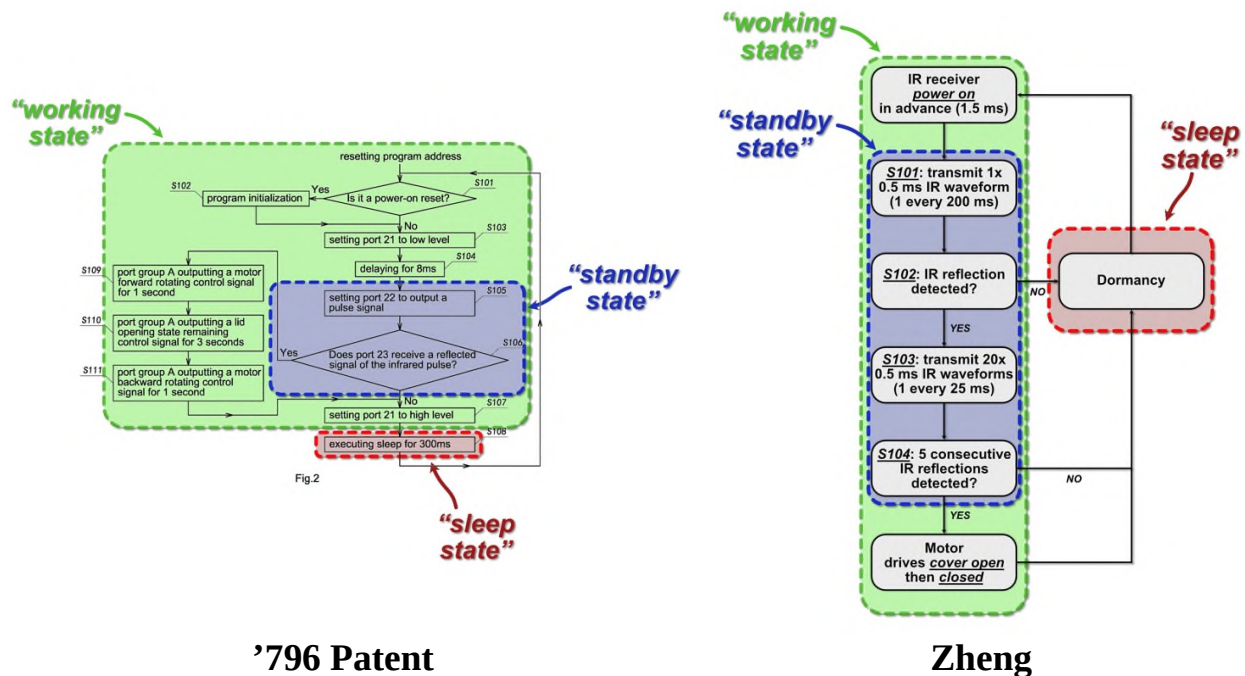
199. Finally, Zheng's **"sleep state"** includes the dormancy period when the infrared sensor is not powered discussed in connection with limitation [1-2].

200. The three states are annotated in the demonstrative figure below:



201. Zheng's operation is compared with that of the '796 patent below. As shown, both include a **"sleep"** state where the microcontroller cuts off power to the infrared sensor. Both also include a **"working"** state where the microcontroller is

not sleeping, but is instead operating (by supplying power to the sensor or causing the trash can cover to open/close). And both include a “**standby**” state that is a sub-set of the “**working**” period where the microcontroller causes the sensor to emit / detect an infrared signal:



202. In operation, a POSITA would have understood that these states would be implemented by Zheng’s microcontroller as follows: the “sleep” and “working” states would be the two top level states through which the microcontroller transitions: it is either dormant/asleep (with no power applied to the infrared sensor) or awake (with power applied to the infrared sensor). The “standby” state would be a sub-state invoked while the “working” state is active. In this “standby” state, the microcontroller would cause the infrared sensor to emit

and detect signals. When this sub-state operation is complete, the microcontroller would return to the top level “working” state that originally initiated the “standby” state before later transitioning to the “sleep” state. Put another way, the “working” state would effectively have two sub-states: “standby” and “not standby.” The “standby” sub-state is active when infrared signals are emitted / detected. The “not standby” sub-state is active at other times, including during the 1.5 ms of time immediately after waking before an infrared signal is emitted and when the bin cover is opening/closing. Again, a POSITA would have understood the ’796 patent to be implemented in a similar manner.

203. Next, in my opinion a POSITA would have understood that Zheng’s method also ***“delay[s] for a few seconds after the motor has driven the lid to open.”***

204. Zheng explains that its trash bin is opened in a way that “facilitates people to directly throw garbage into the trash bin.” Zheng, [0004]; *see also id.*, [0043], [0063] (similarly noting that opening of the bin’s cover allows one to “throw garbage into the trash bin”), [0063].

205. According to Zheng, this makes use of the trash bin “convenient” and “ensure[s] cleanness and tidiness of an environment around the trash bin.” *Id.*

206. Given that Zheng’s trash bin is intended to allow people to throw trash into the bin when open, a POSITA would have considered it obvious that Zheng

would keep its trash bin cover open and delay closing for a few seconds to allow a person to successfully deposit garbage.

207. If Zheng's bin cover were instead snapped closed immediately after opening without a period of delay, it would be unnecessarily difficult to deposit trash.

208. Further, a quickly closing bin cover would interfere with the throwing out process by either deflecting trash or impacting the user's hand while it is still in proximity of the bin.

209. In contrast, keeping the cover open for a few seconds would ensure that users would be able to successfully deposit trash into the bin before the cover is closed. This would in turn make the bin more convenient to use and reduce mess around the bin. Moreover, as bin opening and closing is controlled by Zheng's microcontroller, a POSITA would have understood that the bin would be held open for a fixed, consistent period of time dictated by a stored setting or variable in the microcontroller (or its associated memory).

210. Likewise, a POSITA would have recognized that it is highly obvious to open the bin for a fixed, controlled period of time. This would make the bin's operation more predictable. In contrast, opening the trash bin for a variable period of time (as opposed to the same fixed period of time every time) would render the bin's operation unpredictable making it more difficult to use. For instance, a user

would be confused—and may improperly consider the bin to be broken or malfunctioning—if it stays open for a long time in some instances but a short time in other instances. Again, the fixed period of opening would be set by a variable in the microcontroller (i.e., the microcontroller would set another short timer upon bin opening. The bin closing procedure would not be initiated until the timer expires resulting in the bin cover being held open for a fixed, predictable period of time)

211. As this limitation next requires, Zheng ***“control[s] the driving circuit to drive the motor to rotate backward to close the lid.”*** Per Zheng, “[t]he motor rotates clockwise to open the upper cover, and rotates counterclockwise to close the upper cover.” *Id.*, [0104].

212. Finally, a POSITA would have understood that Zheng ***“set[s] the microcontroller into the sleep state after the lid is closed.”*** Zheng’s system is intended to allow a trash bin cover to be repeatedly opened and closed. *See, e.g., id.*, [0043] (“[t]he smart environmentally-friendly trash bin can automatically open the upper cover when a person carrying garbage walks up to the smart environmentally-friendly trash bin”), [0063] (“when a person carrying garbage walks up” to the bin, the bin is opened), [0114] (“it can be determined that a person walks up to the ... trash bin. In this case, the motor is automatically controlled to start to act, to open the upper cover of the environmentally-friendly trash bin, so

that it is convenient for people to directly throw garbage into the smart environmentally-friendly trash bin.”).

213. To allow for this repeated opening and closing, after bin closing, Zheng restarts its control procedure from the beginning for purposes of detecting the next bin opening event: “after step S104,” Zheng “continu[es] to control, every ... first preset time, the infrared transmitting tube to transmit the first pulse waveform once.” *Id.*, [0073]-[0074].

214. Further, Zheng explains that “each time” “before” it performs “step S101,” its microcontroller “control[s] the infrared receiving tube to be powered on.” Zheng, [0064]-[0066]; *see also* [0011] (“each time before” Zheng “control[s] an infrared transmitting tube to transmit an infrared signal of a first waveform once” it “control[s] the infrared receiving tube to be powered on in advance of a third preset time”), [0102] (similar).

215. In other words, in one embodiment Zheng always starts its control procedure by powering on its infrared receiving tube.

216. It follows that Zheng’s infrared sensor must be powered off—with the microcontroller in its dormancy mode (*see id.*, [0113] (explaining that the microcontroller enters the “dormancy mode” when the infrared sensor is powered off))—after the bin is closed.

217. If this power off did not occur (with the microcontroller in dormancy), it would not be necessary to wake the microcontroller and power on the infrared sensor in advance of step S101 as Zheng teaches.

[1-4] “after a preset time, via a watchdog timer, waking up the microcontroller from the sleep state to the working state, so as to have the microcontroller reenter the working state and repeat the above steps under the standby state”

218. This, in my opinion, is rendered obvious by Zheng.

219. Zheng employs a 200 millisecond long timer to ensure that its “first pulse waveform” is transmitted at the appropriate interval. The microcontroller automatically enters (and wakes from) the dormancy mode between transmissions.

220. More particularly, Zheng explains that its microcontroller causes its “infrared transmitting tube to transmit” an “infrared signal of a first pulse waveform” “once” “every first preset time” during step S101. Zheng, [0051]. This “first preset time” can be “200 milliseconds.” *Id.*, [0052].

221. If no “reflected infrared signal” is detected by the “infrared receiving tube” during step S102, the process will not proceed to step S103 and will instead repeat step S101 in 200 milliseconds. *Id.*, [0053]-[0054].

222. Further, according to Zheng, its infrared sensor is not “turned on all the time” and will instead be “turned off after being turned on for a period of time.” *Id.*, [0066].

223. In one example, “before step S101” is performed, the “infrared receiving tube” is “powered on in advance of a third preset time” of “1.502 milliseconds.” *Id.*

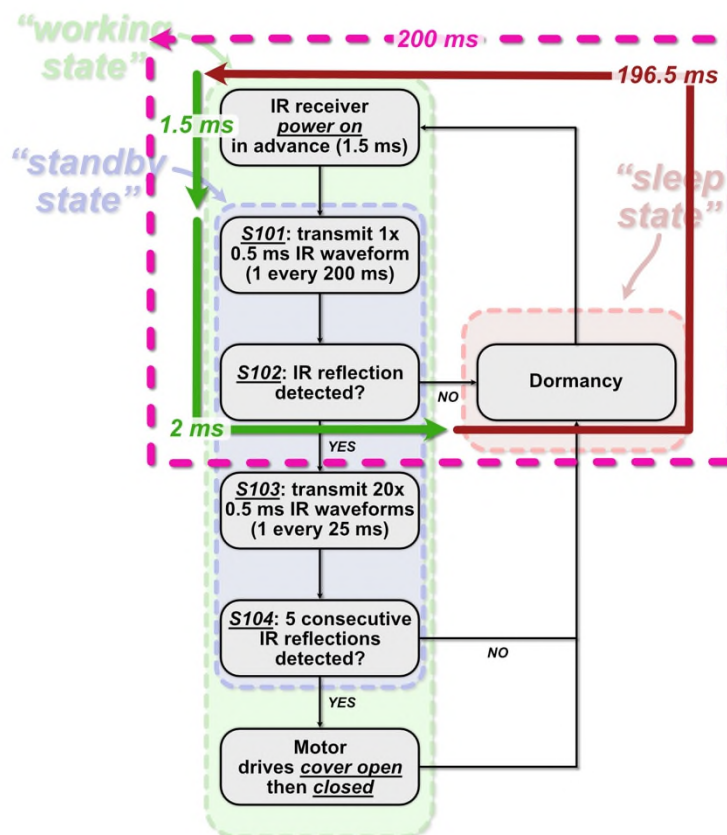
224. Zheng then keeps the sensor “powered on for a fourth preset time” of “2.104 milliseconds.” *Id.*, [0064]-[0066]. Of this time, it takes “0.526 milliseconds” to transmit the “first pulse waveform.” *Id.*, [0051].

225. Assuming Zheng’s system does not proceed to step S103, the sensor will then be “turned off” at the end of the 2.104 millisecond period to “reduce[]” “energy consumption.” *Id.*

226. The microcontroller also “automatically enters” a “dormancy mode” to further save power when the sensor is not powered. *Id.*, [0113]. The microcontroller will then exit dormancy and power on the sensor to transmit another “first pulse waveform” at the 200 millisecond mark. *See id.*, [0053]-[0054].

227. This results in the operation shown in the demonstrative figure below. The sensor powers up for 1.5 milliseconds (first **green** arrow). After power-up, the sensor then maintains power for 2.0 milliseconds to transmit and then detect an infrared pulse (second **green** arrow). If no signal is detected, the sensor will power off and the microcontroller will enter dormancy after this 2.0 millisecond period. The microcontroller will remain in dormancy with the sensor powered off for

196.5 milliseconds (**red** arrow) before powering back on and repeating the process. This on / off process results in a complete cycle that ensures that one first pulse waveform is transmitted every 200 milliseconds (**pink** arrow) as required:



228. Three pre-specified times are used during this on / off process: (1) a “third preset time” of 1.5 milliseconds dictates how long sensor power up takes, (2) a “fourth preset time” of 2.0 milliseconds dictates how long the sensor remains powered for purposes of transmission / detection, and (3) a “first preset time” of 200 milliseconds controls the overall process timing by determining how often a “first pulse waveform” is transmitted. See Zheng, [0051]-[0052] (discussing “first preset time”), [0064]-[0066] (discussing “third” and “fourth preset time[s]”).

229. In my opinion, the “first preset time” of 200 milliseconds is the claimed “*preset time*” for “*waking up the microcontroller.*” This time determines when Zheng’s system will transmit a subsequent first pulse waveform, and also when Zheng’s microcontroller must emerge from dormancy and power up the sensor in preparation for this transmission.

230. While Zheng does not specifically state that it employs a “*timer*” for purposes of waking its microcontroller from dormancy, a POSITA would have considered this obvious.

231. Again, Zheng employs a “first preset time” of 200 milliseconds for purposes of controlling how often a “first pulse waveform” is transmitted.

232. And as I have explained, this “first preset time”—along with the “third preset time” and “fourth preset time”—will dictate how long the microcontroller keeps the sensor powered on, and how long it remains in the dormancy mode after powering off. *See id.*, [0050]-[0052]; *see also id.*, [0064]-[0066].

233. In my opinion, a POSITA would have recognized that one straightforward and highly obvious way to ensure proper signal timing would be to simply start a 200 millisecond timer when powering on the infrared sensor at the start of the “third preset time.” The sensor would then remain powered on for 3.5 milliseconds (1.5 seconds as specified by the “third preset time,” followed by 2.0

seconds as specified by the “fourth preset time”). 196.5 milliseconds would remain on this timer when the sensor is powered down and the microcontroller enters the dormancy mode. When the timer reaches zero, the microcontroller would exit dormancy mode, the infrared sensor would be powered on, the timer would be reset and the process would repeat.

234. Next, in Zheng, upon **“waking up[,]” “the microcontroller”** transitions **“from the sleep state to the working state.”**

235. Zheng’s microcontroller is in a “dormancy mode” whenever its infrared sensor is not powered. Zheng, [0113].

236. Further, Zheng explains that it performs its “power[] on” procedure “in advance [of the] third preset time” whenever it exits dormancy and “before step S101.” *Id.*, [0064]-[0066].

237. Thus, whenever Zheng wakes the microcontroller, it will perform the sensor power up (*i.e.*, enter the **“working state”**) before transmitting infrared signals.

238. Zheng then proceeds to perform steps S101 through S104 (the **“standby state”**) as appropriate. *See id.*, [0050]-[0063]; Fig. 1.

239. It follows that after exiting dormancy, **“the microcontroller reenter[s] the working state and repeat[s] the above steps under the standby state.”**

240. A POSITA would also have considered it obvious to implement Zheng's 200 millisecond timer (which again controls when the microcontroller powers on the infrared sensor and how often the first pulse waveform is transmitted) as a ***"watchdog timer."***

241. At the time the '796 patent was filed, watchdog timers were known, were in routine use, and were commonly employed in the monitoring of microcontroller operation.

242. Zheng's system employs a "microcontroller unit" to control operation of its trash bin. Zheng, [0037]-[0043].

243. Further, watchdog timers typically operated by issuing a reset command to restart normal microcontroller operation if the timer expires.

244. This is the very functionality that Zheng's system requires. If its infrared sensor (and the associated microcontroller unit) does not detect a reflected infrared signal at step S102, the microcontroller will enter a dormancy state and power off the infrared sensor. Then, Zheng resets the microcontroller at the appropriate time allowing it to re-perform the entire process, including power up, transmission of a signal at step S101, and signal detection at step S102.

245. Because watchdog timers are both (1) typically used to control microcontroller operation, and (2) provide the timing functionality Zheng's system

requires, a POSITA would have been motivated to employ such a timer with Zheng.

246. Watchdog timers were also routinely used to control the on/off timing of infrared sensors like that used by Zheng.

247. A reference to Gropper (Ex. 1006) teaches a system for remotely monitoring the fill level of a waste receptacle. *Id.*, 1:15-37, 2:26-34. The system—like Zheng—uses a “sensor 4” with an “infra red transmitter 97 and infra red receiver 98.” *Id.*, 7:53-55. The sensor is “aimed at a central position of the material stored in a” waste “receptable 22.” *Id.*, 7:55-60.

248. Gropper explains that its infrared monitoring system improves “efficiency” via “power saving modes during the vast majority of time that sensor 4 is not sensing....” *Id.*, 12:19-21. Per Gropper, “[o]ften the best power saving mode is to have” a “microcontroller ... turn off power to all peripheral units” and then “place [the] microcontroller ... in a sleep mode.” *Id.*, 12:22-26.

249. A “watch dog timer within [the] microcontroller ... is used to wake up” the “microcontroller ... from the sleep mode” when, for instance, “a preset time has passed.” *Id.*, 12:26-31.

250. Another reference to Wegelin (Ex. 1007) teaches “‘hands-free’ fluid dispensers and methods for dispensing liquid fluid when an object enters a target field.” *Id.*, 1:6-10. A “photodetector 22” that “detects ... light of [an] infrared

light emitting diode” detects close objects for purposes of controlling the dispenser. *Id.*, 4:4-26.

251. The dispenser employs a “controller” with a “watchdog timer ... so that the controller may be stopped or halted for a predetermined period of time.” *Id.*, 4:65-5:1. This allows “full operation of the controller” to “only occur[] at predetermined increments so as to reduce current draw from a power supply.” *Id.*, 5:1-3. “This conserves power and helps increase the life of the power supply which may be in the form of a battery.” *Id.*, 5:3-5.

252. A third reference to Parsons (Ex. 1008) provides another example of use of a watchdog timer.

253. Parsons teaches “automatic sensor based faucets and methods of operating such faucets.” *Id.*, 1:63-64. To control faucet operation, the faucet employs “a known infrared type” “[t]ransceiver” with a “light emitting diode” and an “infrared sensor which detects light reflected from a hand or other object positioned under the faucet spout.” *Id.*, 18:60-19:4. A “microcontroller ... communicates” with this infrared sensor. *Id.*, 21:64-22:2.

254. Parson’s “microcontroller” “goes to a ‘sleep’ mode” at the end of its control procedure to “conserv[e] battery power.” *Id.*, 22:5-10. Then, the “microcontroller ... receives ‘wake-up’ signals from a timer (i.e., watchdog) ... every 250 msec.” *Id.*

255. In sum, as shown by the examples above, watchdog timers were routinely used in the prior art to wake up infrared sensor controlling microcontrollers from sleep states.

256. Such timers were also used in systems analogous to Zheng, including those employing infrared sensors for monitoring waste containers (Ex. 1006), activating hands-free fluid dispensers (Ex. 1007), and controlling automatic faucets (Ex. 1008).

257. Further, watchdog timers were known to improve the efficiency of systems employing infrared sensors for object detection. *See, e.g.*, Ex. 1006, 12:19-31; Ex. 1007, 5:1-5; Ex. 1008, 22:5-10.

258. In my opinion, the routine use of watchdog timers—along with the fact that this type of timer provides the very type of microcontroller / infrared sensor wakeup and power saving functionality Zheng requires—would have provided a strong motivation to use such a timer with Zheng.

259. It also would have provided a POSITA with a more than reasonable expectation of success. Watchdog timers had already been successfully employed multiple times in the art to wake up infrared sensor controlling microcontrollers. A POSITA would have every reason to believe that Zheng would be able to successfully employ such a timer for a similar purpose.

2. Claim 2

260. Claim 2 depends on claim 1 and first requires:

[2-1] “cutting off the power supply of the active infrared sensor when the microcontroller enters the sleep state; and”

261. In my opinion, this is disclosed by Zheng.

262. In particular, as explained, Zheng’s “infrared receiving tube” is not “turned on all the time.” Zheng, [0066]. Thus, when not in use it is “turned off” for purposes of saving power. *Id.*

263. Moreover, Zheng’s “microcontroller unit” “automatically enters a dormancy mode when the infrared transmitting tube and the infrared receiving tube do not work” (*i.e.*, when not powered) for purposes of “saving more power.” *Id.*, [0113].

264. Because of this, Zheng “***cut[s] off the power supply***” to its “***active infrared sensor***” (the infrared receiving tube—part of its sensor—is not powered) “***when the microcontroller enters the sleep state***” (the microcontroller is in dormancy when the infrared sensor is not powered).

265. Claim 2 next requires:

[2-2] “restoring the power supply of the active infrared sensor, delaying for a preset threshold time for the active infrared sensor to enter a stable working state, and controlling the active infrared sensor to emit the infrared pulse signal to the induction area when the microcontroller is in the standby state.”

266. This is also disclosed by Zheng.

267. Again, as I have noted above, in Zheng “before step S101” is performed (the step where an infrared signal is transmitted), the “infrared receiving tube” is “powered on in advance of a third preset time” of “1.502 milliseconds.” Zheng, [0064]-[0066]. At the end of this 1.502 millisecond period, Zheng then performs step S101 and causes its “infrared transmitting tube” to transmit “an infrared signal of a first pulse waveform once.” *Id.*, [0051]. This transmitted signal can then be “detect[ed]” by the “infrared receiving tube” during step S102. *Id.*, [0053]-[0054].

268. The infrared receiving tube operates by detecting “reflected infrared signals.” *Id.*, [0054], [0063], [0103], [0114]. It is also “located close” to the “infrared transmitting tube” “fac[ing] in the same direction.” *Id.*, [0054].

269. Thus, Zheng “**restor[es] the power supply of the active infrared sensor**” (it turns on its infrared receiving tube prior to performing transmitting step S101), “**delay[s] for a preset threshold time**” (it waits a third preset time of 1.502 milliseconds before performing step S101).

270. Because this period of delay occurs prior to the transmission or detection of any signals, a POSITA would have understood that it is intended to allow the Zheng’s sensor to “**enter a stable working state.**” Zheng employs both a “microcontroller unit” and connected “infrared transmitting” and “infrared receiving” tubes. Zheng, [0037], [0097]. These components have different power

needs. And the transmitting and receiving tubes—which are powered off when the microcontroller is in dormancy—will require some time to enter a stable powered on state that allows them to emit (and detect) the type of infrared signals discussed in Zheng. Attempting to emit signals immediately after power on would have the potential to alter the emitted signal waveform. As Zheng’s system is designed to detect reflected emitted infrared signals with a specific waveform (i.e., “the infrared receiving tube receives reflected infrared light of a quantity of 38 KHZ waveforms” (*id.*, [0054])), emitting altered waveforms creates the possibility of missed or erroneous signal detection. In contrast, allowing the infrared sensor to properly prepare for signal emission—by waiting for Zheng’s “third present time” before emitting a signal—ensures that this does not occur.

271. Zheng then ***“control[s] the active infrared sensor to emit the infrared pulse signal to the induction area when the microcontroller is in the standby state”*** (its infrared transmitting tube transmits a signal in step S101 which can be detected by the infrared receiving tube in step S102).

272. Zheng’s infrared receiving tube includes an ***“induction area”*** (it is designed to receive—and detect—reflected infrared signals reflected from objects in the area above the receiving tube).

3. Claims 3 and 4

273. Claims 3 and 4 respectively depend on claims 1 and 2. Both further require:

“wherein the preset time is between 100 ms and 500 ms.”

274. This is disclosed by Zheng.

275. As I explained when discussing claim 1, Zheng employs a “first preset time” of 200 milliseconds to control how often a “first pulse waveform” is transmitted. *See* Zheng, [0051]-[0052] (discussing “first preset time”).

276. As I discuss above in connection with limitation [1-4], this also dictates how long Zheng’s microcontroller will remain in dormancy before waking up to transmit another first pulse waveform.

277. 200 milliseconds is within the claimed range of ***“100 ms and 500 ms.”***

4. Claims 5 and 6

278. Claims 5 and 6 respectively depend on claims 2 and 4. Both further require:

“wherein the preset threshold time is between 2 ms and 50 ms.”

279. As explained when discussing claim 2, Zheng’s system delays for a preset time of 1.502 milliseconds before performing infrared signal transmitting step S101 and signal detection step S102.

280. In my opinion, there is no meaningful difference between the delay employed by Zheng and the '796 patent.

281. Both delay upon power on for a preset time before transmitting and detecting infrared signals (Zheng delays for 1.502 milliseconds; the '796 patent delays for 2-50 milliseconds).

282. A POSITA would also have understood that both Zheng and the '796 patent employ this period of delay for similar purposes.

283. Because Zheng's delay occurs immediately upon powering on its sensor and before step S101 is performed (*see* Zheng, [0064]-[0065]), a POSITA would have understood that it is intended to prepare the now powered infrared sensor for the later transmitting and detecting steps.

284. The '796 patent's period of delay is likewise intended to allow its sensor to "enter a stable working state" before transmitting and detecting infrared signals. Ex. 1001, 2:36-42.

285. Zheng also explains that while the applied delay after power on can be 1.502 milliseconds, it is just an "optional[]" value. Zheng, [0066].

286. Thus, when implementing Zheng, a POSITA would also have considered it obvious to use other values.

287. Zheng controls its infrared sensors in increments of "T" or "0.526 milliseconds." *Id.*, [0052] (discussing transmission for "T"); [0066] (referencing

control for “2T” and “4T”). This would have led a POSITA to also consider—among other things—using delay times that are either 1T above or 1T below 1.5 milliseconds (*i.e.*, delays of about 1.0 or 2.0 milliseconds).

288. A POSITA would have considered use of these alternate delay times to amount to nothing more than a routine, obvious design choice and optimization exercise. A slightly longer 2.0 millisecond delay (falling within the claimed range) would have been particularly obvious as it is only 1T above the example delay Zheng employs.

289. A POSITA would have recognized that use of a slightly longer delay would better ensure that the infrared sensor is prepared to transmit and detect signals.

290. While an excessively long delay could introduce latency causing the trashcan to fail to detect a hand, a POSITA would have recognized that small changes in the power on delay time (*e.g.*, using 2 milliseconds rather than 1.5 milliseconds) would not have such an effect. An additional 0.5 milliseconds of delay would be imperceptible.

291. Thus, a POSITA would have recognized that using a slightly longer delay would have improved operation of Zheng’s trashcan (by better ensuring that the infrared sensor is prepared to transmit/detect) while not otherwise adversely

impacting operation (an additional 0.5 milliseconds of power on delay would not present a substantial risk of a missed detection).

5. Claims 7, 8, 9, 10, 11, and 12

292. Claims 7, 8, 9, 10, 11, and 12 respectively depend on claims 1, 2, 3, 4, 5, and 6. They all further require:

“wherein the induction area is arranged above the induction window that is located on the front can edge of the trash can.”

293. Again, Zheng explains that its trash bin includes an “infrared transmitting tube and ... infrared receiving tube” that are both “arranged” on the “trash bin” to “face the same direction ... and are located close to each other.” Zheng, [0103].

294. The “infrared receiving tube” operates to detect “reflected” infrared signal that was “blocked by a person or an object.” *Id.*

295. Further, Zheng explains that its trash bin is designed to detect a person—and open—“when a person carrying garbage walks up to the smart environmentally-friendly trash bin.” *Id.*, Abstract; *id.*, [0004] (same); *see also id.*, [0043] (noting that “a person or object walks up to the smart environmentally-friendly trash bin” and “blocks the infrared signal” causing the bin to automatically open); [0054], [0063], [0114] (similar).

296. The bin includes an “upper cover” that allows this approaching “user” to “throw garbage into the trash bin.” *Id.*, [0092].

297. In my opinion, this renders everything this limitation requires obvious. In particular, Zheng’s infrared sensor includes an **“induction window”**: it includes an infrared receiving tube that is situated adjacent to its infrared transmitter and operates to detect reflected infrared signals. *Id.*, [0103].

298. This receiving tube also includes an **“induction area”**: the infrared receiving tube will only detect a user when the user passes close enough to the tube such that the user “block[s]” and “reflect[s]” the transmitted infrared signal. *Id.*, [0054], [0063], [0103], [0114].

299. Further, a POSITA would have understood that Zheng’s **“induction area”** is **“above”** its **“induction window,”** and that the area and window are—or at the very least obviously would be—located **“on the front can edge of the trash can.”**

300. Again, Zheng’s bin includes an “upper cover.” *Id.*, Abstract, [0002], [0004], [0010], [0043], [0095]. And the bin is designed to open when a user “walks up” to the bin. *Id.*, [0004], [0043], [0054], [0063], [0114].

301. A POSITA would have understood that the most obvious location to situate Zheng’s infrared transmitting and receiving tubes would be at the top, front-facing edge of the bin.

302. Trash bins are often situated with their backs against a wall. Bins are also frequently shorter in height than users.

303. Thus, users seeking to dispose of garbage in the bin will typically approach the bin from the front and above.

304. A POSITA would have understood that Zheng's infrared sensor (and the receiving tube it contains) must be situated such that it is able to detect users approaching from this direction.

305. Locating the infrared transmitting tube and the infrared receiving tube on the front, top edge of Zheng's trash bin would have best facilitated detection of users approaching from this direction.

306. It would make little sense to locate the tubes elsewhere. For instance, locating the infrared sensor at the rear of the bin would not facilitate proper detection (as the user cannot approach from the direction of the wall, and the wall itself would interfere with proper infrared signal detection).

C. Ground 2: Obviousness over Zheng and Wang

307. In my opinion, a POSITA would have considered both Zheng and Wang to be in the same field of endeavor as the '796 patent (they all relate to automatically opening trash bins).

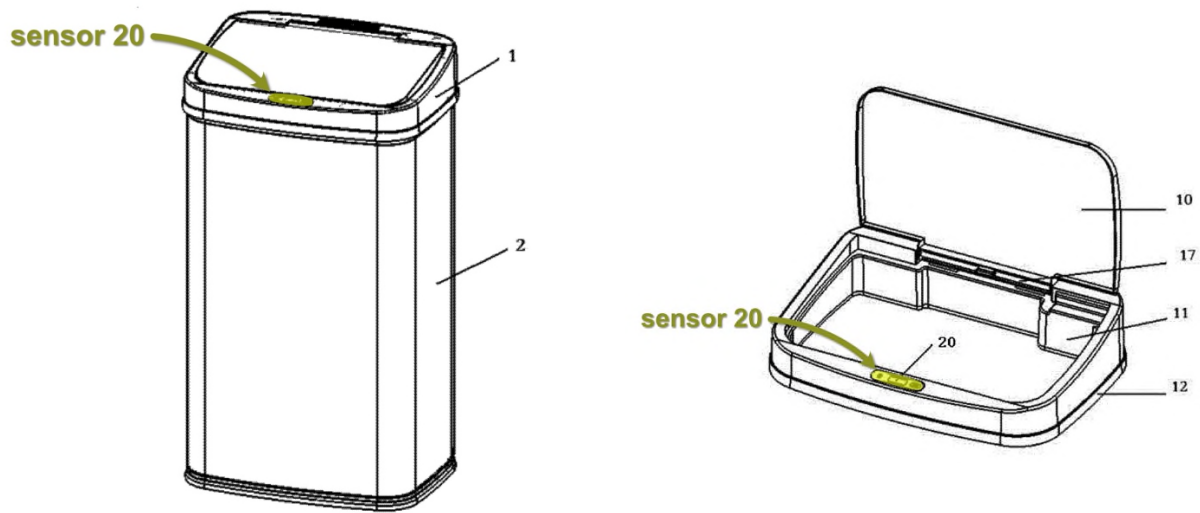
308. A POSITA would also have considered Zheng and Wang to be highly pertinent to the patentability of the '796 patent's claims.

309. As explained below, in my opinion when considered in its totality and in view of the background knowledge possessed by a POSITA, Zheng and Wang disclose and renders obvious claims 7, 8, 9, 10, 11, and 12 of the '796 patent.

310. Again, claims 7, 8, 9, 10, 11, and 12 all require a trash bin with an infrared sensor including an ***“induction area ... arranged above the induction window that is located on the front can edge of the trash can.”***

311. As I have noted, Zheng renders what this limitation requires obvious. To the extent it is determined, however, that something is missing from Zheng, Wang teaches a trash bin with this very type of sensor.

312. Wang's bin includes an “upper can body 1” and a “lower can body 2.” Wang, [0018]. The “lower can body” serves as a “garbage storage space.” *Id.* The “upper can body” includes an automatically opening “can cover 10” and houses the trash bin's “opening-closing apparatus.” *Id.* The “opening-closing apparatus” includes “a sensor 20.” *Id.* “The sensor 20 is disposed on the front side” of the upper can body, and “extend[s] out” of a “mounting hole” in the top of can body's “covering housing.” *Id.*, [0019]. This is shown in Figures 1 and 3 below:



Id., Figs. 1, 3 (annotated). According to Wang, the sensor is intended to detect “[w]hen a hand approaches the sensing trash can.” *Id.*, [0023].

313. A POSITA would have considered it highly obvious that Zheng’s trash bin would be structured in the same way.

314. Zheng’s bin (like a typical trash bin) would include an automatically opening cover at its top.

315. An infrared sensor would be located at the top front of the trash bin for purposes of detecting a user approaching the front of the bin to throw away trash.

316. Locating the sensor in the same place depicted in Wang would have ensured that Zheng’s trash bin operates as intended: users approaching the bin

from the front would be detected allowing the bin to automatically open for purposes of disposing trash.

317. A POSITA would also have considered the location of Zheng's infrared transmitting and receiving tubes to amount to nothing more than a routine, obvious design choice.

318. As Patent Owner admitted during prosecution of the '796 patent, "the touchless trash can is well known in the art." Ex. 1002, p. 170.

319. Thus, a POSITA would have been well aware of how to best situate the infrared sensor employed by such a bin.

320. Wang simply provides one example of where an automatically opening trash bin's sensor should be located to properly and consistently detect an approaching user.

321. Zheng and Wang are also directed to similar subject matter: automatically opening trash bins that use a sensor to detect an approaching user. *See, e.g.*, Zheng, [0004]; Wang, [0003].

322. In my opinion, this would have further motivated combination of the references and provided a POSITA with a more than reasonable expectation of success.

323. Wang also explains that its trash bin has a “compact structure, a proper design, a stable and reliable transmission mechanism, and good waterproof, moisture-proof, and corrosion-proof performance.” Wang, [0003].

324. A POSITA would have understood that locating and mounting Zheng’s sensor in the same way exemplified by Wang would have improved Zheng by similarly rendering its trash can’s opening mechanism waterproof, moisture-proof, and corrosion-proof. The sensor (along with Zheng’s other internal components) would be better protected from the contents of the trash bin and other potential contaminants.

325. This would have further motivated use of Wang’s specific trash bin design (including its method of mounting—and protecting—its sensor within its bin housing).

D. Secondary Considerations of Non-Obviousness

326. Based on my review of the ’796 patent’s prosecution history, I note that no secondary considerations of non-obviousness were identified in connection with the patent’s claims.

327. I am not separately aware of any evidence of commercial success, skepticism, failure of others, industry praise, unexpected results, or the like. Instead, as discussed above, it is my opinion that the subject matter embraced by

the '796 patent's claims was known in the art and would have been expected to function as a working automatic trashcan.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willfully false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1101 of Title 18 of the United States Code.

Date: August 5, 2025
Location: Livermore California
Signature: 
Miguel Gomez

ATTACHMENT A

Curriculum Vitae of Miguel Gomez

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Mr. Gomez has thirty five years of experience in the design and development of hardware and software technology used in telecommunications, data communications, networking and storage infrastructure. He also is highly skilled in the use of microelectronics simulation software, ASIC & FPGA coding and Verilog. Mr. Gomez has designed and coded digital switching, optical encoders, and semiconductor memory hardware and software.

Expertise

- ASIC & FPGA Design
- Computer Architecture
- Computer Buses, Cache, and I/O
- Hardware Emulators
- Hardware Programming Languages
- Hardware Verification & Test
- Software Programming Languages
- Network Protocols
- Telecom Protocols
- Storage, Raid Controllers
- Digital Switching Technology
- Modems
- Security in place, security in motion
- Compression Algorithms,
- Optical Encoders
- Video Capture and Display Systems
- Semiconductor Memories
- Power supply design
- Power Inverter design.
- Computer Vision

Consulting Areas

Computer Architectures

- Data General
- IBM PC
- MIP 3000, 4000
- Intel 8051, x86, Pentium II
- Motorola 68000
- TI TMS320Cxx (DSP)
- PowerPC

Computer Buses:

- USB
- I2C
- PCI
- ISA
- EISA
- PCMCIA
- SBUS
- VME
- S100

Hardware Programming Languages:

- PALASM
- ABEL
- AHDL
- VHDL
- Verilog

Hardware Simulation and Compilation

- Synopsys VCD
- Synplicity
- ModelSim
- VerilogNC
- Spice, Hspice

ASIC and FPGA Design:

- Actel
- Altera
- Xilinx

Networking Protocols:

- ATM
- TCP/IP
- Ethernet
- VOIP
- HTTP/HTML
- SIP/SDP

Software Programming Languages:

- C,C++
- BASIC, VISUAL BASIC
- Assembly and Machine Languages
- FORTRAN
- Java
- Pascal
- Python/Django/bootstrap

Operating Systems:

- MSDOS
- Windows 3.1/NT/9x/2000/XP/CE
- UNIX

Communications

- Spread Spectrum (802.11a,b,g,n)
- LTE
- OFDM
- RF Transmission and reception
- CDMA/GSM

Power Electronics

- Solar Inverters
- 3-phase motors

CAD Tools

- Max+Plus II, Quartus (Altera)
- XACT, ISE (Xilinx)
- Mentor
- Orcad
- Allegro
- Viewlogic
- Schema
- P-Cad

Hardware Emulators

- Quickturn
- Ikos
- Zycad

Computer Memories

- SDRAM
- Rambus
- DDR I,II
- SDR

Compression:

- ADPCM
- H.264

Education

<u>Year</u>	<u>College or University</u>	<u>Degree</u>
1983	Yale University	BSEE

Engineering Experience

From: April 2013
To: Present
Organization: Rockslide Analytics, LLC.
Title: CEO
Summary: Mr. Gomez founded Rockslide Analytics in order to develop and eventually sell a depth sensing camera. A depth sensing camera can image a scene in three dimensions. Currently Rockslide Analytics is also used to promote Mr. Gomez's consulting and expert work.

From: August 2006
To: March 30, 2009
Organization: ActSolar Inc.
Title: VP Engineering and System Architect
Summary: Mr. Gomez has designed and built a 400 watt power inverter which takes an input voltage of 30 volts DC and converts it to 240 VAC. Included in the design is an energy compensation circuit that recovers up to 40% of power normally lost due to power factor correction issues. Included as part of the inverter system was rooftop data collection for power and temperature with wireless connections to cloud management services.

ActSolar was sold to National Semiconductor Corp. on March 19, 2009.

From: September 2004
To: August 2005
Organization: BridgeWave Inc.
Title: Consultant
Summary: Mr. Gomez built a 10 gig Ethernet test platform to facilitate manufacturing tests of Bridgewave's high speed wireless network system. This system replaced the Smart Bits Ethernet test analyzer in the manufacturing test environment.

- Built test generator: Ethernet packet generator which generated packets of various sizes, address spaces, payload and checksums.
- Built test receiver and analyzer which detected various failure mechanisms, maintained statistics and reported them to a user interface written in Lab View.
- Used the Xilinx Vertex II in the 2003 version. Used Xilinx Spartan 3e in 2004 version.

From: September 2004
To: September 2004
Organization: PA Consulting Group
Title: Consultant

Summary: Miguel Gomez has provided hardware evaluation services for corporate mergers and acquisitions. These services include systems and hardware reviews in the following areas:

- Analysis of system performance to cost of the hardware implementation. Costs include development time, flexibility of the system for future growth and final product costs.
- Review of the VHDL and Verilog code implementations, documentation and development strategies.
- VHDL and Verilog code management including compilation processes, simulation, test coverage, bug tracking and source code control.
- FPGA and ASIC tool chain management.
- Circuit board design and layout for production environments
- Circuit board certification testing for FCC, UL, and Environmental tests
- Review of production line management including assembly and test processes.

From: Jan 2003

To: May 2003

Organization: Santel Networks

Title: Consultant

Summary: Mr. Gomez Developed an optical duo-binary (ODB) encoder. At 10.7 Giga bits per second (GBps) ODB reduces the spectral spread to ½ of the ordinary NRZ format. This format allows high spectral efficiency over long distances by reducing nonlinear penalties due to narrower channel spacing and allows a higher bit rate or increases transmission distances. The project was implemented in a Xilinx FPGA running at 667 Mbs with a 10.7 GHz Mux/Demux feeding 16 LVDS streams to the FPGA. The ODB behavior was simulated in a C-coded simulation. The circuit board's highest clock speed was 10.7 Gigahertz and was modeled in HSPICE. Board level simulation was performed using NCVerilog. Several Patents were applied for and the board was shown at the Optical Fiber Communication Conference & Exposition in March of 2003.

From: March 2001

To: December 2002

Organization: Extreme Networks, Inc.

Title: Director of Hardware, Content Networking Division

Summary: Mr. Gomez managed a team of Hardware and Software engineers, which developed and maintained a Layer 5 Content Addressable Switch. The switch is capable of L2, L3, L4 switching as well as L5 switching which uses HTTP headers to make routing decisions. All routing decisions were made in real time (1 GBPs) by hardware in FPGAs while a Power PC provided a user interface, configuration management and housekeeping diagnostics. Communications between the hardware elements and the PowerPC CPU was via a PCI bus.

From: January 2000

To: March 2001

Organization: Webstacks, Inc. (Now Extreme Networks, Inc.)

Title: Director of Hardware
Summary: Extreme Networks and several venture founding partners commissioned Webstacks to build a Content Addressable Switch. As the number four employee Mr. Gomez was hired to be the system architect and to in-turn to hire the hardware team which would implement it. He hired 13 ASIC, FPGA and software engineers into his department and managed them for the duration of the project. Time to development was one year and at that time functionality was proven to Extreme, which then bought Webstacks for \$68MM cash and stock.

From: February 1997
To: December 1999
Organization: Philips Semiconductor
Title: Consultant
Summary:

- Developed the certification environment which was used by Philips Semiconductor and Microsoft to verify operation of Philips' Poseidon handheld chipset running Windows CE. This included board development, FPGA coding and simulation as well as porting Windows CE.
- Supported development of Philip's version of the Mips 4000 along with several of the peripheral devices that made up the system on a chip and the bus interconnect.
- Miguel Gomez also developed the ASIC logic and board level hardware for a 56Kbs software modem while at Philips.

From: September 1994
To: January 1997
Organization: Minden Group, Inc.
Title: President & Founder
Summary: After founding The Minden Group, Miguel Gomez developed several types of memory adapters used to adapt various sizes and types of memory sticks into Personal Computers. These were sold through retail stores throughout the nation. Over 250,000 memory adapters were sold at stores such as Fry's, CompUSA, Computer City and Future Shop. Miguel Gomez also designed a video conferencing system including a low cost video capture board and modified drivers. This system was also sold through the retail channels.
After developing these products he organized and managed a small team of 10 to 15 product managers and sales personal. Manufacturing was done in Taiwan with final assembly and distribution in the United States.

From: April 1989
To: August 1994
Organization: Spectrum Analysis, Inc.
Title: Founder & President
Summary: Consulting services company which Mr. Gomez founded specializing in computing, telephony and data systems. The company was a full service design firm capable of electrical circuit design with emphasis on ASIC, FPGA and ASIC emulation as well as complex PCB level designs. Responsibilities as founder were to identify specific business opportunities as well as to manage and implement portions of the technical projects.

From: August 1987
To: March 1989
Organization: Quickturn Systems, Inc.
Title: Applications Manager
Summary: Quickturn developed an ASIC emulator using Xilinx FPGAs. Mr. Gomez was hired as Quickturn's first applications engineer, and was initially responsible for developing the training and demonstration systems for Quickturn's initial customers. Later as the company matured, he managed the customer support team. Since this ASIC emulator worked at a fraction of clock speed, he developed a methodology of slowing board designs to 100s of KHz while maintaining clock and memory (DRAM) integrity.

From: July 1987
To: September 1988
Organization: Telestream Corporation
Title: Applications Engineer
Summary: Applications engineer responsible for demonstration system development, training and sales support of the Telestream programmable voice and data management system.

From: March 1985
To: April 1987
Organization: Stratacom, Inc.
Title: Design Engineer
Summary: Responsible for development and maintenance of an Adaptive Differential Pulse Code Modulation (ADPCM) voice compression board. This system allowed twice as many calls to be placed on T1 transmission lines. Also developed Stratacom's digital data over T1 lines which was used in Stratacom's network management system, a precursor to frame-relay.

From: June 1983
To: March 1985
Organization: ROLM Corporation
Title: Design Engineer
Summary: Responsible for the development of a multiplex/demultiplex hardware board used in the ROLM BUS 295 telephone switch. A novel elastic buffer was used to automatically determine the length of an inter-cabinet data bus, whose length varied based on the customer's requirements. This eliminated the need for manufacturing technicians to manually adjust clock skew.

Litigation Support Experience

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Fabricant LLP
Case Names: Apex Beam Tech v. ZTE
2:22-cv-00031-JRG-RSP

Supported Apex Beam Tech

Services Provided: Investigated cellular antenna systems

Dates: October 2023 - Present

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Fabricant LLP
Case Names: Rampart v. NXP Semiconductors
6:21-CV-01294-ADA

Supported Rampart

Services Provided: Investigated DDR SDRAM memory systems

Dates: December 2022 - September 2023

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Winston Strawn LLP
Case Names: Flypsi Inc. v. Google LLC
6:22-cv-00031

Supported Flypsi

Services Provided: Investigated Voice over IP software code.

Dates: February 2023 - December 2023

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Sheridan Ross LLC
Case Names: K.Mizra v. Cisco Systems
6:20-cv-01031

Supported K.Mizra

Services Provided: Investigated infringement related to contagion detection, isolation and repair.

Dates February 2023 - December 2023

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Procopio, Cory, Hargreaves & Savitch LLP
Case Names: RCMIC LLC v. Teldata Enterprise Networks
3:21-cv-1334-CAB-MDD

Supported Teldata

Services Provided: Wrote invalidity report to a health care and safety alerting system patent.
Investigated prior art source code.

Dates June 2022 - May 2023

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Hoge Fenton LLP
Case Names: Michael Joseph Costabile v. Ustopit, LLC
7:21-cv-00155-BO

Supported Michael Constablile

Services Provided: Investigated infringement of timing systems in sports events. Wrote claim construction report and defended opinions at deposition.

Dates August 2022 - March 2023

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Fabricant LLP
Case Names: RFCyber v. Apple Inc.
IPR2022-00412, IPR2022-00413

Supported RFCyber

Services Provided: Wrote and defended a response to invalidity contentions concerning security used in financial transactions.

Dates November 2022 - February 2023

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Fabricant LLP

Case Names: Rampart Asset Management v. NXP, Renesas, Texas Instruments, Huawei and Silicon Motion.
6:20-cv-01031

Supported Rampart Asset Management

Services Provided: Investigated infringement related to PCIe equalization circuits.

Dates January 2022 - February 2022

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Fish and Richards

Case Names: Ikorongo v. Bumble Trading LLC
6:20-cv-00256

Supported Bumble Trading LLC

Services Provided: Investigated infringement related to collecting geographic location data from cell phones.

Dates October 2021 - November 2021

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Folio Law PLLC

Case Names: K.Mizra v. Cisco Systems
6:20-cv-01031

Supported K.Mizra

Services Provided: Investigated infringement related to contagion detection, isolation and repair.

Dates June 2021 - October 2021

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Mintz
Case Names: Philips v. MediaTek, RealTek
337-TA-1222

Supported Philips

Services Provided: Investigated infringement related to securing digital video.

Dates January 2021 - July 2021

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Russ August & Kabat
Case Names: EcoFactor v. Google, ecobee, Alarm, Vivent
337-TA-1185

Supported EcoFactor

Services Provided: Investigated infringement related to smart thermostat devices.

Dates February 2020 - September 2020

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Russ August & Kabat
Case Names: Pavo Technologies v. Kingston
8:14-cv-1352-JLS

Supported Pavo

Services Provided: Investigated infringement related to USB Flash Drives. I provided a written opinion, defended my opinions in a deposition and testified at trial.

Dates

February 2019 - February 2020

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Orrick
Case Names: Infinity Computer Products Inc. v. Toshiba America Business Solutions'
2:12-cv-06796-NIQA

Supported Konica Minolta Business Solutions (Defendant).

Services Provided: Investigated infringement related to fax/business copy solutions

Dates April 2019 - June 2019

Expert Engagement:

Type of Matter: Contracts Dispute

Law Firm: HorizonIP

Case Names: Smith v. ORBCOMM

Supported ORBCOMM

Services Provided: Investigated geolocation services for asset tracking.

Dates March 2019 - July 2019

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Russ August & Kabat

Case Names: SPEX Technologies v. Kingston

Supported SPEX

Services Provided: Investigated infringement related to secure disk drives. I provided a written opinion, defended my opinions in three depositions and testified at trial.

Dates

January 2017 - July 2020

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Orrick, Herrington & Sutcliffe

Case Names: Synopsys v. Mentor Graphics
Inv.

Supported Synopsys

Services Provided: Analyzed FPGA based hardware emulators relative to patent infringement allegations. Provided written statements.

Dates December 2014 – September 2017

Expert Engagement:

Type of Matter: Inter Partes Review

Law Firm: Schmeiser, Olsen & Watts

Case Names: NA

Services Provided: Researched prior art related to video conferencing systems.

Dates May 2016 – March 2017

Expert Engagement:

Type of Matter: Patent Infringement and Trade Secret Cases

Law Firm: Russ August & Kabat

Case Names: VIA Technologies, Inc., et al. v. ASUS Computer International, Inc. Case No. 5:14-cv-03586-BLF

Supported VIA Technologies.

Services Provided: Analyzed hardware infringement of USB and PCIE drivers. Analyzed trade secrets theft of the same hardware. Provided written statements and oral testimony. I provided a written opinion, defended my opinions in three depositions and presented our positions at an arbitration hearing.

Dates

June 2015 – August 2017

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: CALDWELL CASSADY CURRY P.C.

Case Names: Smartflash LLC, et al. v Google Inc., et al.,
Case No. 6:14-cv-435- KNM

Services Provided: Analyzed Google in-app purchase client-server software.

Dates January 2015 – November 2015

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Orrick, Herrington & Sutcliffe

Case Names: Certain Consumer Electronics and Display Devices with Graphics Processing and Graphics Processing Units Therein

Nvidia v. Qualcomm, Samsung, Imagination
Inv. No. 337-TA-932

Supported Nvidia

Services Provided: Analyzed thread execution and video processing in graphics integrated circuits.

Dates December 2014 – May 2015

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: CALDWELL CASSADY CURRY P.C.
Case Names: Smartflash LLC, et al. v Apple Inc., et al.,
Case No. 6:13-cv-447-MHS-KNM

Supported Smartflash

Services Provided: Analyzed Apple in-app purchase client-server software.

Dates June 2014 – August 2014

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Young Basile Hanlon & MacFarlane P.C.
Durie Tangri
Case Names: Narada Systems, LLC v. Tabula Inc.
Case No. 6:13-cv-336-LED

Supported Tabula Inc.

Services Provided: Analyzed prior art related to FPGA switch and routing fabrics.

Dates February 2014 – April 2014

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Morrison Foerster
Case Names: Intellectual Ventures I & II, LLC et al. v. Altera Corporation et al.
Case No. 10cv 01065-LPS

Supported Altera and Xilinx

Services Provided: Analyzed prior art related to systems on a chip.

Dates September 2012 – May 2014

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: ParkerVision Inc. Inc. v. Qualcomm Incorporated.

Civil Action No. 3:11-cv-719-J-37-TEM

Supported ParkerVision

Services Provided: Reviewed schematics related to the down conversion of a radio frequency signal to a base band signal.

Dates September 2012 – May 2013

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: WI-LAN INC., v. HTC CORPORATION, HTC AMERICA, INC., and EXEDEA, INC.

Civil Action No. 2:11-CV-68
Supported WiLAN

Services Provided: Investigated patent infringement related to the decoding and encoding of broadband transmission. I investigated VHDL, Verilog, C, and C++ source code related to Orthogonal Frequency Division Multiplexing and SC-OFDMA

Dates September 2012 – August 2013

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Orrick, Herrington & Sutcliffe
Case Names: Lantiq Deutschland GmbH v. Ralink Technology Corp., et al.

Civil Action No. 11-cv-00234-EJD
Supported Ralink

Services Provided: Investigated patent infringement related to fractional phase lock loops and integer phase lock loops embedded in Ethernet and DSL circuits.

May 2012 – September 2012

Dates

Expert

Engagement:

Type of Matter:

Law Firm:

Case Names:

Patent Infringement Case
Morrison and Foerster
Sonic v. Arteris
UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA

Case No. 11-CV-05311 MEJ

Supporting Sonic

Services Provided: Investigating infringement of hardware patents related to integrated circuit interconnections.

Dates March 2012 – February 2013

Expert

Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Quinn Emanuel
Case Names: MotionPoint v. Transperfect

Supported MotionPoint

Services Provided: Investigated infringement of software patents related to language translation. Offered an opinion regarding MotionPoint's product infringement on the asserted patent and invalidity thereof. Testified at trial in the United States District Court, Northern District of California Oakland Division.

Dates: August 2012 – July 1 2013

Expert

Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Faegre Baker Daniels
Case Names: Honeywell International, Inc, v. Nest Labs Inc., and Best Buy Co. Inc.
Case No. 12-cv-299 (SRN/JSM)

Supporting Honeywell International

Services Provided: Investigated infringement of hardware patents related to power stealing.

Dates: July 2012 – August 2012

Expert

Engagement:

Expert

Engagement:
Type of Matter: Patent Infringement Case
Law Firm: DLA Piper
Case Names: MOTOROLA MOBILITY, INC. and GENERAL INSTRUMENT CORP.
v. TIVO Inc.
UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
Civil Action No. 5:11-00053-DF

Supported Motorola

Services Provided: Investigated infringement of software patents related to Personal Video Recording devices.

Dates: February 2012 – August 2012

Expert

Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Hansen, Todd, Evans & Figel. P.L.L.C. Washington D.C.
Case Names: TiVo Inc. v Verizon Communications Inc. et al.
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS MARSHALL DIVISION
Case No. 2:09-cv-257-DF (E.D. Tex.)

Supported Verizon

Services Provided: Investigated infringement of software patents related to digital video recording.

Dates: April 2012 – June 2012

Expert

Engagement:

Type of Matter: Patent Infringement Case
Law Firm: McDermott Will & Emery
Case Names: MotionPoint v. Transperfect
UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
Case No. 4:10-cv-02590-CW (JCS)

Supported MotionPoint

Services Provided: Investigated infringement of software patents related to language translation.

Dates: January 2012 – June 2012

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: DLA Piper LLP
Case Names: Freescale Semiconductor v. Funai Electric, MediaTek Inc., Zoran Corporation
INTERNATIONAL TRADE COMMISSION
Case No. ITC 337-TA-786
Supporting Funai, MediaTek, Zoran.

Supported Zoran

Services Provided: None

Dates: October 2011 – June 2012

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Morrison and Foerster
Case Names: Altera v. LSI
UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF CALIFORNIA
Case No. 11-cv-03139 CW
Supported Altera

Services Provided: Investigated infringement of hardware patents related to integrated circuit power management, clock recovery and high-speed bus implementations.

Dates: June 2011 – September 2011

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Jones Day
Case Names: Nielsen. v comScore Inc.
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF VIRGINIA ALEXANDRIA DIVISION
Case No. 1:11-cv-290-LMB-TRJ
Supported Nielsen

Services Provided: Investigated infringement of software patents related to the collection of demographic information from survey panels and automated user identification.

I investigated C, C++, C#, Java and SQL code residing on servers and personal computers.

Dates June 2011 – September 2011

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Hansen, Todd, Evans & Figel. P.L.L.C. Washington D.C.
Case Names: Active Video Networks Inc. v Verizon Communications Inc.
UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF TEXAS MARSHALL DIVISION
Case No. 2:10-cv-248-RAJ-FBS

Supported Verizon

Services Provided: Investigated infringement of software patents related to communications between the set-top box and content providing servers at the communications head-end.

Dates December 2010 – March 2011

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.C. Washington D.C.
Case Names: HTC v. Apple Computers in the matter of Certain Portable Electronic Devices and Related Software.
UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON D.C.
[Case 337-TA-721](#)

Supported HTC

Services Provided: Investigated infringement of software patents related to power management in smart phones.

Dates November 2010 – January 2011.

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Hansen, Todd, Evans & Figel. P.L.L.C. Washington D.C.
Case Names: Verizon Communications Inc. in the matter of Certain Digital Set-Top Boxes
UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON D.C.
Case 337-TA-712

Case 337-TA-717

Supported Verizon

Services Provided: Investigated infringement of software patents related to communications between the set-top box and content providing servers at the communications head-end.

Dates June 2010 – September 2010

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: WiLAN Inc. v. Acer, et. al.
THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

Civil Action No. 2-07CV-473 (E.D. Tex.)
WiLAN Inc. v. Acer, et. al.

Civil Action No. 2-07CV-473 (E.D. Tex.)
WiLAN Inc. v. Westell Technologies Inc.

Civil Action No. 2:08-CV-247 (TJW)
WiLAN Inc. v. RESEARCH IN MOTION CORPORATION,
RESEARCH IN MOTION LTD.,
MOTOROLA, INC., UTSTARCOM, INC.,
LG ELECTRONICS MOBILECOMM
U.S.A., AND LG ELECTRONICS, INC.,

Case No. 5:08-CV-04555-JW
WiLan v. Intel

Supported WiLAN

Services Provided: These cases consisted of 802.11a,b,g,n and Bluetooth investigations. In as much I investigated infringement of hardware patents related to the decoding and encoding of broadband transmission. Investigated Verilog, C, and C++ source code related to Bluetooth piconets, Orthogonal Frequency Division Multiplexing and Complementary Code Key incorporated in various integrated circuits. In addition to the above investigations, I was deposed and was asked to testify. This case settled before trial.

Dates May 2009 – March 2011

Expert Engagement:

Type of Matter: Patent Infringement Case

Law Firm: Jones Day, Palo Alto CA.
Case Names: Agere Systems Inc. and LSI Corp. vs. Xilinx, Inc.
UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK
[Case 09 Civ. 9717 \(JSR\)](#)
[Case 09 Civ. 9719 \(JSR\)](#)

Supported Xilinx

Services Provided: Investigated infringement of hardware patents related to the implementation of Field Programmable Gate Arrays (FPGAs).

Dates February 2010 – April 2010

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Goodwin Procter LLP
Case Names: MedioStream, Inc. v. Acer, et al.
Consolidated Case No. 2:08-CV-369-CE, Eastern District of Texas

Supported MedioStream

Services Provided: Investigated infringement of software patents related to the decoding and encoding of video in Apple Computer products. Investigated C, C++ and Objective C source code in various video transcoding applications.

Dates July 2009 – October 2010

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Womble Carlyle Sandridge & Rice.
Case Names: Rembrandt Data Technologies vs. AOL LLC, et. al.

THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA - Alexandria Division
C.A. No. 1:08-cv-01009-GBL-IDD

Supported Rembrandt Data Technologies.

Services Provided: Investigated infringement of hardware and software patents related to the transmission of data, voice and video over cable networks.

Miguel Gomez performed the following tasks:

- Investigated assembly level source code for a V.34 modem physical layer modulation and de-modulation circuit.
- Gave testimony at deposition.

Dates April 2009 – June 2009

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: Kellogg, Huber, Todd, Evans & Figel Washington D.C.
Case Names: Rembrandt Data Technologies vs. Comcast, et. al.

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

2:06-cv-00047-TJW-CE

Rembrandt Data Technologies vs.
Rembrandt Data Technologies vs.
SHARP CORPORATION and
SHARP ELECTRONICS CORP.

Case No. 2:06CV507 (LED)

Rembrandt Data Technologies vs.
CHARTER COMMUNICATIONS, INC.,)
CHARTER COMMUNICATIONS)
OPERATING, LLC, and COXCOM, INC.

2:06-cv-00223-TJW-CE

Rembrandt Data Technologies vs.
CHARTER COMMUNICATIONS, INC,
CHARIER COMMUNICATIONS
OPERATING, LLC, COX
COMMUNICATIONS, INC, COXCOM,
INC, COX ENTERPRISES, INC., CSC
HOLDINGS, INC, and CABLEVISION
SYSTEMS CORPORATION,

**THE UNITED STATES BANKRUPTCY COURT
SOUTHERN DISTRICT OF NEW YORK**

Case No. 02-41729 (REG)

Rembrandt Data Technologies vs.
Adelphia Communications Corporation;)
Century-TCI California, LP;)
Century-TCI California Communications, LP;)
Century-TCI Distribution Company, LLC;)
Century-TCI Holdings, LLC;)
Parnassos, LP;)
Parnassos Communications, LP;)
Parnassos Distribution Company I, LLC;)
Parnassos Distribution Company II, LLC;)
Parnassos Holdings, LLC;)
Western NY Cablevision, LP

Supported Rembrandt Data Technologies.

Services Provided: Investigated infringement of hardware and software patents related to the transmission of data, voice and video over cable networks.

Miguel Gomez performed the following tasks:

- Investigated Verilog source code used to implement a modem physical layer modulation and de-modulation circuit.
- Investigated C and C++ software used to implement cable modems.

Dates September 2008 – February 2009

Expert Engagement:

Type of Matter: Patent Infringement Case
 Law Firm: Hogan and Hartson, New York NY
 Case Names: ProMOS Technologies vs. Freescale Semiconductor Inc.
 Case No. 06-788 JJF (D. Del.)

Supported ProMOS

Services Provided: Investigated infringement of hardware logic patents related to cache controllers.

Miguel Gomez performed the following tasks:

- Investigated Verilog source code used to implement a cache controllers in integrated circuits designed and produced by Freescale Technologies.

Dates February 2008 – August 2008

Expert Engagement:

Type of Matter: Patent Infringement Case
 Law Firm: McKool Smith, Dallas Texas
 Case Names: i4i Limited Partnership vs. Microsoft., et al.

THE UNITED STATES DISTRICT COURT
 FOR THE EASTERN DISTRICT OF TEXAS
 TYLER DIVISION
 Case No. 6:07-CV-113-LED

Supported i4i.

Services Provided: Investigated infringement of software patents related to the organization of XML data.

Miguel Gomez performed the following tasks:

- Investigated C and C++ software code that read, displayed and managed XML constructs in Microsoft office software products.

Dates November 2007 – August 2008

Expert Engagement:

Type of Matter: Patent Infringement Case
 Law Firm: McKool Smith, Dallas Texas
 Case Names: Rembrandt Data Technologies vs. Comcast., et al.
 MDL Docket No. 07-mdl-1848 GMS

Supported Rembrandt Data Technologies.

Services Provided: Investigated infringement of software and hardware patents related to the transmission of data, voice and video over cable networks.

Miguel Gomez performed the following tasks:

- Investigated C and C++ software code in the cable modem management layer that controlled data flows through the various chip sets of the cable modem.
- Investigated DSP code that provided data connection services in cable modems.

Dates May 2007 – July 2007

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: Samsung vs. Ericsson et al.,

UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.
Case No. 337-TA-583
Case No. 337-TA-577

Supported Ericsson.

Services Provided: Investigated infringement of patents in cell phones.

Miguel Gomez performed the following tasks:

- Investigated C and C++ software code that controlled the power management and clock calibrations.
- Reviewed hardware description language code and DSP firmware to trace the control flow from the managing software down to the hardware registers.
- Wrote an expert report that documented the findings.
- Acquired and wrote software tools to assist the investigation process.

Dates January 2007 – May 2007

Expert Engagement:

Type of Matter: Patent Infringement Case
Law Firm: McKool Smith, Dallas Texas
Case Names: American Video Graphics, L.P. vs. Sony Computer Entertainment America
American Video Graphics, L.P. vs. Hewlett Packard Co., et al.,

Supported American Video Graphics.

Services Provided: Investigated patent infringement in graphic chipsets used in personal computers and game consoles.

Miguel Gomez performed the following tasks:

- Investigated the accused chipsets by examining the hardware code for various sub-modules including the 2D and 3D rendering engines and the frame buffers that connect the graphics processing units to memory devices.
- Wrote claim charts and created exhibits.
- Acquired and wrote software tools to assist the investigation process.

August 2005 – November 2005

Dates

Expert Engagement:

Type of Matter: Patent Infringement Case
 Law Firm: McKool Smith, Dallas Texas
 Case Names: American Video Graphics, L.P. vs. Sony Corporation of America, et al.,
 American Video Graphics, L.P. vs. Hewlett-Packard Co., et al.,
 American Video Graphics, L.P. v. Electronic Arts, Inc., et al., No. 6:04-CV-398 LED

Supported American Video Graphics.

Services Provided: Patent infringement investigation of computer game software.

Miguel Gomez performed the following tasks:

- Examined C and C++ source code for electronic computer games which ran on Sony, Microsoft and Nintendo game consoles as well as Personal Computers
- Wrote a claim chart and created exhibits.

Dates May 2005 – August 2005

Expert Engagement:

Type of Matter: Patent Infringement
 Law firm: Dewey Ballantine, Palo Alto, California
 Case Name: Matsushita vs. Texas Instruments

Supported Matsushita.

Services Provided:

- Read and interpreted approximately 50 patents issued to Matsushita for Dewey Ballantine attorneys in their preparation for litigation between Matsushita and Texas Instruments.

Dates: November 2004 – March 2005

Expert Engagement:

Type of Matter: Patent Infringement
 Law firm: Wilson Sonsini Goodrich Rosatti
 Case Name: Zoran vs MediaTek et, al.

Supported MediaTek.

Service Provided: Offered an opinion as to when a product was ready for patenting per the requirements for an on-sale bar.

Miguel Gomez performed the following tasks:

- Offered an opinion as to whether the product in this was ready to be patented
- Reviewed all available documentation.
- Wrote report and rebuttal to opposition expert report
- Gave testimony at deposition and provided a written opinion at the ITC hearing.

Dates

September 2004 – February 2005

Patents

Issued Patents

7,814,204	Method of and system for analyzing the content of resource requests
7,447,777	Switching system
7,298,746	Method and system for reassembling and parsing patents in a network environment
7,321,926	Method of and system for allocating resources to resource requests
8,412,838	Method of and system for analyzing the content of resource requests

Applications

"System and Method for an array of intelligent inverters"

European: 09747629.5-1242/2291908

US PCT/US2009044033

Also published as: CN102067429A, US2009283129, WO2009140548A3