

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APUTURE IMAGING INDUSTRIES CO., LTD.,

Petitioner,

v.

ROTOLIGHT LIMITED,

Patent Owner.

Case No.: IPR2024-01422
U.S. Patent No. 10,845,044

**DECLARATION OF P. MORGAN PATTISON, PhD
IN SUPPORT OF PETITION FOR *INTER PARTES*
REVIEW OF U.S. PATENT NO. 10,845,044**

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I, P. Morgan Pattison, PhD, hereby declare as follows:

I. INTRODUCTION

A. Engagement

1. I have been retained by Aputure Imaging Industries Co., LTD. to offer technical analysis and opinions relating to U.S. Patent No. 10,845,044 (Ex. 1001) (the “’044 Patent”) and certain prior art references relating to its subject matter.

2. As far as I am aware, I have no financial interest in the Petitioner, Patent Owner, the ’044 Patent, or in the outcome of this proceeding. I am being compensated for my work as an expert on an hourly basis at my standard consulting rate. My compensation is not dependent on the outcome of these proceedings or the content of my opinions.

3. I present this Declaration in order to present my opinions on ’044 Patent and its relation to the prior art.

B. Background and Qualifications

4. I received my B.S. in Electrical Engineering, Electronic Devices and Materials from the University of California, San Diego, in 1996. From there, I worked as a laser test engineer at Cymer Laser in San Diego. During my time there, I tested and developed test methodology for production and prototype KrF and ArF excimer lasers used in deep UV photolithography for manufacturing of advanced semiconductor products.

5. After working at Cymer Laser, I attended the University of California, Santa Barbara and received my M.S. in Electrical Engineering, Electronics and Photonics in 2003 and my Ph.D. Materials Science, Electronic and Photonic Materials in 2006.

6. In early 2006, I started working as a project manager for the U.S. Department of Energy where I managed DOE funded R&D projects in energy efficient LED and OLED based lighting technologies, so called solid state lighting (SSL). In this capacity I identified priority R&D areas to achieve the maximum energy savings, I managed R&D funding solicitations, and I managed DOE funded R&D projects covering all aspects of LED and OLED lighting technology including, light emitting devices (LEDs and OLEDs), power supplies, optics, integrated fixtures, lighting controls, and lighting applications.

7. In 2007, I founded and am still currently the President of Solid State Lighting Services, Inc. Some of the services we offer include providing technical, strategic, and market expertise in the areas of LEDs, OLEDs, lighting, displays, and optoelectronic materials and devices. We also provide services related to LED and lighting product failure and reliability evaluation. I have worked at Solid State Lighting Services, Inc. for almost 17 years.

8. Further details regarding my qualifications are included in my CV, which is attached hereto as Appendix A and incorporated by reference as if set forth in its entirety herein.

II. UNDERSTANDING OF THE GOVERNING LAW REGARDING OBVIOUSNESS

A. Invalidity by Anticipation

9. I understand that invalidity of a patent claim may be established under the legal doctrine of anticipation. A determination that a claimed invention is anticipated requires a showing that each and every element of the claim is disclosed in a single prior art reference, either expressly or inherently, or that the claimed invention was previously known or embodied in a single prior art device, product, or method. Additional references may be relied upon in limited circumstances, to explain terminology in the anticipating reference, to show that the anticipating reference is enabling, or to show that a characteristic not disclosed expressly in the reference is nonetheless disclosed inherently.

10. I understand that under the doctrine of inherency, if a structure in the prior art necessarily functions in accordance with the limitations of a patent claim, the claim is anticipated. This doctrine also applies to inherent properties and inherent uses. For instance, if a claim to a new method recites the same steps as those disclosed in a prior art method using the same compound, then the new use is not patentable, and any benefit achieved by the claimed method will be considered

to naturally flow from the prior method, even if that benefit was not recognized at the time the prior method was disclosed.

11. I understand that whether a reference is available as “prior art” is determined in accordance with 35 U.S.C. §102, which sets forth a number of subsections that define “prior art,” or knowledge that is deemed to be within the public domain for purposes of ascertaining novelty.

1. A patent claim is invalid for anticipation under (post-AIA) §102(a) when:

(1) the claimed invention was patented, described in a printed publication, or in public use, on sale, or otherwise available to the public before the effective filing date of the claimed invention; or

(2) the claimed invention was described in a patent issued under 35 U.S.C. § 151, or in an application for patent published or deemed published under 35 U.S.C. § 122(b), in which the patent or application, as the case may be, names another inventor and was effectively filed before the effective filing date of the claimed invention.

12. Thus, a timely publication printed in any country, or a timely public use, sale, or offer for sale will invalidate a patent claim under 35 U.S.C. § 102(a)(1).

B. Invalidity by Obviousness

13. I understand that obviousness is analyzed from the perspective of a person of ordinary skill in the art (a “POSITA”) at the time the alleged invention

was made. I also understand that a POSITA is presumed to have been aware of all pertinent prior art at the time of the alleged invention.

14. I understand that an obviousness analysis involves comparing a claim to the prior art to determine whether the claimed invention as a whole would have been obvious to a POSITA in view of the prior art, and in light of the general knowledge in the art at the time the invention was made. I also understand that the invention may be deemed obvious when a POSITA would have reached the claimed invention through routine experimentation.

15. I understand that obviousness can be established by combining or modifying disclosures to the prior art to achieve the claimed invention. It is also my understanding that where there is a reason to modify or combine the prior art to achieve the claimed invention, there must also be a reasonable expectation of success in so doing to render the claimed invention obvious. I understand that the reason to combine prior art references can come from a variety of sources, not just the prior art itself or the specific problem the patentee was trying to solve. I also understand that the references themselves need not provide a specific hint or suggestion of the alteration needed to arrive at the claimed invention; the analysis may include recourse to logic, judgment, and common sense available to a POSITA.

16. I understand that when there is some recognized reason to solve a problem, and there are a finite number of identified, predictable solutions, a

POSITA has good reason to pursue the known opinions within his or her technical grasp. If such an approach leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In such a circumstance, when a patent simply arranges old elements with each performing the same function it had been known to perform and yields no more than one would expect from such an arrangement, the combination is obvious.

17. I understand that when considering the obviousness of an invention, one should also consider whether there are any objective indicia that support the non-obviousness of the invention. I further understand that objective indicia of non-obviousness include failure of others, copying, unexpected results, information that “teaches away” from the claimed subject matter, perception in the industry, commercial success, and long-felt but unmet need. I also understand that in order for objective indicia of non-obviousness to be applicable, the indicia must have some sort of nexus to the subject matter in the claim that was known in the art. I understand that this nexus includes a factual connection between the patentable subject matter of the claim and the objective indicia alleged.

18. Finally, I understand that Patent Examiners at the U.S. Patent and Trademark Office (“USPTO”) rely upon certain exemplary rationales in review patent applications to understand whether the subject matter of the claims is obvious. I understand that the following is a list of exemplary rationales relied upon

by Patent Examiners at the USPTO:

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

C. Materials Relied on in Forming My Opinions

19. In forming my opinions expressed in this declaration, I have relied on my own knowledge, experience, and expertise, as well as the knowledge of a POSITA in the relevant timeframe. In addition, I have reviewed and relied upon the following list of materials, and any other cited reference, in this declaration:

- U.S. Patent No. 10,845,044 (the “’044 Patent) (EX1001);
- Prosecution History of the ’044 Patent (EX 1002);
- U.S. Patent Application Publication. No. 2005/0275626 to Mueller *et al.* (“Mueller”) (EX1004);
- The Astera Manual (“Astera”) (EX1010);
- Declaration of Mr. Simon Canins from *Arnold Richter Cine Technik GmbH & Co. Betriebs KG v. Rotolight Ltd.*, IPR2021-01498 (P.T.A.B.) (EX1012); and
- U.S. Patent No. 9,743,010 to Edwards (“Edwards”) (EX1011).

III. BACKGROUND OF THE ’044 PATENT AND LIGHTING EFFECT TECHNOLOGY

20. Independent Claims 1, 12, and 19 of ’044 Patent recite a method, system, and computer program, respectively, for “controlling a lighting device to produce a range of different user customisable lighting effects.” These claims recite five basic elements: (1) **receive** a user input of “at least one user input simulation parameter to customize a lighting effect,” where the input simulation parameter

depends on the lighting effect being simulated; (2) store the user input simulation parameter in memory; (3) recall the user input simulation parameter from the memory; (4) calculate, using an effect simulator, a “timevarying lighting value” based on the parameter; and (5) output the “time varying lighting value” to a lighting device, so as to generate the user-selected lighting effect.

21. Claim 1 recites:

[1p] A method for controlling a lighting device to produce a range of different user customisable lighting effects, the method comprising:

[1a] receiving user input of at least one user input simulation parameter to customise a lighting effect;

[1b] storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;

[1c] recalling from said memory said at least one stored user input simulation parameter;

[1d] calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter; and

[1e] outputting to said lighting device said time varying lighting value thereby to simulate the lighting effect.

EX1001, 11:43-58.

22. Claim 12 recites:

[12p] A system adapted to control at least one lighting device to produce a range of different user customisable lighting effects, the system comprising:

[12a] an input interface adapted to receive user input of at least one user input simulation parameter to customise a lighting effect;

[12b] a memory adapted to store said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated; and

[12c] an effect simulator adapted to:

recall from said memory said at least one stored user input simulation parameter; and

[12d] calculate a time varying lighting value based on said recalled simulation parameter;

[12e] wherein the effect simulator is adapted to output said calculated time varying lighting value to the at least one lighting device thereby to simulate a lighting effect.

Id., 12:29-47.

23. Claim 19 recites:

[19p] A computer program product comprising software code for controlling a lighting device to produce a range of different user customisable lighting

effects the computer program product is adapted to perform, when executed, the steps of:

[19a] receiving user input of at least one user input simulation parameter to customise a lighting effect;

[19b] storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;

[19c] recalling from said memory said at least one stored user input simulation parameter;

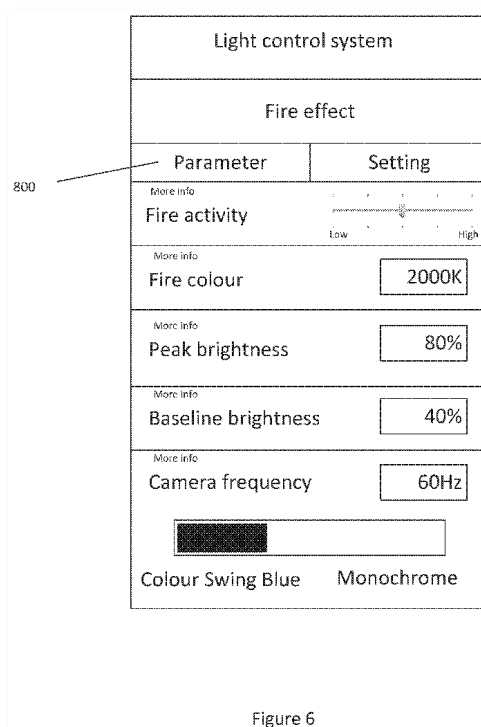
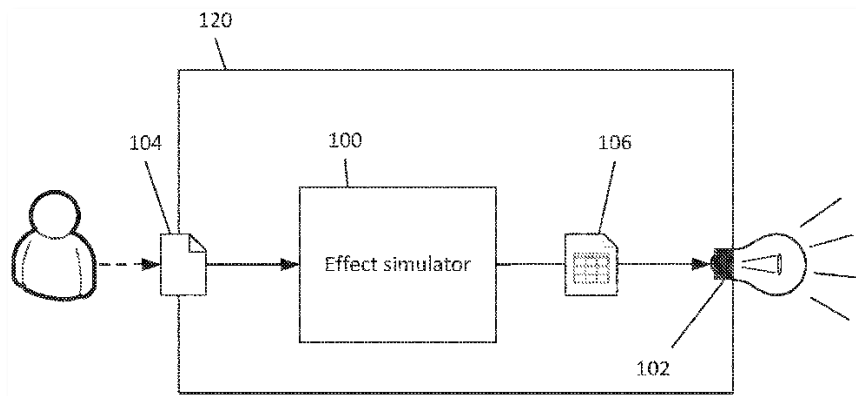
[19d] calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter; and

[19e] outputting to said lighting device said time varying lighting value thereby to simulate a lighting effect.

Id., 12:66-13:16.

24. With reference to the Figures 2 and 6 below, the '044 Patent describes how users can make selections of desired lighting effects on a control panel interface. *Id.*, 5:61-6:8; 8:5-18. Depending on the desired effect, users may select and adjust “simulation parameters,” such as “brightness,” “duration,” “colour,” and “frequency,” to customize the effect. *Id.*, 1:52-67, 6:37-7:6, 7:66-8:18, Figure 6. These simulation parameters are used by the “effect simulator” to calculate the data

106, or “time varying lighting values,” that characterize the lighting effect, and which are used to produce signals sent to the LEDs to generate the effect. *Id.*, 5:41-54, 7:19-36, 8:5-39. Effects (with their parameters) may be “stored” and then “recalled” from memory at a later time. *Id.*, 9:27-36.



EX1001, Figures 2, 6.

A. '044 Patent File History

25. The '044 Patent was filed April 7, 2017, and issued November 24, 2020. It claims priority to U.S. Provisional Application No. 62/319,809, filed April 8, 2016. During examination, the originally presented claims were rejected for claiming features not shown in the drawings, and on non-statutory double patenting grounds in view of U.S. Patent Application No. 15/820,469 (issued as U.S. Patent No. 10,197,257). Applicant submitted a new claim set, along with amendments to the specification and figures.

26. A subsequent Final Office Action objected to the amendments as introducing new matter and for failing to comply with the written description requirement. Applicant withdrew the amendments and filed a terminal disclaimer. The '044 was thereafter allowed. Applicant proceeded to file additional IDSs on January 14, 2020, March 5, 2020, and June 30, 2020. However, no new Office Actions were issued, and nothing in the record indicates that any of the references was substantively considered, much less considered as presented herein.

B. Entertainment Lighting Effects Systems

27. Starting in the late 1990's and continuing today, LED technology enabled a dramatic shift in the levels of control achievable with lighting technology. LEDs can emit light at a range of colors, can be integrated with optical down-converters to generate different hues of white light, and can be modulated (turned

off and on and dimmed) very rapidly. These capabilities of LED lighting technology enable the generation of innumerable effects by combining lighting colors with their modulation. Colors from the different LEDs can be combined to create different perceived colors and the LEDs can be modulated to generate changes in color over time which can then be used to simulate the light emitted from all sorts of natural and man-made phenomena. The control of the LEDs to achieve these effects boils down to controlling the drive current for the different color LEDs.

28. Many of these effects were not possible with previous lighting technologies since previous lighting technologies have limitations on the colors they can be engineered to emit, and they cannot be modulated as rapidly or as readily as LED technology.

29. The lighting effects described in the '044 Patent have long been used in the film, broadcast, and T.V. industry since before the advent of LEDs. Directors and producers have desired to provide a realistic a lighting arrangement so that the audience is fully drawn into the plot of the movie or program. Warm, dynamic light from a fire or light effects reflected from water help complete the illusion for the viewers.

30. Using LEDs for lighting effects has been commonplace due to their better efficiency, easier controls, and faster response times. LEDs were also

available in multiple colors, so colored gels and filters weren't required, and a single LED luminaire could perform many different tasks.

31. Many options, including LED lighting, were available for lighting effects generation in the film industry at the time of the earliest claimed date of the '044 Patent. Luminaires were capable of producing effects and could be controlled either locally, through a control panel on the luminaire, or remotely through a data connection, such as the industry standard DMX-512 control protocol. Multiple luminaires could be connected to coordinate effects, such as showing lightning bursts from different directions or movement of light. All these systems and techniques were in common use at the time of the '044 Patent.

IV. CLAIM CONSTRUCTION AND POSITA DEFINITION

A. Claim Construction

32. It is my understanding that claims in an *inter partes* review are generally given their ordinary and customary meaning, which is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.

33. I have analyzed the patentability of Claims 1-19 in the '044 Patent based on their ordinary and customary meaning, unless otherwise stated below.

B. Definition of a Person of Ordinary Skill in the Art

34. A POSITA in the field of the '044 Patent, as of April 8, 2016, would have had a good working knowledge of electrical engineering and entertainment lighting systems, controls, and effects. They would have gained this through an undergraduate degree in electrical engineering or a comparable field as well as some experience in the field of entertainment lighting systems. The more education one has, the less experience needed to attain an ordinary level of skill. Similarly, more experience in the field may serve as a substitute for formal education.

V. THE ELEMENTS IN CLAIMS 1-19 OF THE '044 PATENT ARE TAUGHT BY THE PRIOR ART

35. I have been asked to provide an analysis as to whether the elements of Claims 1-19 of the '044 Patent (the “Challenged Claims”) are taught by.

36. My analysis of these prior art references relative to the elements of the Challenged Claims—specifically, how and where the prior art references disclose or teach the limitations of the Challenged Claims—is provided below. The citations that I have included are not intended to provide an exhaustive list, but the citations rather provide examples of how the references disclose or teach the elements of these claims.

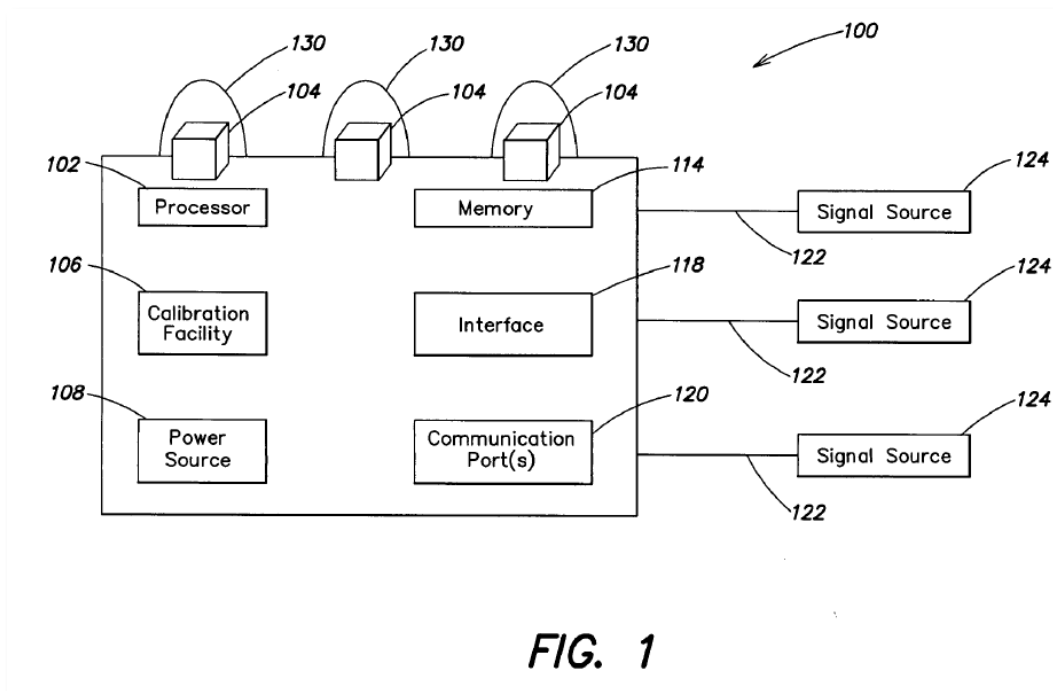
A. Ground 1: Claims 1-4 and 7-19 of the '044 Patent are obvious under 35 U.S.C. 103 over Mueller.

1. Overview of Mueller

37. U.S. Patent Application Publication 2005/0275626 to Mueller *et al.*, titled “Entertainment Lighting System” was filed on March 2, 2005, and published on December 15, 2005. Mueller is therefore prior art to the '044 Patent at least under 35 U.S.C. 102(a).

38. Mueller describes the creation and modification of coordinated lighting effects in real time. In doing so, Mueller describes a processor 102 that is configured to output one or more control signals to drive light sources 104 so as to generate various intensities of light from each light source 104. EX1004, [0168]. The processor 102 may be particularly configured (*e.g.*, programmed) to provide control signals to one or more of the light sources 104 so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects. *Id.*, [0170]. Mueller further describes that the processor's control of one or more of the light sources 104 could be based, at least in part, on user signals provided through an interface 118. *Id.*, [0183]. Such user signals could be user-selectable settings or functions, including, but not limited to, generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, and setting particular

identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182].



Id., Figure 1.

39. Mueller discloses a number of alternative embodiments utilizing the general concepts disclosed therein in a variety of specific devices and settings. A POSITA would understand that the concepts discussed in the context of each of these embodiments are applicable to Mueller's other embodiments. Generally, employing these concepts across Mueller's embodiments would require only the alteration or addition of software code, a concept with which a POSITA would be familiar. A POSITA would thus be motivated, where required, to combine the teachings of Mueller's various embodiments with those of other embodiments.

2. Claim 1

40. It is my opinion that Mueller renders Claim 1 obvious.

a. Claim Element 1p

41. The preamble of Claim 1, designated Claim Element 1p herein, recites “A method for controlling a lighting device to produce a range of different user customisable lighting effects, the method comprising:” EX1001, 11:43-45.

42. It is my understanding that a patent claim’s preamble does not limit the scope of the claim except in limited circumstances. If the preamble of Claim 1 is not limiting, then it does not impact the validity of Claim 1. For the purposes of this declaration, I assume that the preamble of Claim 1, and the preambles of independent Claims 12 and 19, are limiting and must be considered for the purposes of evaluating the validity of these claims.

43. Regardless, Mueller teaches Claim Element 1p.

44. Mueller describes a method for controlling a lighting device. In particular, Mueller describes “methods and systems for managing control instructions for a plurality of light systems.” EX1004, [0025]. In particular, Mueller describes a “**lighting unit 100** that may serve as a device in a lightning environment,” which a lighting device. *Id.*, [0164] (emphasis added). Lightning unit 100 is controlled by a processor 102 that “may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources [within

the lighting unit 100] so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.*, [0182] (referring to user-selectable settings or functions that “generally controlling the light output of the lightning unit 100 . . .”).

45. In addition, Mueller describes a system for generating control signals to lighting units. EX1004, [0204] The lighting system includes a “graphical source” that can “be a program for creating lighting effects in a two-or three-dimensional lighting environment. For example, a user may specify an explosion lighting effect. The desired effect may be an initial bright white light in a corner of a room with light traveling away from the corner (possibly with changing color) at a specified speed and in a specified direction.” *Id.*, [0207].

46. Mueller further discloses that control of the lightning unit 100 includes producing user customizable lighting effects. Specifically, Mueller describes “controlling the light output of lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, [and] setting particular identifiers such as addresses or serial numbers for the lighting unit” *Id.*, [0182]; *see also id.*, [0202] (“a lighting system user may want to generate a color changing effect that varies colors from one lighting unit 100 to another lighting unit 100, or across a number of the lighting units 100 in such a way as to

generate the appearance of a propagating rainbow of colors (‘rainbow chase’), given a particular placement of lighting units 100 with respect to one another. In this example, the user may provide a simple instruction to the central controller 204 to accomplish this”), [214] (“An explosion icon can be selected with a mouse-controlled cursor or other interface technique, which may prompt the user to click on a starting and ending point for the explosion in the coordinate system. By locating a vector in the representation, the user can cause an explosion to be initiated”).

47. For at least these reasons, Mueller teaches Claim Element 1p.

b. Claim Element 1a

48. Claim Element 1a recites “receiving user input of at least one user input simulation parameter to customize a lighting effect;” EX1001, 11:46-47.

49. Mueller teaches Claim Element 1a.

50. Mueller states that the interface 118 can present a user interface to a user for controlling the lighting unit 100. EX1004, [0182]. Mueller thus discloses user input through the interface 118.

51. Mueller further describes that the interface 118 can enable a user to both “chang[e] and/or select[] various pre-programmed lighting effects to be generated by the lighting unit” and “chang[e] and/or select[] various parameters of selected lighting effects.” *Id.*

52. Mueller also discloses that the interface 118 “may be coupled . . . to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

53. Muller further discloses an “interface 118 may present external controls that are, for example, physical controls such as switches, dials, buttons, or the like, programmatic controls, such as an application programming interface, or a user interface such as a graphical user interface on a computer.” *Id.*

54. Mueller also discloses that “the interface 118 may simply present a network interface that may be accessed through any corresponding network facility and may be coupled in turn to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

55. A POSITA would interpret the using the interface of Mueller, whether through a network or physical controls, for selecting pre-programmed lighting effects, i.e., the simulation parameter, as providing a simulation parameter to customize lighting effects.

56. For at least these reasons, Mueller teaches Claim Element 1a.

c. Claim Element 1b

57. Claim Element 1b recites “storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;” EX1001, 11:48-51.

58. Mueller teaches Claim element 1b.

59. Mueller describes, associated with the processor disclosed therein, “one or more storage media generically referred to . . . as ‘memory[.]’” EX1004, [0064]. “[T]he storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein.” *Id.* Mueller describes such functions as including, “generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting *various parameters of selected lighting effects*, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

60. Mueller further provides that

[t]he lighting unit 100 also may include a *memory* 114 to *store* various information. For example, the memory 114 may be employed to *store one or more lighting programs* for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation

Id., [0172] (emphasis added).

61. Mueller also discloses the processor “may be configured to respond to operation of the interface 118.” *Id.*, [0183]. In addition, the processor 102 may respond to “selecting one or more pre-programmed control signals stored in memory 114, modifying control signals generated by executing a lighting program,

selecting and executing a new lighting program from memory 114, or otherwise affecting the radiation generated by one or more of the light sources 104.” *Id.*

62. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: “the lighting control interface allows for the storage and downloading of new functions and new parameter settings.” EX1004, [0380].

63. In view of the disclosure by Mueller that the storage of lighting effects and the user-selected parameters associated therewith is carried out by memory, EX1004, [0064], a POSITA would understand that such storage of user input simulation parameters must be in memory for fast execution by processor 102.

64. Therefore, Mueller teaches Claim Element 1b.

d. Claim Element 1c

65. Claim Element 1c recites “recalling from said memory said at least one stored user input simulation parameter;” EX1001, 11:52-53.

66. Mueller teaches Claim Element 1c.

67. As discussed in the context of Claim element 1b, Mueller discloses storing at least one user input simulation parameter depending on the lighting effect being simulated. Mueller also discloses recalling the stored simulation parameter

being recalled for execution: “[t]he memory 114 may be employed to store one or more lighting programs for execution by the processor 102 (e.g., to generate one or more control signals for the light sources.” EX1004, [0172].

68. A POSITA would understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for “user modification and implementation” of lighting effects. EX1004, [0380].

69. Mueller also explains “the processor 102 may be configured to respond by selecting one or more pre-programmed control signals stored in memory 114. . . .”

70. Therefore, Mueller teaches Claim Element 1c.

e. Claim Element 1d

71. Claim Element 1d recites “calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter;” EX1001, 11:54-56.

72. Mueller teaches Claim element 1d.

73. Mueller describes an effect simulator which performs calculations, namely a processor/controller. Specifically, Mueller describes that a processor 102

within lighting device 100 is configured to output at least one control signal for each light source 104 so as to independently control the intensity of light generated by each light source 104. EX1004, [0168].

74. Mueller further explains that the processor 102 calculates a time varying lighting value: “the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.*, [0182] (“changing and/or selecting various parameters of selected lighting effects”).

75. In connection with a number of additional embodiments, Mueller further discloses the use of a processor as an effect simulator to calculate a time varying lighting value:

- “[A] simulation window 4970 can be generated for any effect, which simulates the appearance of an effect on the selected group of lights. . . . The simulation window 4970 is an animation window, so that the effect runs through time, representing the time parameters selected by the user.” *Id.*, [0304]; *see also id.*, [303];
- “The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where ***the color changes in hue, saturation or intensity over a period of time***, ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200.” *Id.*, [0215] (emphasis added);

- “By changing the coordinates in the configuration file, the real world lights can be mapped to the virtual world represented on the screen in a way that allows them to reflect what is happening in the virtual environment. The developer can thus create time-based effects, such as an explosion.” *Id.*, [0242].

76. A POSITA would have understood that the Mueller disclosed an effect simulator (processor 102) that could be programmed in a multitude of different ways, including to calculate a time-varying lighting value based on a recalled simulation parameter in the manner disclosed in multiple embodiments withing Mueller.

77. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0215]–[0218]. Mueller also describes an algorithm for altering the image information. *Id.* “The algorithm may average the information, calculate and select the maximum information, calculate and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . .or perform another calculation on the information.” *Id.*, [0218].

78. A POSITA would have understood that the parameters used to calculate information that is applied to the object with the lighting system could include a time varying value to change the information (i.e., parameter) that is used to apply a lighting effect to an object. It would have been obvious to use the

embodiment of Mueller to calculate a time varying value to produce lighting effects of Mueller's system.

79. For at least these reasons, Mueller teaches Claim Element 1d.

f. Claim Element 1e

80. Claim Element 1e recites “outputting to said lighting device said time varying lighting value thereby to simulate the lighting effect.” EX1001, 11:57-58.

81. Mueller teaches Claim Element 1e.

82. Mueller describes the outputting a time varying lighting value to simulate a selected lighting effect, as it explains that “processor 102 . . . is configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104. EX1004, [0168]. Mueller further discloses that “the processor 102 may be particularly configured (e.g., programmed) to provide controls signals to one or more of the light sources so as to generate a variety of static or *time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.*” *Id.*, [0170] (emphasis added).

83. Again, Mueller offers multiple disclosures of outputting a time varying lighting value to a lighting device, as it describes, for instance, a “simulation window 4970 [that] can be used to *display a simulation of any effect selected by the user.*” *Id.*, [0304] (emphasis added). In addition, Mueller describes:

[o]nce information is entered for the lighting system 200, the program may be used to deploy lighting effects on the lighting system using the

techniques generally described above with reference to FIGS. 4 and 5. The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where the color changes in hue, saturation or intensity over a period of time, ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200.

Id., [0215].

84. For at least these reasons, Mueller discloses Claim Element 1e.

2. Claim 2

85. Claim 2 recites “The method according to claim 1, wherein said user customisable simulation parameter is stored locally.” EX1001, 11:59-60.

86. It is my opinion that Mueller renders Claim 2 obvious.

87. The memory discussed above in connection with Claim elements 1b and 1c is located within lighting unit 100 disclosed by Mueller. *See supra* Claim Elements 1b and 1c. Specifically, Mueller discloses that the lighting unit 100 described therein can include a memory 114 to store various information, such as “one or more lighting programs for execution by the processor 102 (e.g., to generate one or more control signals for the light sources), as well as various types of data useful for generating variable color radiation” EX1004, [0172]. In addition, Mueller describes “[o]ne or more calibration values for one or more of the light

sources 104 may be stored in the memory 114, and the processor 102 may be programmed to apply the respective calibration values to the control signals for the corresponding light sources 104 so as to generate the calibrated intensities.” *Id.*, [0178]. “[P]re-programmed control signals stored in memory 114” can be accessed by a processor. *Id.*, [0183].

88. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true given Mueller’s disclosure that a user of lighting unit 100, via interface 118, can “facilitate any of a number of user-selectable settings or functions (e.g., generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, . . . etc.).” EX1004, [0182].

89. Further, the one or more calibration values (e.g., predictable, reproducible) affect the output of the lighting system and the lighting values and can be stored locally after the calibration values are determined. A POSITA, based on my understanding, would interpret the memory 114 as capable of storing a wide range of simulation parameters or lighting effects, such as the calibration values or control signals produced through an interface.

90. Mueller also describes storing at least one simulation parameters locally in another embodiment, as it describes “the lighting control interface allows for the *storage* and downloading of *new functions and new parameter* settings.” EX1004, [0380] (emphasis added). A POSITA would understand that such downloaded functions and parameter settings are stored locally.

4. Claim 3

91. Claim 3 recites “The method according to claim 1, wherein the simulation parameter comprises a colour or colour temperature.” EX1001, 11:61-62.

92. It is my opinion that Mueller renders Claim 3 obvious.

93. Mueller explains that a simulation parameter to be used with lighting unit 100 can comprises a color. Specifically, Mueller discloses that the processor 102 of lighting unit 100 “may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of stator or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” EX1004, [0170].

94. In connection with an embodiment in which multiple lighting units 100 are used together, Mueller describes the manner in which a user can “generate a color changing effect that various colors from one lighting unit 100 to another lighting unit 100 and across a number of lighting units 100 in such a way as to

generate the appearance of a propagating rainbow of colors (“rainbow chase”)” *Id.*, [0202]. Within connection with that same embodiment, Mueller explains that commands may be sent to each lighting unit 100 that “contain timing, intensity, hue, saturation or other relevant information, for example.” *Id.*

95. Mueller also describes calibration values are used by the processor 102 to cause the light source 104 to generate calibrated color. *See Id.*, [0176]–[0178]. Based on my understanding, a POSITA would interpret these calibrated values are simulation parameters that includes a color or color temperature.

96. In yet another embodiment, Mueller describes a “parameters pane 4074 presents parameters for a random color effect . . . using the button 4462, the user can select the initial color, such as by selecting it from the palette 4750 of FIG. 47.” *Id.*, [0303].

5. Claim 4

97. Claim 4 recites

The method according to claim 1, wherein the simulation parameter is related to at least one of: an effect frequency; an effect speed; a colour; a colour temperature; a trigger; a rate of increase of brightness; a rate of decrease of brightness; a rate of change of colour; a brightness; a local maximal (peak) brightness; a local minimal brightness; a brightness fluctuation period; and a colour fluctuation time period.

EX1001, 11:63-12:3.

98. It is my opinion that Mueller renders Claim 4 obvious.

99. As explained above in the context of Claim 3, Mueller discloses or teaches the method of Claim 1 wherein the simulation parameter is related to a color or a color temperature. *See supra* Claim 3.

100. Mueller also teaches simulation parameters related to brightness, EX1004, [0168] (processor 102 can be “configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104.”), and rates of change of color, *id.*, [0170] (“the processor 102 may be particularly configured . . . to provide control signals . . . so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature lighting effects.”)). A POSITA would interpret a time-varying lighting effect as including an effect frequency or effect speed since both of these effects are “time-varying.”

101. Mueller also describes that a simulation parameter related to a color in connection with other embodiments. For example, Mueller describes a “parameters pane 4074 presents parameters for a random color effect . . . using the button 4462, the user can select the initial color, such as by selecting it from the palette 4750 of FIG. 47.” *Id.*, [0303]. As understood based on my experience, a random color effect would include, for example, a rate of change of color.

102. Mueller further describes “an algorithm may be performed on information that is collected.” *Id.*, [0218]. The information is image information that

is related to effects produced by the lighting system 200. *Id.*, [0215]–[0217]. “Once information is entered for the lighting system 200, the program may be used to deploy lighting effects on the lighting system.” *Id.*, [0215]. The algorithm “[averages] the information, calculate and select the maximum information, calculate and select the minimum information, . . . or perform another calculation.” *Id.*, [0218]. A POSITA would understand the information used by the lighting system 200 can be calculated to include various effects of the lighting system, such as a minimum brightness or a maximum brightness.

6. Claim 7

103. Claim 7 recites

The method according to claim 1, wherein the lighting effect is designed to mimic at least one of: fire; lightning; police car light; television; a neon flickering sign; a candle; muzzle (gunshot); welding; spark/short circuit; a scan (e.g. fingerprint scanner); paparazzi flashes; fireworks; flashes (strobe); a propeller; a (nuclear) explosion; and a wormhole.

EX1001, 12:11-16.

104. It is my opinion that Mueller renders Claim 7 obvious.

105. In connection with an embodiment in which multiple lighting devices 100 are employed together, Mueller discloses a number of user customizable lighting effects included in the list comprising Claim 7, including a fire, EX1004, [0221], an explosion, *id.*; *see also id.*, [0215], flashes, *id.*, [0215], “and many others,” *id.*, [0221]. A POSITA would understand that these types of effects could

be generated with a single lighting unit of Mueller as well as an embodiment employing multiple lighting units as discussed in conjunction with the lighting system 200.

106. In additional embodiments, “red alert” sequences are simulated using the lighting effects of Mueller. *Id.*, [0222]. A POSITA would understand that this effect can be incorporated with the lighting unit 100.

7. Claim 8

107. Claim 8 recites “The method according to claim 1, wherein the lighting value comprises brightness and/or colour data.” EX1001, 12:17-18.

108. It is my opinion that Mueller renders Claim 8 obvious.

109. Mueller includes multiple disclosures of an effect simulator (*i.e.*, processor 102), calculating a time-varying lighting value which comprises brightness and/or color data. For instance, Mueller states that “the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to **generate** a variety of static or **time-varying (dynamic) multi-color** (or multi-color temperature) lighting effects.” EX1004, [0170] (emphasis added). Mueller also states that processor 102 can be “configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104.” *Id.*, [0168].

110. Based on my understanding, a POSITA would interpret the “multi-color lighting effects” and the “various intensities of light” as being the same as a “brightness and/or colour data.” The multi-color lighting effects would inherently require the processor 102 to process corresponding data in order to generate the multi-color lighting effects. The same or similar logic would apply for the various intensities of light as well.

8. Claim 9

111. Claim 9 recites “The method according to claim 1, further comprising converting at least one of brightness and colour data into a lighting signal and outputting the lighting signal to the lighting device.” EX1001, 12:19-22.

112. It is my opinion that Mueller renders Claim 9 obvious.

113. Mueller discloses converting at least one of brightness and color data into a lighting signal and outputting that lighting signal to the light source(s) of lighting unit 100. Specifically, Mueller discloses that a user may interact with one or more interfaces 118, which are provided “to facilitate any of a number of user-selectable settings or functions (e.g., . . . changing and/or selecting various parameters of selected lighting effects)” EX1004, [0182]. Mueller further explains that the processor 102 “controls one or more light sources 104” based at least in part on user signals provided through interface 118. *Id.*, [0183]. Such control is the result of the processor being configured “to respond to operation of the

interface 118 by originating one or more control signals for controlling one or more of the light sources 104.” *Id.*

114. As explained above in connection with Claim 8, these controls signals vary lighting parameters including color and brightness. *See supra* Claim 8; *see also* EX1004, [0168], [0170].

9. Claim 10

115. Claim 10 recites “The method according to claim 1, wherein the controlling is for a lighting system for videography, broadcast, cinematography, studio filming and/or location filming.” EX1001, 12:23-25.

116. It is my opinion that Mueller renders Claim 10 obvious.

117. Mueller explains that the systems described therein can be used in a variety of contexts and locations, including “a film studio, [and] a video studio.” EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

118. Further, many of the disclosed embodiments, such as the lighting system 200 can be used for the same or similar purposes of “videography, broadcast, cinematography, studio filming and/or location filming.” The disclosed units and systems, such as lighting unit 100 and lighting system 200, could easily be used for

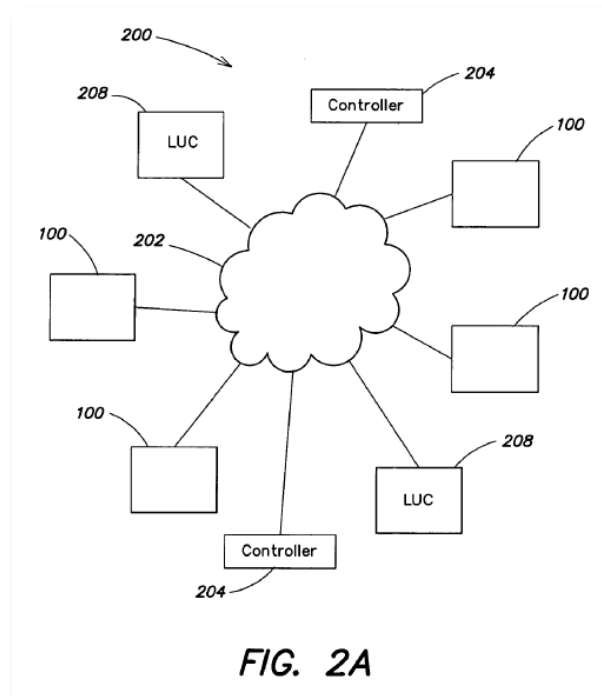
videography, broadcast, cinematography, studio filming, and/or location filming with little to no modifications.

10. Claim 11

119. Claim 11 recites “The method according to claim 1, further comprising controlling at least one further lighting device.” EX1001, 12:26-27.

120. It is my opinion that Mueller renders Claim 11 obvious.

121. Mueller explains that “a number of lighting units 100, such as those described above with reference to FIG. 1, may be interconnected in a communicating relationship through a network to form a networked lighting system.” EX1004, [0197]. This networked lighting system is illustrated in Figure 2 of Mueller.



Id., Figure 2A; *see also id.*, [0197].

122. Mueller goes on to explain that the lighting system 200 illustrated in Figure 2A comprises additional lighting devices (lighting units 100). *Id.*, Figure 2A.

11. Claim 12

123. It is my opinion that Mueller renders Claim 12 obvious.

a. Claim Element 12p

124. The preamble of Claim 12, designated Claim Element 12p herein, recites “A system adapted to control at least one lighting device to produce a range of different user customisable lighting effects, the system comprising:” EX1001, 12:30-32.

125. For purposes of this Declaration, I assume that the preamble of Claim 12 is limiting and must be considered for purposes of evaluating the validity of the claim.

126. Regardless, Mueller teaches Claim Element 12p.

127. Mueller describes a system adapted to control a lighting device. In particular, Mueller describes “methods and systems for managing control instructions for a plurality of light systems.” EX1004, [0025]. In particular, Mueller describes a “**lighting unit 100** that may serve as a device in a lightning environment,” which a lighting device. *Id.*, [0164] (emphasis added). Lightning unit 100 is controlled by a processor 102 that “may be particularly configured (e.g.,

programmed) to provide control signals to one or more of the light sources [within the lighting unit 100] so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.*, [0182] (referring to user-selectable settings or functions that “generally controlling the light output of the lightning unit 100 . . .”).

128. In addition, Mueller describes a system for generating control signals to lighting units. EX1004, [0204] The lighting system includes a “graphical source” that can “be a program for creating lighting effects in a two-or three-dimensional lighting environment. For example, a user may specify an explosion lighting effect. The desired effect may be an initial bright white light in a corner of a room with light traveling away from the corner (possibly with changing color) at a specified speed and in a specified direction.” *Id.*, [0207].

129. Mueller further discloses that control of the lightning unit 100 includes producing user customizable lightning effects. Specifically, Mueller describes “controlling the light output of lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, [and] setting particular identifiers such as addresses or serial numbers for the lighting unit . . .” *Id.*, [0182]; *see also id.*, [0202] (“a lighting system user may want to generate a color changing effect that varies colors from one lighting unit 100 to another

lighting unit 100, or across a number of the lighting units 100 in such a way as to generate the appearance of a propagating rainbow of colors (‘rainbow chase’), given a particular placement of lighting units 100 with respect to one another. In this example, the user may provide a simple instruction to the central controller 204 to accomplish this”), [214] (“An explosion icon can be selected with a mouse-controlled cursor or other interface technique, which may prompt the user to click on a starting and ending point for the explosion in the coordinate system. By locating a vector in the representation, the user can cause an explosion to be initiated”).

130. For at least these reasons, Mueller teaches Claim Element 12p.

b. Claim Element 12a

131. Claim Element 12a recites “an input interface adapted to receive user input of at least one user input simulation parameter to customise a lighting effect;” EX1001, 12:33-35.

132. Mueller teaches Claim Element 12a.

133. Mueller states that the interface 118 can present a user interface to a user for controlling the lighting unit 100. EX1004, [0182]. Mueller thus discloses user input through the interface 118.

134. Mueller further describes that the interface 118 can enable a user to both “chang[e] and/or select[] various pre-programmed lighting effects to be

generated by the lighting unit” and “chang[e] and/or select[] various parameters of selected lighting effects.” *Id.*

135. Mueller also discloses that the interface 118 “may be coupled . . . to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

136. Muller further discloses an “interface 118 may present external controls that are, for example, physical controls such as switches, dials, buttons, or the like, programmatic controls, such as an application programming interface, or a user interface such as a graphical user interface on a computer.” *Id.*

137. Mueller also discloses that “the interface 118 may simply present a network interface that may be accessed through any corresponding network facility and may be coupled in turn to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

138. A POSITA would interpret the using the interface of Mueller, whether through a network or physical controls, for selecting pre-programmed lighting effects, i.e., the simulation parameter, as providing a simulation parameter to customize lighting effects.

139. For at least these reasons, Mueller teaches Claim Element 12a.

c. Claim Element 12b

140. Claim Element 12b recites “a memory adapted to store said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated; and” EX1001, 12:36-39.

141. Mueller teaches Claim Element 12b.

142. Mueller describes, associated with the processor disclosed therein, “one or more storage media generically referred to . . . as ‘memory[.]’” EX1004, [0064]. “[T]he storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein.” *Id.* Mueller describes such functions as including, “generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting *various parameters of selected lighting effects*, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

143. Mueller further provides that

[t]he lighting unit 100 also may include a *memory* 114 to *store* various information. For example, the memory 114 may be employed to *store one or more lighting programs* for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation

Id., [0172] (emphasis added).

144. Muller also discloses the processor “may be configured to respond to operation of the interface 118.” *Id.*, [0183]. In addition, the processor 102 may respond to “selecting one or more pre-programmed control signals stored in memory 114, modifying control signals generated by executing a lighting program, selecting and executing a new lighting program from memory 114, or otherwise affecting the radiation generated by one or more of the light sources 104.” *Id.*

145. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: “the lighting control interface allows for the storage and downloading of new functions and new parameter settings.” EX1004, [0380].

146. In view of the disclosure by Mueller that the storage of lighting effects and the user-selected parameters associated therewith is carried out by memory, EX1004, [0064], a POSITA would understand that such storage of user input simulation parameters must be in memory for fast execution by processor 102.

147. Therefore, Mueller teaches Claim Element 12b.

d. Claim Element 12c

148. Claim Element 12c recites
an effect simulator adapted to:

recall from said memory said at least one stored user input simulation parameter; and

EX1001, 12:40-42.

149. Mueller teaches Claim Element 12c.

150. As discussed in the context of Claim Element 12b, Mueller discloses storing at least one user input simulation parameter depending on the lighting effect being simulated. Mueller also discloses recalling the stored simulation parameter being recalled for execution: “[t]he memory 114 may be employed to store one or more lighting programs for execution by the processor 102 (e.g., to generate one or more control signals for the light sources.” EX1004, [0172].

151. A POSITA would understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for “user modification and implementation” of lighting effects. EX1004, [0380].

152. Mueller also explains “the processor 102 may be configured to respond by selecting one or more pre-programmed control signals stored in memory 114. . . .”

153. Therefore, Mueller teaches Claim Element 12c.

e. Claim Element 12d

154. Claim Element 12d recites “calculate a time varying lighting value based on said recalled simulation parameter;” EX1001, 12:43-44.

155. Mueller teaches Claim Element 12d.

156. Mueller describes an effect simulator which performs calculations, namely a processor/controller. Specifically, Mueller describes that a processor 102 within lighting device 100 is configured to output at least one control signal for each light source 104 so as to independently control the intensity of light generated by each light source 104. EX1004, [0168].

157. Mueller further explains that the processor 102 calculates a time varying lighting value: “the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.*, [0182] (“changing and/or selecting various parameters of selected lighting effects”).

158. In connection with a number of additional embodiments, Mueller further discloses the use of a processor as an effect simulator to calculate a time varying lighting value:

- “[A] simulation window 4970 can be generated for any effect, which simulates the appearance of an effect on the selected group of lights. . . . The simulation window 4970 is an animation window, so

that the effect runs through time, representing the time parameters selected by the user.” *Id.*, [0304]; *see also id.*, [303];

- “The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where ***the color changes in hue, saturation or intensity over a period of time***, ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200.” *Id.*, [0215] (emphasis added);
- “By changing the coordinates in the configuration file, the real world lights can be mapped to the virtual world represented on the screen in a way that allows them to reflect what is happening in the virtual environment. The developer can thus create time-based effects, such as an explosion.” *Id.*, [0242].

159. A POSITA would have understood that the Mueller disclosed an effect simulator (processor 102) that could be programmed in a multitude of different ways, including to calculate a time-varying lighting value based on a recalled simulation parameter in the manner disclosed in multiple embodiments withing Mueller.

160. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0215]–[0218]. Mueller also describes an algorithm for altering the image information. *Id.* “The algorithm may average the information, calculate and select the maximum information, calculate

and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . .or perform another calculation on the information.” *Id.*, [0218].

161. A POSITA would have understood that the parameters used to calculate information that is applied to the object with the lighting system could include a time varying value to change the information (i.e., parameter) that is used to apply a lighting effect to an object. It would have been obvious to use the embodiment of Mueller to calculate a time varying value to produce lighting effects of Mueller’s system.

162. For at least these reasons, Mueller teaches Claim Element 12d.

f. Claim Element 12e

163. Claim Element 12e recites “wherein the effect simulator is adapted to output said calculated time varying lighting value to the at least one lighting device thereby to simulate a lighting effect.” EX1001, 12:45-47.

164. Mueller teaches Claim Element 12e.

165. Mueller describes the outputting a time varying lighting value to simulate a selected lighting effect, as it explains that “processor 102 . . . is configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104. EX1004, [0168]. Mueller further discloses that “the processor 102 may be particularly configured

(e.g., programmed) to provide controls signals to one or more of the light sources so as to generate a variety of static or *time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.*” *Id.*, [0170] (emphasis added).

166. Again, Mueller offers multiple disclosures of outputting a time varying lighting value to a lighting device, as it describes, for instance, a “simulation window 4970 [that] can be used to *display a simulation of any effect selected by the user.*” *Id.*, [0304] (emphasis added). In addition, Mueller describes:

[o]nce information is entered for the lighting system 200, the program may be used to deploy lighting effects on the lighting system using the techniques generally described above with reference to FIGS. 4 and 5. The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where the color changes in hue, saturation or intensity over a period of time, ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200.

Id., [0215].

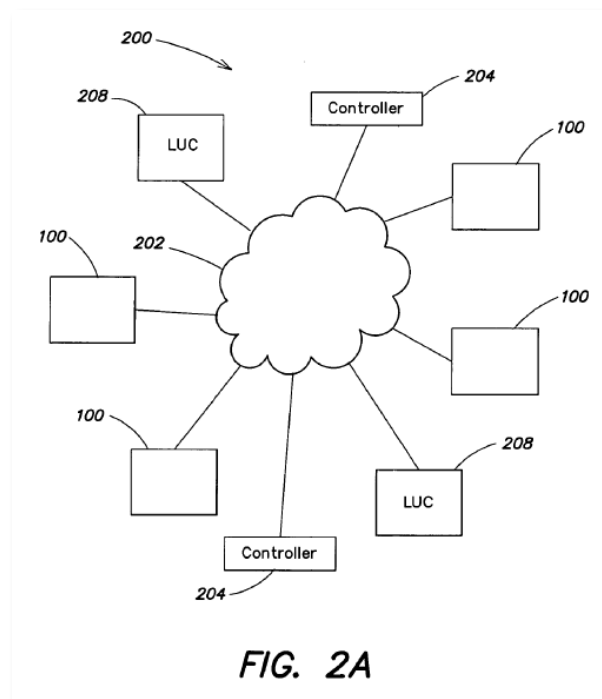
167. For at least these reasons, Mueller discloses Claim Element 12e.

12. Claim 13

168. Claim 13 recites “The system according to claim 12, wherein the system is adapted to control at least one further lighting device.” EX1001, 12:48-49.

169. It is my opinion that Mueller renders Claim 13 obvious.

170. Mueller explains that “a number of lighting units 100, such as those described above with reference to FIG. 1, may be interconnected in a communicating relationship through a network to form a networked lighting system.” EX1004, [0197]. This networked lighting system is illustrated in Figure 2 of Mueller.



Id., Figure 2A; *see also id.*, [0197].

171. Mueller goes on to explain that the lighting system 200 illustrated in Figure 2A comprises additional lighting devices (lighting units 100). *Id.*, Figure 2A.

13. Claim 14

172. Claim 14 recites “The system according to claim 12, further comprising an input interface and wherein the input interface comprises at least one of: a wireless communication interface; a dial; a slider; a display and buttons.” EX1001, 12:50-53.

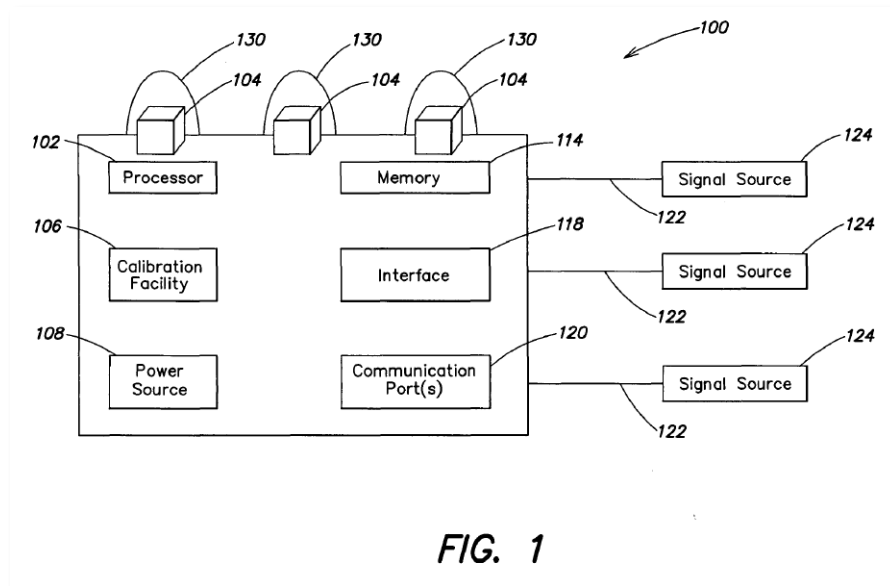
173. It is my opinion that Mueller renders Claim 14 obvious.

174. As explained above in connection with Claim Element 12a, Mueller discloses an input interface in the form of interface 118. *See supra* Claim Element 12a; *see also* EX1004, [0182]. Mueller further provides that “[t]he interface 118 may present external controls that are, for example, physical controls such as switches, dials, buttons, or the like, programmatic controls, such as an application programming interface, or a user interface such as a graphical user interface on a computer.” EX1004, [0182].

175. Mueller goes on to explain that “the interface 118 may simply present a network interface that may be accessed through any corresponding network facility and may be coupled in turn to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

176. Mueller further discloses the manner in which lighting unit 100 can be wirelessly networked with other devices through “communication ports 120” which are interfaces for communication with other lighting devices. *Id.*, [0190] (“the

lighting unit 100 may include one or more communication ports 120 to facilitate coupling of the lighting unit 100 to any of a variety of other devices . . . the communication port 120 may include an interface for any suitable wireless communications”), Figure 1.



Id., Figure 1.

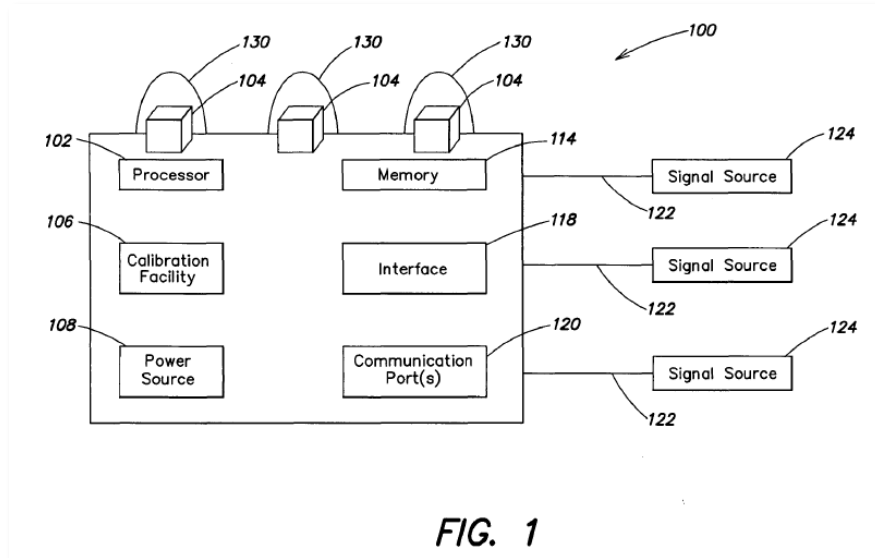
177. Mueller explains that the communication port(s) 120 can be integrated into the processor 102, as it describes that “any of the components discussed above, such as the signal sources 124, interfaces 118, communication ports 120, and other components . . . either as stand alone components, integrated components or shared components” can be flexibly configured to be included with processor 102. *Id.*, [0198].

14. Claim 15

178. Claim 15 recites “The system according to claim 12, wherein said at least one lighting device is integrated in a combined unit.” EX1001, 12:54-55.

179. It is my opinion that Mueller renders Claim 15 obvious.

180. Mueller describes that the effect simulator (i.e., processor 102), input interface 118, memory 114, and light sources 104 are integrated in a combined unit: lighting unit 100. EX1004, [0168], Figure 1.



Id., Figure 1.

181. Based on FIG. 1, a POSITA would interpret the description and FIG. 1 to show that the components could be integrated in a combined unit to form the lighting unit 100.

15. Claim 16

182. Claim 16 recites “The system according to claim 12, wherein the at least one lighting device comprises a lighting device for videography, broadcast, cinematography, studio filming and/or location filming.” EX1001, 12:56-59.

183. It is my opinion that Mueller renders Claim 16 obvious.

184. Mueller explains that the systems described therein can be used in a variety of contexts and locations, including “a film studio, [and] a video studio.” EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

185. Further, many of the disclosed embodiments, such as the lighting system 200 can be used for the same or similar purposes of “videography, broadcast, cinematography, studio filming and/or location filming.”

16. Claim 17

186. Claim 17 recites “The system according to claim 12, wherein the at least one lighting device comprises at least one light emitting diode.” EX1001, 60-62.

187. It is my opinion that Mueller renders Claim 17 obvious.

188. Mueller discloses that the lighting device (lighting unit 100) comprises one or more light sources 104, and that those light sources 104 may be light emitting diodes (LEDs). EX1004, [0167] (“The lighting unit 100 may include one or more light sources 104, wherein one or more of the light sources may be an LED-based light source that includes one or more light emitting diodes (LEDs).”).

17. Claim 18

189. Claim 18 recites “A lighting device according to claim 17, wherein the at least one lighting device is used for videography, broadcast, cinematography, studio filming and/or location filming.” EX1001, 12:63-65.

190. It is my opinion that Mueller renders Claim 18 obvious.

191. Mueller explains that the systems described therein can be used in a variety of contexts and locations, including “a film studio, [and] a video studio.” EX1004, [0034]. A POSITA would understand that the lighting systems and methods described in Mueller could be used in a number of entertainment settings, including videography, broadcast, cinematography, studio filming, and/or location filming.

192. Further, many of the disclosed embodiments, such as the lighting system 200 can be used for the same or similar purposes of “videography, broadcast, cinematography, studio filming and/or location filming.”

18. Claim 19

193. It is my opinion that Mueller renders Claim 19 obvious.

a. Claim Element 19p

194. The preamble of Claim 19, designated Claim Element 19p herein, recites “A computer program product comprising software code for controlling a lighting device to produce a range of different user customisable lighting effects the computer program product is adapted to perform, when executed, the steps of:” EX1001, 12:66-13:3.

195. For purposes of this Declaration, I assume that the preamble of Claim 19 is limiting and must be considered for purposes of evaluating the validity of the claim.

196. Mueller discloses the methods described therein can be performed by a “software program” as in Claim 19. Mueller discloses that, “[i]n some implementations [of the methods and systems described therein], the storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein.” EX1004, [0064]. Mueller further provides that “[t]he terms ‘program’ and ‘computer program’ are used herein in a generic sense to refer to any type of computer code (e.g., high or low level software, microcode, and so on) that can be employed to control operation of a processor.” *Id.* A POSITA would thus understand that the

control of lighting systems and methods disclosed in Mueller is via a processor's execution of software code.

197. Mueller further describes “methods and systems for managing control instructions for a plurality of light systems.” EX1004, [0025]. In particular, Mueller describes a “**lighting unit 100** that may serve as a device in a lightning environment,” which a lighting device. *Id.*, [0164] (emphasis added). Lightning unit 100 is controlled by a processor 102 that “may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources [within the lighting unit 100] so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.*, [0182] (referring to user-selectable settings or functions that “generally controlling the light output of the lightning unit 100 . . .”).

198. In addition, Mueller describes a system for generating control signals to lighting units. EX1004, [0204] The lighting system includes a “graphical source” that can “be a program for creating lighting effects in a two-or three-dimensional lighting environment. For example, a user may specify an explosion lighting effect. The desired effect may be an initial bright white light in a corner of a room with light traveling away from the corner (possibly with changing color) at a specified speed and in a specified direction.” *Id.*, [0207].

199. Mueller further discloses that control of the lightning unit 100 includes producing user customizable lightning effects. Specifically, Mueller describes “controlling the light output of lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects, [and] setting particular identifiers such as addresses or serial numbers for the lighting unit” Id., [0182]; see also id., [0202] (“a lighting system user may want to generate a color changing effect that varies colors from one lighting unit 100 to another lighting unit 100, or across a number of the lighting units 100 in such a way as to generate the appearance of a propagating rainbow of colors (‘rainbow chase’), given a particular placement of lighting units 100 with respect to one another. In this example, the user may provide a simple instruction to the central controller 204 to accomplish this”), [214] (“An explosion icon can be selected with a mouse-controlled cursor or other interface technique, which may prompt the user to click on a starting and ending point for the explosion in the coordinate system. By locating a vector in the representation, the user can cause an explosion to be initiated”).

200. For at least these reasons, Mueller teaches Claim Element 19p.

b. Claim Element 19a

201. Claim Element 19a recites “receiving user input of at least one user input simulation parameter to customise a lighting effect;” EX1001, 13:4-5.

202. Mueller teaches Claim Element 19a.

203. Mueller states that the interface 118 can present a user interface to a user for controlling the lighting unit 100. EX1004, [0182]. Mueller thus discloses user input through the interface 118.

204. Mueller further describes that the interface 118 can enable a user to both “chang[e] and/or select[] various pre-programmed lighting effects to be generated by the lighting unit” and “chang[e] and/or select[] various parameters of selected lighting effects.” *Id.*

205. Mueller also discloses that the interface 118 “may be coupled . . . to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

206. Muller further discloses an “interface 118 may present external controls that are, for example, physical controls such as switches, dials, buttons, or the like, programmatic controls, such as an application programming interface, or a user interface such as a graphical user interface on a computer.” *Id.*

207. Mueller also discloses that “the interface 118 may simply present a network interface that may be accessed through any corresponding network facility and may be coupled in turn to a computer that provides a graphical user interface to a user for controlling the lighting unit 100.” *Id.*

208. A POSITA would interpret the using the interface of Mueller, whether through a network or physical controls, for selecting pre-programmed lighting effects, i.e., the simulation parameter, as providing a simulation parameter to customize lighting effects.

209. For at least these reasons, Mueller teaches Claim Element 19a.

c. Claim Element 19b

210. Claim Element 19b recites “storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;” EX1001, 13:6-9.

211. Mueller discloses Claim Element 19b.

212. Mueller describes, associated with the processor disclosed therein, “one or more storage media generically referred to . . . as ‘memory[.]’” EX1004, [0064]. “[T]he storage media may be encoded with one or more programs that, when executed on one or more processors, perform at least some of the functions discussed herein.” *Id.* Mueller describes such functions as including, “generally controlling the light output of the lighting unit 100, changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting *various parameters of selected lighting effects*, setting particular identifiers such as addresses or serial numbers for the lighting unit. *Id.*, [0182] (emphasis added).

213. Mueller further provides that

[t]he lighting unit 100 also may include a **memory** 114 to **store** various information. For example, the memory 114 may be employed to **store one or more lighting programs** for execution by the processor 102 (e.g., to generate one or more control signals for the lights sources, as well as various types of data useful for generating variable color radiation

Id., [0172] (emphasis added).

214. Muller also discloses the processor “may be configured to respond to operation of the interface 118.” *Id.*, [0183]. In addition, the processor 102 may respond to “selecting one or more pre-programmed control signals stored in memory 114, modifying control signals generated by executing a lighting program, selecting and executing a new lighting program from memory 114, or otherwise affecting the radiation generated by one or more of the light sources 104.” *Id.*

215. A POSITA would understand that a lighting program stored in memory 114 could include a user input simulation parameter depending on a selected lighting effect to be simulated. This is particularly true because, in connection with another embodiment, Mueller describes storing at least one simulation parameter in memory: “the lighting control interface allows for the storage and downloading of new functions and new parameter settings.” EX1004, [0380].

216. In view of the disclosure by Mueller that the storage of lighting effects and the user-selected parameters associated therewith is carried out by memory,

EX1004, [0064], a POSITA would understand that such storage of user input simulation parameters must be in memory for fast execution by processor 102.

217. Therefore, Mueller teaches Claim Element 19b.

d. Claim Element 19c

218. Claim Element 19c recites “recalling from said memory said at least one stored user input simulation parameter;” EX1001, 13:10-11.

219. Mueller teaches Claim Element 19c.

220. As discussed in the context of Claim Element 19b, Mueller discloses storing at least one user input simulation parameter depending on the lighting effect being simulated. Mueller also discloses recalling the stored simulation parameter being recalled for execution: “[t]he memory 114 may be employed to store one or more lighting programs for execution by the processor 102 (e.g., to generate one or more control signals for the light sources.” EX1004, [0172].

221. A POSITA would understand that the purpose for storing in memory a lighting program, comprising lighting effects and their parameters, was to later recall the lighting program and run it. This is particularly true given that Mueller, in the context of a separate embodiment describes that lighting functions and parameters can be stored for “user modification and implementation” of lighting effects. EX1004, [0380].

222. Mueller also explains “the processor 102 may be configured to respond by selecting one or more pre-programmed control signals stored in memory 114. . . .”

223. Therefore, Mueller teaches Claim Element 19c.

e. Claim Element 19d

224. Claim Element 19d recites “calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter; and” EX1001, 13:12-14.

225. Mueller describes an effect simulator which performs calculations, namely a processor/controller. Specifically, Mueller describes that a processor 102 within lighting device 100 is configured to output at least one control signal for each light source 104 so as to independently control the intensity of light generated by each light source 104. EX1004, [0168].

226. Mueller further explains that the processor 102 calculates a time varying lighting value: “the processor 102 may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.*, [0182] (“changing and/or selecting various parameters of selected lighting effects”).

227. In connection with a number of additional embodiments, Mueller further discloses the use of a processor as an effect simulator to calculate a time varying lighting value:

- “[A] simulation window 4970 can be generated for any effect, which simulates the appearance of an effect on the selected group of lights. . . . The simulation window 4970 is an animation window, so that the effect runs through time, representing the time parameters selected by the user.” *Id.*, [0304]; *see also id.*, [303];
- “The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where ***the color changes in hue, saturation or intensity over a period of time***, ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200.” *Id.*, [0215] (emphasis added);
- “By changing the coordinates in the configuration file, the real world lights can be mapped to the virtual world represented on the screen in a way that allows them to reflect what is happening in the virtual environment. The developer can thus create time-based effects, such as an explosion.” *Id.*, [0242].

228. A POSITA would have understood that the Mueller disclosed an effect simulator (processor 102) that could be programmed in a multitude of different ways, including to calculate a time-varying lighting value based on a recalled simulation parameter in the manner disclosed in multiple embodiments withing Mueller.

229. In connection with additional embodiments, Mueller describes altering image information that is used to control lighting effects applied to real world objects also shown in a virtual environment. *Id.*, [0215]-[0218]. Mueller also describes an algorithm for altering the image information. *Id.* “The algorithm may average the information, calculate and select the maximum information, calculate and select the minimum information, calculate and select the first quartile of the information, calculate and select the third quartile of the information, . . .or perform another calculation on the information.” *Id.*, [0218].

230. A POSITA would have understood that the parameters used to calculate information that is applied to the object with the lighting system could include a time varying value to change the information (i.e., parameter) that is used to apply a lighting effect to an object. It would have been obvious to use the embodiment of Mueller to calculate a time varying value to produce lighting effects of Mueller’s system.

231. For at least these reasons, Mueller teaches Claim Element 19d.

f. Claim Element 19e

232. Claim Element 19e recites “outputting to said lighting device said time varying lighting value thereby to simulate a lighting effect.” EX1001, 13:15-16.

233. Mueller teaches Claim Element 19e.

234. Mueller describes the outputting a time varying lighting value to

simulate a selected lighting effect, as it explains that “processor 102 . . . is configured to output one or more control signals to drive the light sources 104 so as to generate various intensities of light from the light sources 104. EX1004, [0168]. Mueller further discloses that “the processor 102 may be particularly configured (e.g., programmed) to provide controls signals to one or more of the light sources so as to generate a variety of static or *time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.*” *Id.*, [0170] (emphasis added).

235. Again, Mueller offers multiple disclosures of outputting a time varying lighting value to a lighting device, as it describes, for instance, a “simulation window 4970 [that] can be used to *display a simulation of any effect selected by the user.*” *Id.*, [0304] (emphasis added). In addition, Mueller describes:

[o]nce information is entered for the lighting system 200, the program may be used to deploy lighting effects on the lighting system using the techniques generally described above with reference to FIGS. 4 and 5. The program may be configured, for example to generate an array of lighting effects such as color-changing effects, stroboscopic effects, flashing effects, coordinated lighting effects, lighting effects coordinated with other media such as video or audio, color wash where the color changes in hue, saturation or intensity over a period of time, ambient color generation, color fades, effects that simulate movement such as a color chasing rainbow, a flare streaking across a room, a sun rising, a plume from an explosion, other moving effects, and any other lighting effect consistent with the environment 602 and the lighting system 200.

Id., [0215].

236. For at least these reasons, Mueller discloses Claim Element 1e.

B. Ground 1a: Claims 5 and 6 of the '044 Patent are obvious under 35 U.S.C. 103 over Mueller in view of Edwards.

1. Overview of Edwards

237. Edwards was filed as U.S. Patent Application No. 15/061,893 on March 4, 2016, and issued as U.S. Patent No. 9,743,010 on August 22, 2017. Edwards Claims priority to Provisional Application No. 62/128,392, filed March 4, 2015, and Provisional Application No. 62/264,673, filed December 8, 2015. Edwards is prior art under at least 35 U.S.C. § 102(a)(2).

238. Edwards discloses a system and method for synchronizing LED light fixtures to digital camera shutters. EX1011, Abstract. The system controls the LEDs so that “changing of lighting can be synchronized with the times when the shutter is closed so that all frames are complete and are without the visual artifact of the light changing mid frame.” *Id.*

239. Edwards discloses that its lighting system can produce lighting effects, such as lightning, a camera flash, strobing, street light flicker, fire, and a candle, while compensating for rolling shutter artefacts. *Id.*, 3:18-28, 11:38-12:1. The lighting system includes “LED light fixtures” and a “lighting controller.” *Id.*, 5:18-51, 6:49-62. The lighting controller “can be included inside each individual LED light fixture” or in “an external third system which links all the lights together and coordinates the commands.” *Id.*, 6:57-62; *see also id.*, 7:20-8:1. A user can input a camera synchronization signal to the lighting controller, along with the “commands

that control the lights” and produce the effect. *Id.*, 5:18-24, 6:57-62, 7:20-8:1. The lighting controller compensates for the rolling shutter artefacts by holding commands to control the lights “until the next vertical frame synch pulse,” and then times any lighting transitions for each frame to “occur during the closed shutter period prior to the frame being captured by the camera.” *Id.*, 5:24-29.

240. In Edwards, the LEDs are synchronized to the camera shutter frequency, such that they are “on” while the camera shutter is open, and changes to the LED lighting, which would otherwise introduce undesired visual artifacts, occur only when the shutter is closed. *Id.*; *see also id.*, 1:25-30 (“The present invention is related to synchronization of changes in lighting to the camera shutter for videos and motion pictures. This enables all lighting transitions to be done between frames making the resulting frame image capture clean and free from artifacts that occur when lighting changes occur in the middle of a frame.”).

2. Motivation to Combine Edwards with Mueller

241. Mueller and Edwards are in the same field of art, namely entertainment lighting methods and systems. Mueller provides abundant disclosures regarding the control of lighting devices to produce a wide range of entertainment lighting effects, including light effects to be used in film and video recording.

242. Mueller does not specifically provide specific disclosure relating to use of lighting controls to compensate for camera shutter speeds and frame rates to

prevent the creation of flicker or rolling shutter artifacts. As demonstrated by Edwards, however, the need for such controls, and the methods to carry them out, were well known as of the priority date of the '101 Patent. Knowing the necessity of such controls, a POSITA would have been motivated to supplement the disclosures of Mueller with known methods for preventing flicker and rolling shutter artifacts, such as those taught by Edwards.

3. Claim 5

243. Claim 5 recites “The method according to claim 1, wherein the lighting effect comprises a short time-period (e.g. stroboscopic) lighting effect with a user adjustable minimum pulse width.” EX1001, 12:4-6.

244. It is my opinion that Mueller in view of Edwards renders Claim 5 obvious.

245. In connection with an embodiment in which multiple lighting devices 100 are employed together, Mueller describes a stroboscopic lighting effect. *See, e.g.,* EX1004, [0215] (“The program may be configured, for example to generate an array of *lighting effects* such as color-changing effects, *stroboscopic effects*” (emphasis added)). Such stroboscopic effects are short time-period lighting effects. A POSITA would understand that this type of effect could be generated with a single lighting unit of Mueller as well as an embodiment employing multiple lighting units.

246. Edwards discloses that its lighting system can produce lighting effects, such as lightning, a camera flash, strobing, street light flicker, fire, and a candle, while compensating for rolling shutter artefacts. EX1011, 3:18-28, 11:38-12:1. The lighting system includes “LED light fixtures” and a “lighting controller.” *Id.*, 5:18-51, 6:49-62. The lighting controller “can be included inside each individual LED light fixture” or in “an external third system which links all the lights together and coordinates the commands.” *Id.*, 6:57-62; *see also id.*, 7:20-8:1. A user can input a camera synchronization signal to the lighting controller, along with the “commands that control the lights” and produce the effect. *Id.*, 5:18-24, 6:57-62, 7:20-8:1.

247. A POSITA would have understood that Mueller and Edwards teach that a user could adjust pulse width, i.e., a short time-period (e.g. stroboscopic) lighting effect with a user adjustable minimum pulse width.

4. Claim 6

248. Claim 6 recites “The method according to claim 1, wherein the user customisable simulation parameter comprises a parameter indicative of a group consisting of: a camera recording frequency; a camera shutter speed; and a camera frame rate.” EX1001, 12:7-10.

249. It is my opinion that Mueller in view of Edwards renders Claim 6 obvious.

250. Mueller describes a method for controlling a lighting device. In particular, Mueller describes “methods and systems for managing control instructions for a plurality of light systems.” EX1004, [0025]. Mueller specifically describes a “**lighting unit 100** that may serve as a device in a lightning environment.” *Id.*, [0164] (emphasis added). Lightning unit 100 is controlled by a processor 102 that “may be particularly configured (e.g., programmed) to provide control signals to one or more of the light sources [within the lighting unit 100] so as to generate a variety of static or time-varying (dynamic) multi-color (or multi-color temperature) lighting effects.” *Id.*, [0170]; *see also id.* at [0182] (referring to user-selectable settings or functions that “generally controlling the light output of the lightning unit 100 . . .”).

251. Mueller further discloses that control of the lightning unit 100 includes producing user-customizable lightning effects. Specifically, Mueller describes “controlling the light output of lighting unit 100, ***changing and/or selecting various pre-programmed lighting effects to be generated by the lighting unit, changing and/or selecting various parameters of selected lighting effects***, [and] setting particular identifiers such as addresses or serial numbers for the lighting unit” *Id.*, [0182] (emphasis added); *see also id.*, [0202] (“a lighting system user may want to generate a color changing effect that varies colors from one lighting unit 100 to another lighting unit 100, or across a number of the lighting units 100 in such a way

as to generate the appearance of a propagating rainbow of colors (‘rainbow chase’), given a particular placement of lighting units 100 with respect to one another. In this example, the user may provide a simple instruction to the central controller 204 to accomplish this”), [214] (“An explosion icon can be selected with a mouse-controlled cursor or other interface technique, which may prompt the user to click on a starting and ending point for the explosion in the coordinate system. By locating a vector in the representation, the user can cause an explosion to be initiated”).

252. It would have been obvious to a POSITA to apply Edwards’s additional teachings of compensating for rolling shutter artifacts produced by a camera to Mueller. Mueller and Edwards are analogous art—both disclose systems for producing lighting effect. Both include controllers allowing a user to select and customize lighting effects such that a POSITA would have understood that adding the feature of compensating for rolling shutter artifacts produced by a camera as described in Edwards, would simply be the addition of a known method to a compatible system.

C. Ground 2: Claims 1-19 are anticipated under 35 U.S.C. § 102 by Astera or are obvious under 35 U.S.C. § 103 over Astera.

1. Overview of Astera

253. Astera (EX1010) discloses how the AX10 can, through an interface on the light, a remote, or an app, receive user selections for customizable lighting

effects, store those inputs, and then produce the customizable lighting effects at a later time.

254. Astera is a user manual for the AX10, a controllable lighting device used in studio filming and entertainment lighting. I understand the AX10 was sold to customers beginning in 2014 in Germany, and the first orders from customers in the United States were in March 2015. EX1012, ¶¶4-8 Astera bears a date of May 7, 2015, and was made publicly available, including to distributors and purchasers of the AX10, beginning at least in June of 2015 in the U.S., including via a Quick Start guide in product packaging and via Astera’s website. *Id.*

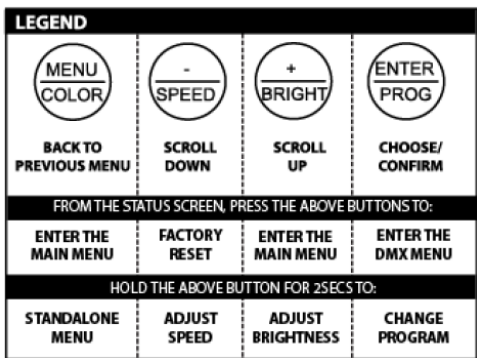
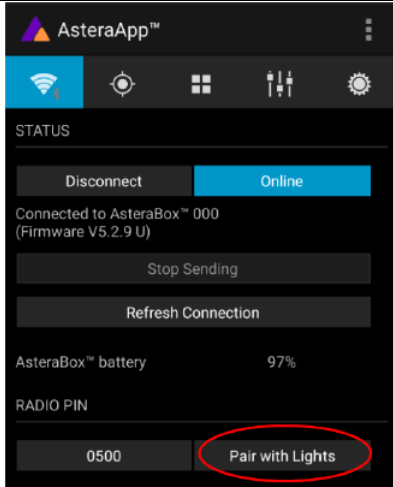
255. Astera describes operation and use of the AX10, a controllable lighting fixture with an array of nine “RGBAW” (*i.e.*, red, green, blue, amber, and white) LEDs:



EX1010, cover (annotated).

256. The AX10 can be controlled by various controllers, including (a) LCD Control Panel (with a “standalone engine”) on the AX10 (“**Control Panel**”), (b) remote control, (c) “AsteraApp” (an app for mobile devices), and (d) CRMX wireless DMX. *Id.*, 9.

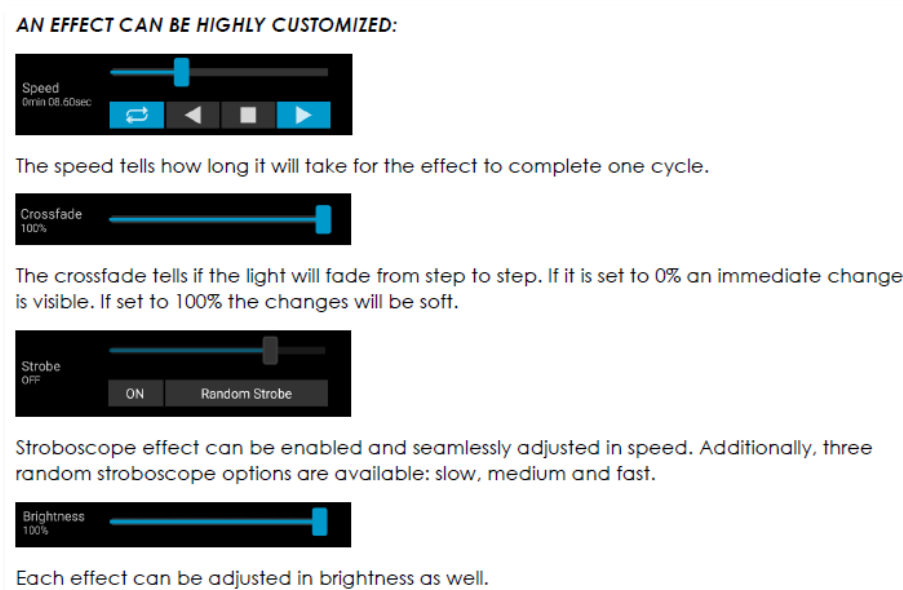
257. The AX10 can be controlled by various controllers, including (a) LCD Control Panel (with a “standalone engine”) on the AX10 (“**Control Panel**”), (b) remote control, (c) “AsteraApp” (an app for mobile devices), and (d) CRMX wireless DMX. *Id.*, 9.

Control Panel on AX10 Light	Remote Control	App
		

Id., 9, 11, 23.

258. The AX10 produces customized lighting effects, *id.*, 23-24, 27-28, 32, run through the Control Panel, infrared remote, AsteraApp, and DMX control. *Id.*, 21, 28; *see also id.*, 17. The effects include fire, fast, medium, and slow strobes, color chaser effects, color fades, spiral colors, and rainbow. *Id.*, 17, 21. Users can

customize these effects by adjusting parameters including speed, crossfade, stroboscope, and brightness:



Id., 27; *see also id.*, 20, 24-29.

2. Claim 1

259. It is my opinion that Astera anticipates or renders obvious Claim 1.

a. Claim Element 1p

260. The preamble of Claim 1, designated Claim Element 1p herein, recites “A method for controlling a lighting device to produce a range of different user customisable lighting effects, the method comprising:” EX1001, 11:43-45.

261. It is my understanding that a patent claim’s preamble does not limit the scope of the claim except in limited circumstances. If the preamble of Claim 1 is not limiting, then it does not impact the validity of Claim 1. For the purposes of this declaration, I assume that the preamble of Claim 1, and the preambles of

independent Claims 12 and 19, are limiting and must be considered for the purposes of evaluating the validity of these claims.

262. Regardless, Astera discloses Claim Element 1p.

263. Astera discloses features and functionality of the AX10, a controllable lighting fixture with an array of nine “RGBAW” (*i.e.*, red, green, blue, amber, and white) LEDs. EX1010, 7.



Id., cover (annotated).

4 SPECIFICATION

LED power:	135W
Illuminants:	9 x 15W RGBAW Philips LEDs
Luminous Flux*:	3,350lm (at White 4000K)
Emittance*:	10,350lx (at 2m; White 4000K)
CRI*:	up to 92

Id., 7 (annotated).

264. The AX10 can be controlled via various controllers, including the Control Panel and AsteraApp. *Id.*, 9.

Control Panel on AX10 Light	Remote Control	App																				
LEGEND <table><tr><td> MENU COLOR BACK TO PREVIOUS MENU </td><td> - SPEED SCROLL DOWN </td><td> + BRIGHT SCROLL UP </td><td> ENTER PROG CHOOSE/ CONFIRM </td></tr><tr><td colspan="4">FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:</td></tr><tr><td>ENTER THE MAIN MENU</td><td>FACTORY RESET</td><td>ENTER THE MAIN MENU</td><td>ENTER THE DMX MENU</td></tr><tr><td colspan="4">HOLD THE ABOVE BUTTON FOR 2SECS TO:</td></tr><tr><td>STANDALONE MENU</td><td>ADJUST SPEED</td><td>ADJUST BRIGHTNESS</td><td>CHANGE PROGRAM</td></tr></table>	MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM	FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:				ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU	HOLD THE ABOVE BUTTON FOR 2SECS TO:				STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM		AsteraApp™ Wi-Fi, Settings, App Store, Home, Siri STATUS Disconnect Online Connected to AsteraBox™ 000 (Firmware V5.2.9 U) Stop Sending Refresh Connection AsteraBox™ battery 97% RADIO PIN 0500 Pair with Lights
MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM																			
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:																						
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU																			
HOLD THE ABOVE BUTTON FOR 2SECS TO:																						
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM																			

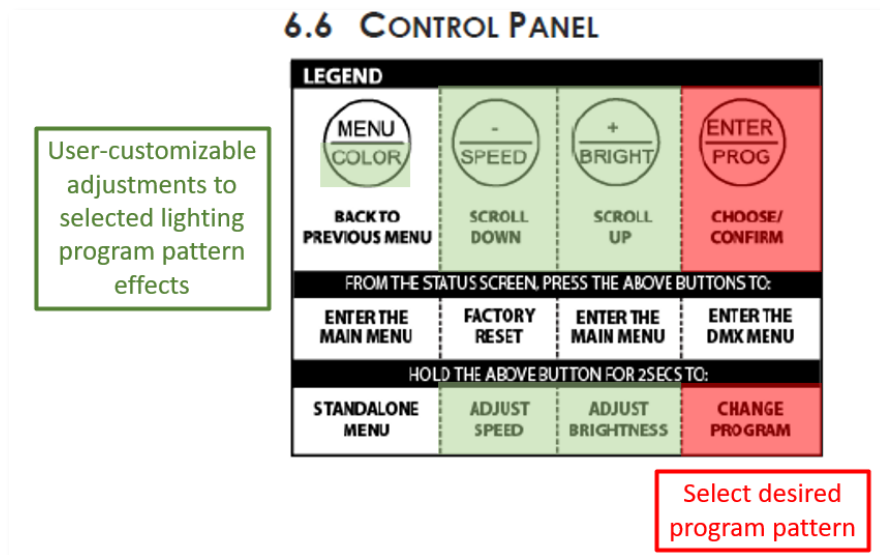
Id., 9, 11, 23.

265. The AX10 can produce different “user customizable lighting effects.” “Effect modes” offer “a comprehensive control of the built in standalone engine,” to implement “predefined programs” for effects including fire, strobe, static colors, color fades, rainbow, spiral colors. *Id.*, 17, 21.

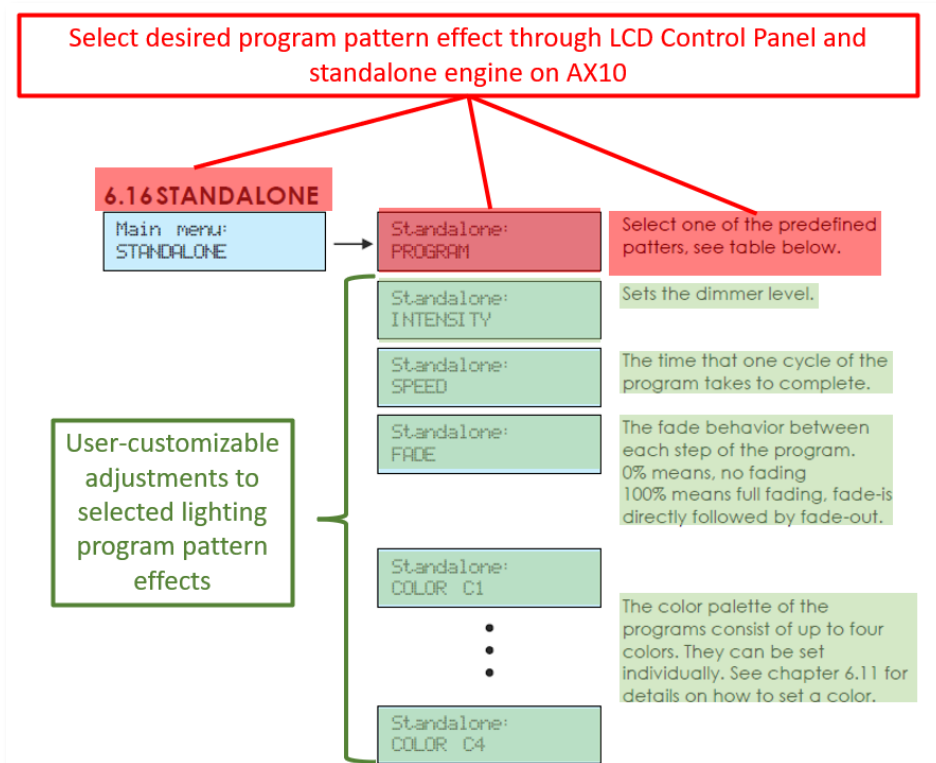
Name	Pattern
ONE COLOR STATIC	A static color is displayed on the whole virtual light.
TWO COLOR STATIC	The virtual light is split into two halves and two colors are displayed.
THREE COLOR STATIC	The virtual light is split into three parts and three colors are displayed.
FOUR COLOR STATIC	The virtual light is split into four parts and four colors are displayed.
ONE COLOR FADE	For all FADE programs, the whole color palette of four colors is used. Those colors are faded in and out one by one. Here, the whole virtual light shows the same color.
TWO COLOR FADE	The virtual light is split and shows two colors at a time.
THREE COLOR FADE	The virtual light is split and shows three colors at a time.
FOUR COLOR FADE	The virtual light is split and shows four colors at a time.
SIMPLE RUNNING	A running light; the background and the running pixels color can be set.
DOUBLE RUNNING	Two pixels are running in opposite direction.
TWO COL RUNNING	The two pixels are of different color even.
FLAG RUNNING	A three color flag is running over the background color.
DOUBLE FLAG RUNNING	Two flags are running over background in opposite direction.
SPIRAL 4 COLORS	The color is changed pixel by pixel. All four colors are used one after the other.
SPIRAL 2 COLORS	The color changes between color 1 and 2 from the outside to the inside, pixel by pixel.
RAINBOW	A rainbow effect is displayed.
FIRE	The fire effect is a random flicker between two colors, background and flickering color.

Id., 21.

266. Users can customize these effects. *Id.*, 8, 11, 13, 20, 24-29. The Control Panel allows users to “select” an effect and modify it by adjusting: (i) intensity to set a dimmer level; (ii) speed to change the time to complete one cycle; (iii) fade time between program steps; and (iv) color. *Id.*, 20.



Id., 11 (annotated).



Id., 20 (annotated).

267. Similarly, users can select and customize effects including “running lights,” “fire,” “rainbow,” “chaser effects” and “stroboscope” through AsteraApp.

Id., 27-28.

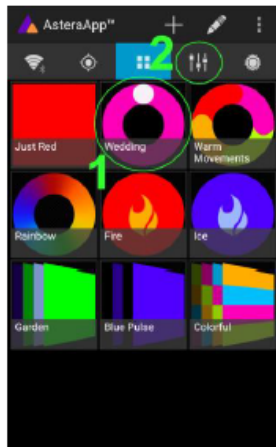
7.7 LIST OF EFFECTS

The effects' patterns are pre-defined and cannot be modified by the user. They are pre-programmed inside of each light. Still they can be parameterized. These effects are:

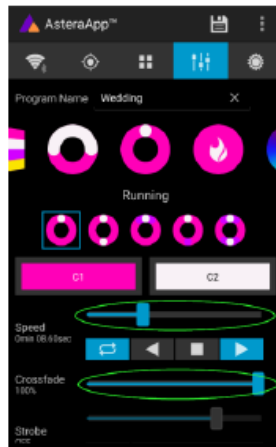
	Several variations of running lights are available.
	The Fire effect shows a random flickering effect. The background color and the color of the flickering effect can be adjusted.
	The rainbow effect shows a color change through all colors. Only its speed can be adjusted.
	Chaser effects provide an efficient means to create dancefloor lighting. The static chaser exchanges the color of the lights according to the tapped-in beat. The colors are randomly chosen. The effect can be adjusted to show up to 4 different colors at a time.
	The Moving Chasers overlay the static chaser by a second movement of the four displayed colors over the available positions of a Flow-Set. This gets mostly interesting if the Moving Strobe is chosen. Then, only some of the positions strobe and they are moving. So the strobe effect moves over the Flow-Set.

Id., 28 (annotated). Selected effects can then be customized by adjusting parameters including: (i) “speed” for “the effect to complete one cycle,” (ii) “crossfade” between steps, (iii) “speed” of a “stroboscope” effect, (iv) “brightness,” and (v) “color”:

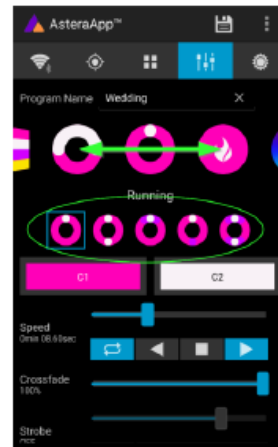
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).

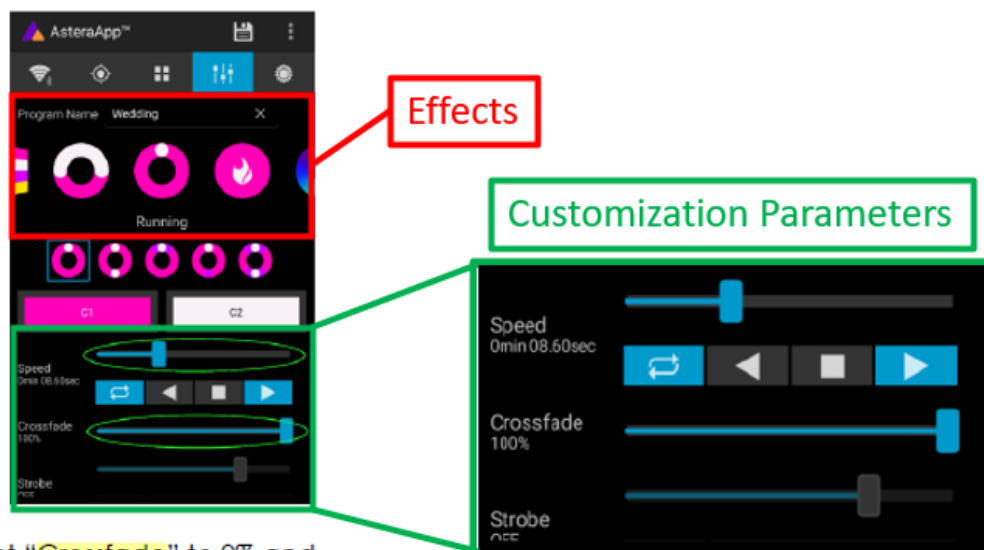


Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



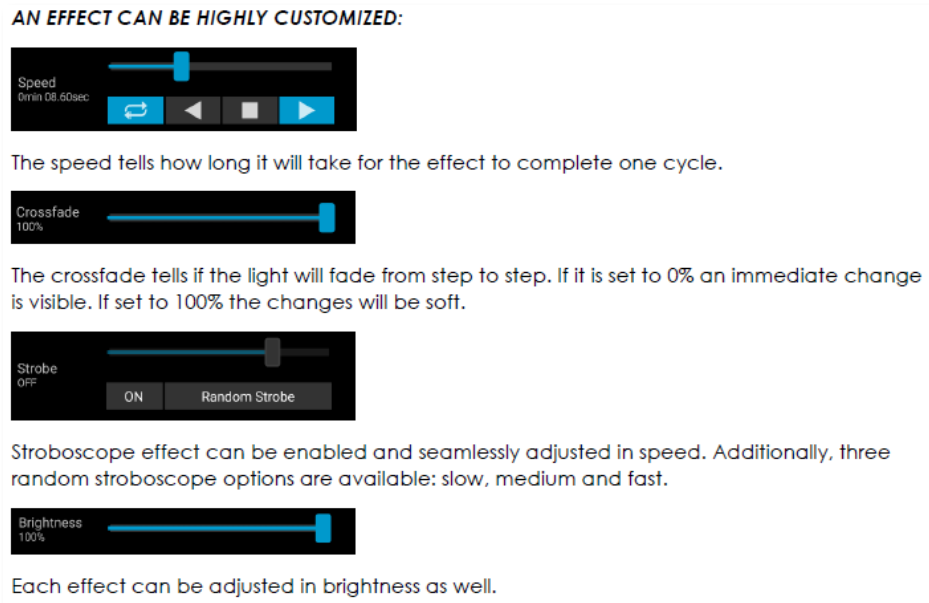
The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.

Id. (annotated).



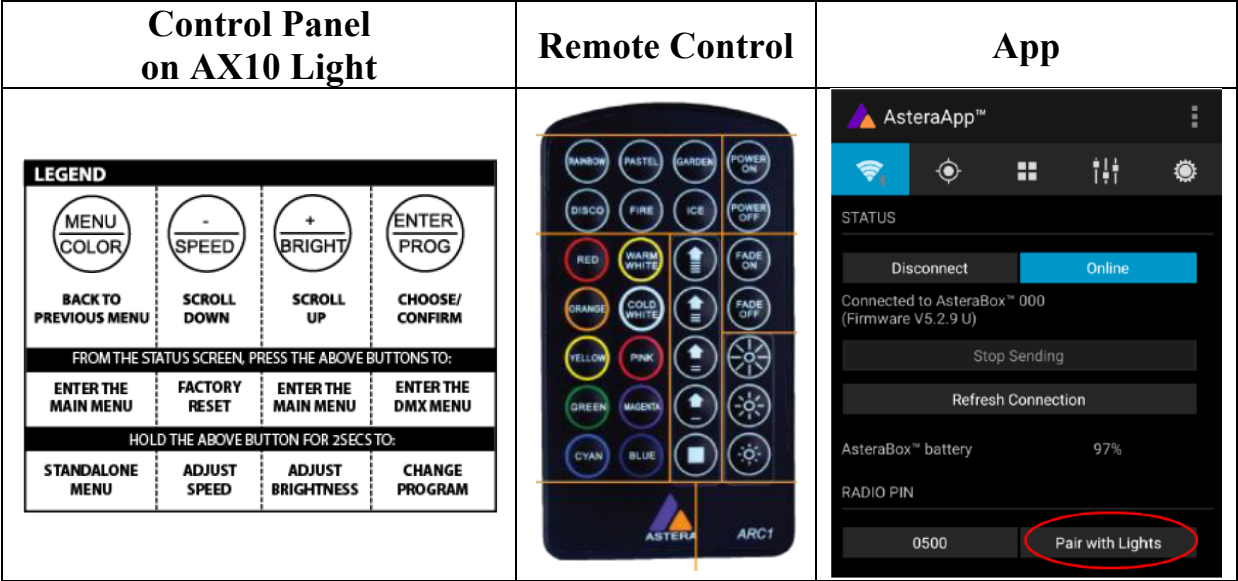
Id.

b. Claim Element 1a

268. Claim Element 1a recites “receiving user input of at least one user input simulation parameter to customize a lighting effect;” EX1001, 11:46-47.

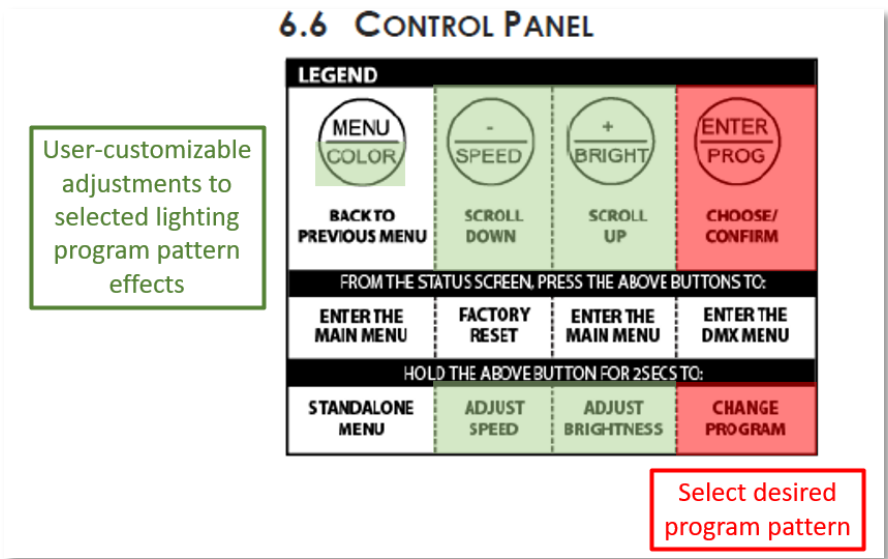
269. Astera teaches Claim Element 1a.

270. The AX10 receives user inputs through multiple user interfaces:

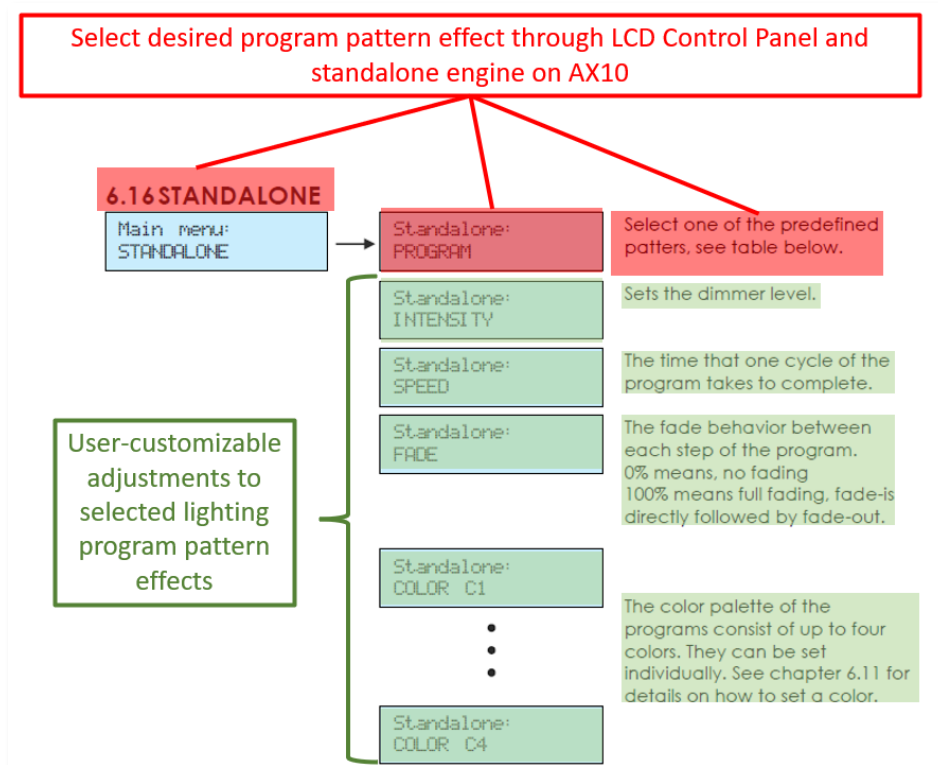


EX1010, 9, 11, 23. Users can select desired effects and input parameters through interfaces on the Control Panel or AsteraApp. *Id.*, 8, 11, 13, 20, 24-29.

271. The Control Panel includes an LCD interface that “receives” user selections of a lighting program (*e.g.*, those listed on page 21) and parameters of: (i) intensity; (ii) speed of a cycle of the program; (iii) fade time between steps; and (iv) color selections. *Id.*, 20.



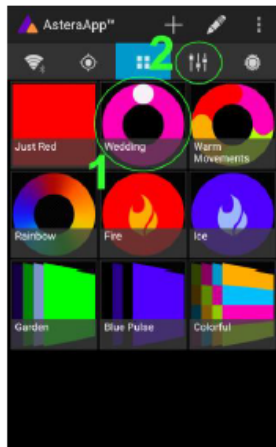
Id., 11 (annotated).



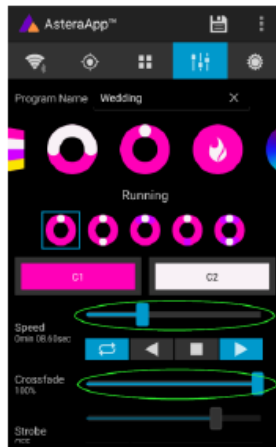
Id., 20 (annotated). These selections are received by the Control Panel, which then adjusts the effect accordingly. *See supra* Claim Element 1p.

272. Similarly, with AsteraApp, programs of effects, such as “wedding,” may be selected and “highly customized.” EX1010, 27. In particular, different “effects” may be selected from a main screen, and the user can then “enter the editor” where the user is provided options to customize parameters of the effect. *Id.* Any user inputs of adjustments to the effect parameters are received by AsteraApp through the user interface. *Id.*

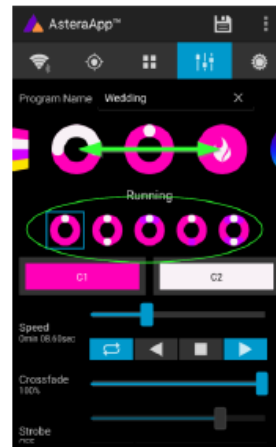
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.

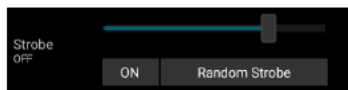
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

Id.

273. In addition, Astera discloses that pre-defined effect patterns, such as “fire,” “fading colors,” and “rainbow,” may be selected, with the user then being able to adjust parameters of the effect that are received by AsteraApp. *Id.*, 28. For example, if a “fire” effect is selected as part of a program, the user can adjust at least the “background” and “flickering” colors, and if a “rainbow” effect is included, then the “speed” can be adjusted. *Id.* Finally, for all effects, Astera discloses a “master brightness” control that can adjust the brightness of any lights that would run an effect. *Id.*, 31.

c. Claim Element 1b

274. Claim Element 1b recites “storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;” EX1001, 11:48-51.

275. Astera discloses Claim element 1b.

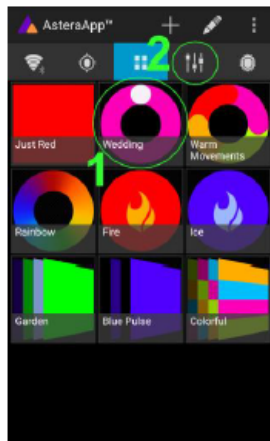
276. In Astera, the simulation parameter depends on the user-selected pre-programmed light effect (*e.g.*, fire, rainbow, chaser), as customized by any desired random strobing, speed, brightness, or color parameters. *See supra* Claim Element 1a. The speed, fade, color, stroboscope, and brightness selectable menu options are based on the user-selected effect and are presented as parameters for adjusting the particular selected effect. EX1010, 20-21,24-28. For example, when “rainbow” is selected a “speed” parameter can be generated, and when “fire” is selected

parameters to generate the “random flicker” and set the background and flickering effect colors are generated. *Id.*, 28.

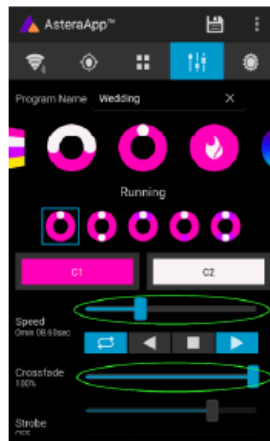
277. The effects and user adjustments made to them may also be “saved back to the main screen by pressing the save button.” EX1010, 27. Users may select an effect (like “fire” or “wedding”) and modify it by changing simulation parameters (like “colors,” “speed,” “stroboscope,” and “brightness”). *Id.*; *see also id.*, 25. When the user is done, she can click the disk icon in AsteraApp, saving the modified effect parameters. *Id.*, 27.¹

¹ Moreover, Astera discloses that a user’s adjustments for “Anti-Flicker” are preserved, or saved, once entered into AsteraApp. EX1010, 32. By “preserving” the Anti-Flicker adjustments, these settings are also saved and recalled when the lamps are powered back on.

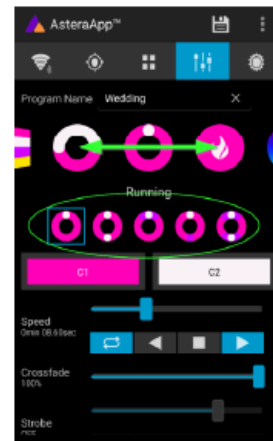
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

Id. (annotated).

278. Once saved to the main screen, these stored effects (with their modified parameters) can later be recalled and played. *Id.*, 10, 24, 30; *see also infra* Claim Element 1c. Saving within AsteraApp (a program stored in memory) therefore saves to a “memory,” as saving within the main menu must save to a memory so that the saved effect can later be recalled and replayed.

279. Similarly, when operating the AX10 through the Control Panel on the lighting device, a POSITA would understand that any user selected effects and adjusted parameters are “saved” to a memory within the AX10. From the Control Panel, users can make Standalone mode selections of programs (*i.e.*, effects) and

parameter adjustments. EX1010, 11, 14, 17, 20-21; *see also supra* Claim Element 1a. For example, a user can select a program, and then adjust and set an “intensity” parameter for the program. EX1010, 20. After setting the intensity, a user can also adjust “speed,” and then “fade” parameters of the same program. *Id.* Each of these parameter selections must be stored in memory; otherwise, a user would not be able to change one parameter and then make another selection to change a different parameter prior to finalizing the effect and outputting it from the light.

280. Further, the Control Panel provides an option for users to “reset” the settings of the device, including “resetting” the Standalone settings set for any particular user-customized effect and program. EX1010, 12, 22. That the Standalone settings, which include the selected effect and any adjusted parameters. *id.*, 12 (“reset all user settings to default”), 20-22, can be “reset” to default values indicates those parameters must be stored in memory on the device. That is, the user selected parameter settings are stored and saved until they are changed or reset to default.

d. Claim Element 1c

281. Claim Element 1c recites “recalling from said memory said at least one stored user input simulation parameter;” EX1001, 11:52-53.

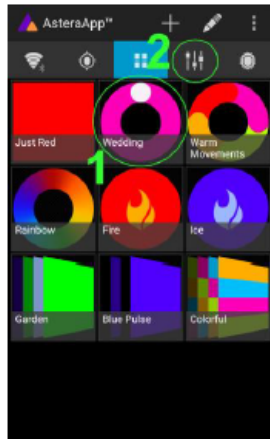
282. Astera discloses Claim Element 1c.

283. The stored user input parameters, *see supra* Claim Element 1b, are recalled from memory prior to, and during, the output of desired effects from the AX10.²

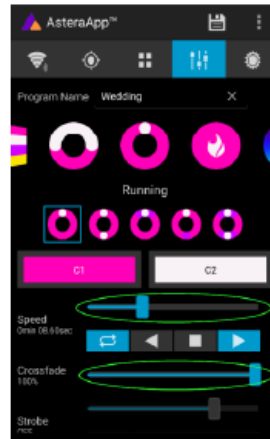
284. In AsteraApp, stored effects (with their modified parameters) can be recalled, with lighting values calculated based on the recalled effect and parameters so the effect can be played later. EX1010, 24, 27, 30. For example, adjusted program effects such as “Wedding” may be “saved back to the main screen,” from which they can later be recalled, played, or further adjusted. *Id.*, 27. The saved programs of “effects” are represented by “tiles” on a main screen where they can be selected and recalled. *Id.*, 30.

² The '044 contains a single reference to storing and recalling parameters, stating “[i]t should be appreciated that due to the nature of the light 102, the effects may be customised by a user, for example, the frequency/speed, peak/minimum brightness or colour/colour temperature may be dynamically changed, and/or made to vary over time in a customised manner. ***Such user input simulation parameters may be stored in memory 220 and recalled from the memory 220 at a later time.*** The effects may be triggered on cue (for example from a director) by sending a signal over a wired remote trigger or wireless device.” EX1001, 9:27-36.

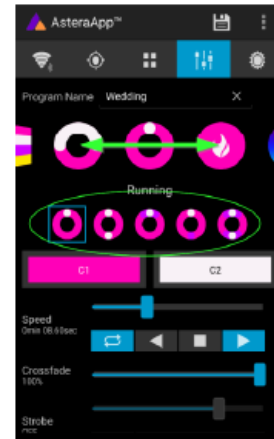
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



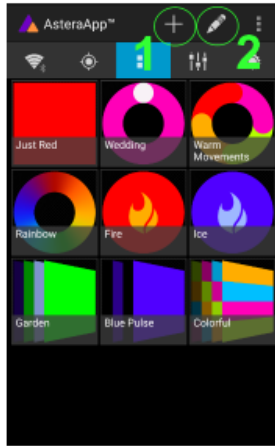
The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

Id., 27.

7.9 THE MAIN SCREEN

Here each program is represented by a tile. Those tiles can be edited and freely positioned. Several pages of tiles are available.



To move or delete a tile, press the pen icon (2). A popup will show the available actions. To add a new program tile, press the "+" icon (1).



While adding a tile, either a default "Static Red" or the currently running program can be selected. Additionally, special function tiles are available.

Id., 30.

285. Again, the stored effects and adjusted parameters are saved to a memory, *see supra* Claim Element 1b, and when they are recalled, they are recalled from this same memory.

286. Similarly, in Standalone mode implemented through the Control Panel, saved user parameter settings are "recalled" for the AX10 to "replay" and "display" the customized effect programs with the lights. EX1010, 10, 17, 20-21; *see also id.*, 7 (indicating the AX10 may be "operating under a previous setting.").

e. Claim Element 1d

287. Claim Element 1d recites “calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter;” EX1001, 11:54-56.

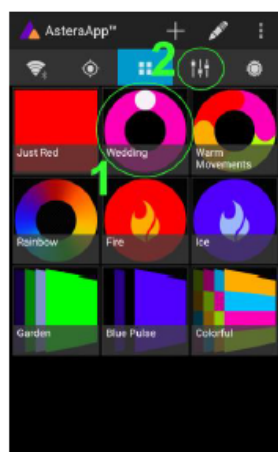
288. Astera discloses Claim element 1d.

289. The Control Panel and AsteraApp include effect simulators to calculate time varying lighting values for generating special effects based on recalled simulation parameters. EX1010, 9-11, 13, 17, 21, 24.

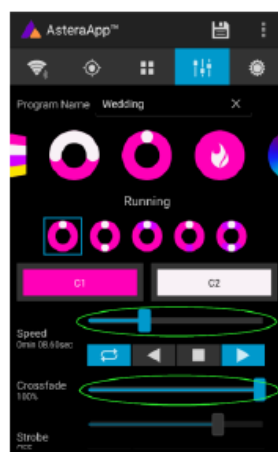
290. The Control Panel allows users to “select” from predefined effects, and then adjust parameters including intensity (to set a brightness level), speed (to change the time to complete one cycle), fade time, and color. *Id.*, 20. As noted above, these effects with adjusted parameters are stored and recalled from the AX10 (via the Control Panel) in order for the user to make selections and adjustments and play the desired effect. *See supra* Claim Elements 1b-1c. The Control Panel creates data characterizing the adjusted lighting effect based on the recalled effect settings, in the form of values and settings for the LEDs to “display these effects properly with [the] light.” EX1010, 12, 17, 20-21. The “standalone engine” then causes the LEDs to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” *Id.*, 24; *see also id.*, 10, 17. For effect patterns, the values vary with time to change the output of the LEDs, creating the effect. *Id.*

291. Similarly, in AsteraApp, users can select from different lighting effects, such as “fire,” “chasers,” “rainbow” and “stroboscope.” EX1004, 23-24, 27-28; *see supra* Claim Element 1p. Selected effects can then “be highly customized,” to adjust parameters including: (i) “speed” of how long it will take to complete one cycle, (ii) “crossfade” between steps, (iii) random “stroboscope” speed, and (iv) “brightness.” *Id.*, 27. Users can also select and customize colors for effects “with a customizable color pallete,” and certain effects, like “fire effect,” allow a user to “adjust” the colors making up the effect. *Id.*, 24, 28.

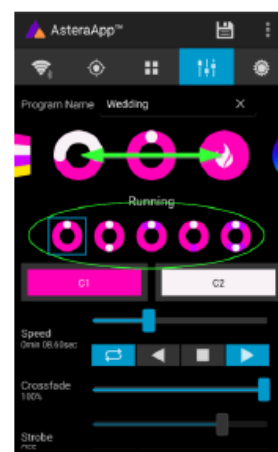
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.

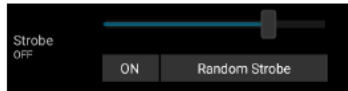
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

Id.

292. These selections may be saved and recalled for later use, such that the recalled parameters are used to calculate the time varying lighting value. EX1010, 10, 24, 30. For example, after recalling saved effects, AsteraApp calculates time varying lighting values, including brightness and color information, for these user-customized effects. *Id.*, 23-29. AsteraApp can “send complex effects” to the lights and can be “used to adjust the lights remotely” by sending controls (which are lighting values). *Id.*, 23. Thus, based on recalled user parameters, “effects can be created and can be sent to the light by the built in UHF receiver,” where the effects are “triggered” and replayed at each light. *Id.*, 23.

f. Claim Element 1e

293. Claim Element 1e recites “outputting to said lighting device said time varying lighting value thereby to simulate the lighting effect.” EX1001, 11:57-58.

294. Astera discloses Claim Element 1e.

295. Both the Control Panel and AsteraApp output time-varying lighting values for the AX10 to “display these [selected] effects properly with [its] light.” EX1010, 21.

296. The Control Panel “Main Menu” allows users to select “STANDALONE” mode, where the Control Panel will “set the parameters of the standalone engine” in the AX10. *Id.*, 12, 17. In “STANDALONE,” the Control Panel allows users to select a desired effect program and adjust parameters of intensity, speed, fade, and color. *Id.*, 20-21; *see also supra* Claim Element 1a. When a user then wants the lights to play the effect, the “standalone engine” outputs the lighting values to the LEDs to cause them to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” EX1010, 24; *see also id.*, 10, 17. For effect patterns, the output values vary with time to change the output of the LEDs, creating the effect. *Id.*

297. With AsteraApp, users can select from different effects (*e.g.*, fire, chasers, rainbow) and customize them (*e.g.*, adjust speed, crossfade, stroboscope, brightness). *See supra* Claim Element 1a. When a user wants to play an effect, the

calculated lighting values for that effect are output from AsteraApp to the AX10 lighting device. EX1010, 24. (“With the AsteraApp these effects can be created and be *sent to the light by the built in UHF receiver*,” where they are received by the standalone engine in the AX10.” (emphasis added)); *see also id.*, 10, 17. That is, AsteraApp outputs the lighting values representing the adjusted effect to the AX10 light. When the lighting values are received by the standalone engine, the AX10 “replays [the effect] autonomously until a new effect is received.” *Id.*, 24.

3. Claim 2

298. Claim 2 recites “The method according to claim 1, wherein said user customisable simulation parameter is stored locally.” EX1001, 11:59-60.

299. It is my opinion that Astera anticipates or renders obvious Claim 2.

300. The user-selectable lighting effects, and user adjustments made to those effects, may be locally “saved back to the main screen by pressing the save button” within the app. EX1010, 27. Saving locally within AsteraApp saves the effect and parameters on a “local” memory on the device running the app.

301. Similarly, when operating in “Standalone” and controlled by the local Control Panel, where “[t]he light can no longer be controlled by any wireless signal,” *Id.*, 11, the user customized programs and parameters are saved locally in the AX10 itself. *See supra* Claim Elements 1b-1c. A POSITA would recognize that

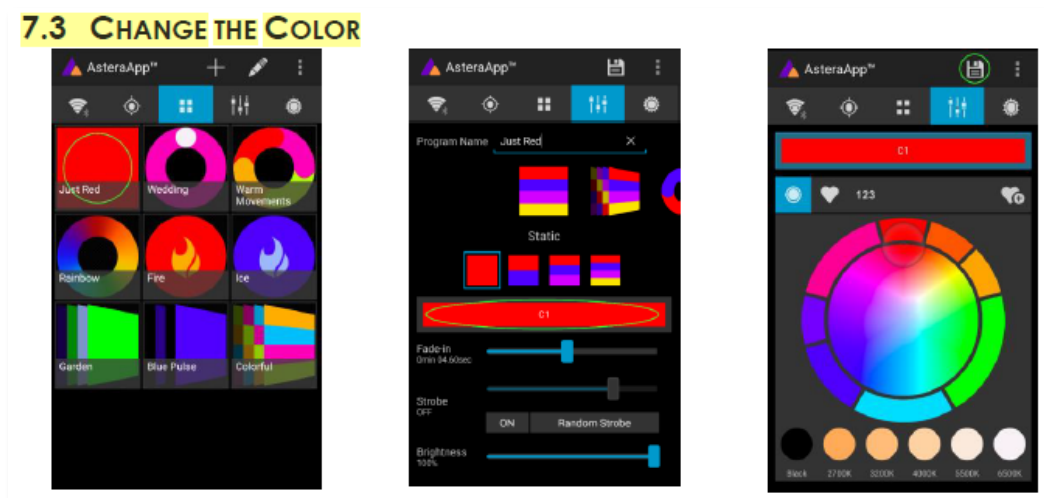
the standalone engine implementing “Standalone” mode would use a local memory in order to execute stored lighting commands.

4. Claim 3

302. Claim 3 recites “The method according to claim 1, wherein the simulation parameter comprises a colour or colour temperature.” EX1001, 11:61-62.

303. It is my opinion that Astera anticipates or renders obvious Claim 3.

304. In “Standalone,” users can choose “color” parameters to set a “color palette” of a selected program. EX1010, 20, 24. Similarly, in AsteraApp, users can set color parameters for lighting effects. *Id.*, 24, 27-28.



Id., 24 (annotated); *see also id.*, 25-27.

305. Astera also discloses that “color temperature” can be selected by choosing a static color from a list of predefined color options, including colors based on temperature. *Id.*, 14.

6.11.1 Predefined Colors			
Color	Red	Green	Blue
RED	255	0	0
ORANGE	255	107	0
YELLOW	255	160	18
GREEN	0	255	0
CYAN	0	255	224
BLUE	0	0	255
VIOLET	127	84	255
PINK	255	53	119
BLACK	0	0	0
2700K	255	166	70
3200K	255	178	89
4000K	255	193	115
5500K	255	211	150
6500K	255	219	167

Id. (annotated). Moreover, colors can be selected and edited to set “AsterarGB values” for a particular “color temperature.” *Id.*, 8.

5. Claim 4

306. Claim 4 recites

The method according to claim 1, wherein the simulation parameter is related to at least one of: an effect frequency; an effect speed; a colour; a colour temperature; a trigger; a rate of increase of brightness; a rate of decrease of brightness; a rate of change of colour; a brightness; a local maximal (peak) brightness; a local minimal brightness; a brightness fluctuation period; and a colour fluctuation time period.

EX1001, 11:63-12:3.

307. It is my opinion that Astera anticipates or renders obvious Claim 4.

308. Users can select from various lighting effects from the Control Panel or AsteraApp. EX1010, 17, 20-21, 23-24, 27-28. Users may adjust the “color” of an effect, as well as select settings related to “color temperature.” *See supra* Claim 3. Users can also adjust the “intensity,” or “brightness,” and “speed” parameters of each effect. EX1010, 20, 27. And, in the “Anti-Flicker” settings, a “frequency”

parameter “can be freely adjusted.” *Id.*, 32. Accordingly, Astera expressly discloses parameters related to “frequency,” “a brightness,” “speed,” “color,” and “color temperature,” as these may be adjusted.

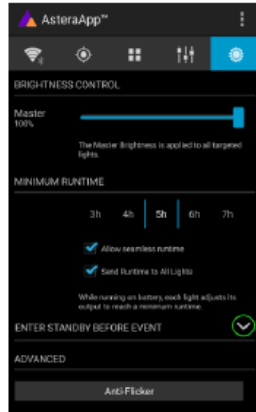
309. Moreover, Astera discloses simulation parameters related to a rate of increase or decrease of brightness, and the brightness fluctuation period, as the time for an effect to complete a cycle is adjusted through the speed parameter. *Id.*, 17, 20, 27-28. Completing the same effect, such as a one, two, or three color fade, in a shorter time cycle changes how quickly brightness or color fluctuates to complete the effect.

310. In addition, “stroboscope” can be adjusted in speed, thereby changing the brightness fluctuation period of flashes in the effect. *Id.*, 27. Further, rate of color change and color fluctuation period parameters can be adjusted in the “chaser effect” and “rainbow effect” that change colors, as the “speed” of both can be adjusted. *Id.*, 27-28. Changing the speed changes the rate of color change and color fluctuation period.

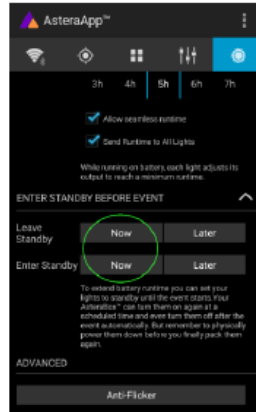
311. Astera also discloses parameters related to a “trigger,” as users can manually select when to start the effect by selecting “now” or setting a particular “later” time in “standby” settings. *Id.*, 34. The “standby is intended to be used between setup and event... [A]ll lights may be switched to standby mode and woken up later when the event starts.” *Id.*

7.14 ENTER AND LEAVE STANDBY

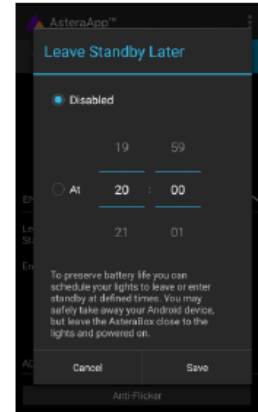
The standby is intended to be used between setup and event (see chapter 3.2.1 **Error! Reference source not found.**). After setup is completed, all lights may be switched to standby mode and woken up later when the event starts. This ensures that no battery runtime is wasted. This can be either done manually or automated.



Press the small arrow to open the standby menu.



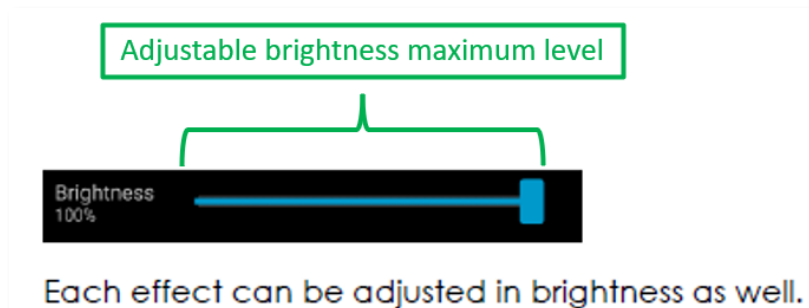
By pressing the "Now" buttons, standby can be switched on or off for all currently targeted lights.



Any of the "Later" buttons will require a time to be set. The standby will be scheduled to the specified time.

Id.

312. Additionally, AsteraApp has a slider such that “[e]ach effect can be adjusted in brightness.” *Id.*, 27. Accordingly, the user-selected simulation parameter can be a maximum brightness, with the slider setting possible maximum brightness percentage.



Id., 27 (annotated). The Control Panel allows for the same brightness adjustment. *Id.*, 11. Because a “background” color can be set, this is related to a

“minimum brightness” that is at least the background color brightness. *Id.*, 21, 27-28.

6. Claim 5

313. Claim 5 recites “The method according to claim 1, wherein the lighting effect comprises a short time-period (e.g. stroboscopic) lighting effect with a user adjustable minimum pulse width.” EX1001, 12:4-6.

314. It is my opinion that Astera anticipates or renders obvious Claim 5.

315. Astera discloses both a “stroboscope” effect and the ability to create a short-time alteration between pulses of lights with a color fade or “chaser” effect, each customizable for minimum pulse width. EX1010, 27-28.

316. With respect to the “stroboscope effect,” this can be “enabled and seamlessly adjusted in speed.” *Id.*, 27. The stroboscopic effect is an effect of flashes with a short-time period between flashes.

AN EFFECT CAN BE HIGHLY CUSTOMIZED:

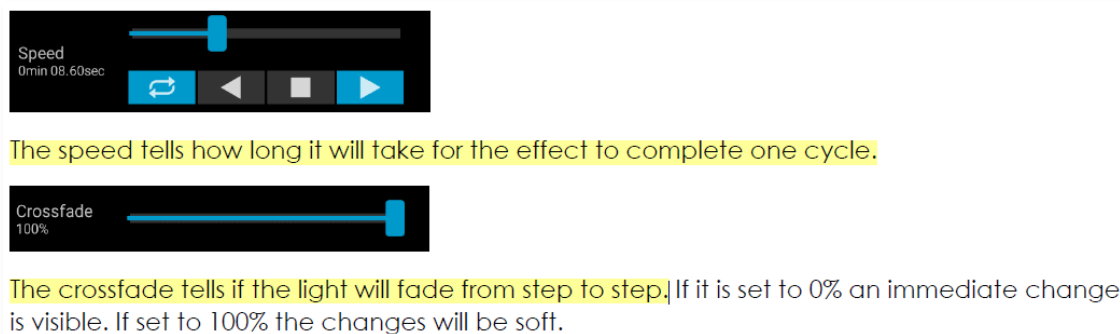


Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.

Id., 27 (annotated). By enabling a user to adjust speed of the strobe, Astera allows users to adjust minimum pulse width. For example, a slower strobe would have a longer duration, and thus a longer pulse width, and adjustments to increase the speed of the strobe would result in the duration and thus pulse width becoming smaller.

Id. Moreover, Astera provides that a user can select from “three random stroboscope options are available: slow, medium and fast.” *Id.*, 27. By selecting between these speeds, a user again can adjust minimum pulse width, as a random slow stroboscope effect would have a greater pulse width than a random fast stroboscope effect that comprises more flashes.

317. Further, Astera describes that both the Control Panel and AsteraApp provide for control of “crossfade” between steps in an effect program, and “speed” of how “long it will take for the effect to complete one cycle.” EX1010, 17, 20, 27-28.



Id., 27 (annotated).

318. Using this, a user may select a simple program of, for example, “one color fade,” creating a cycle which involves one color fading from maximum brightness to 0% brightness in one step, or a simple “chaser effect” of alternating between two colors. *Id.*, 17, 20, 27-28. By adjusting the speed of how long it takes the light to complete this cycle of fading down to 0% brightness, the user will adjust the pulse width of the light. Setting the speed to complete the effect cycle of fading

down to 0% brightness in five seconds, for example, will create a longer duration pulse than setting a speed for the same effect to fade down to 0% brightness in one second. Thus, by creating effects with a light pulse, and adjusting fade of the light and speed of the cycle in which the light fades, Astera teaches a user can create short-time period lighting effects with adjustable pulse width. *Id.*, 17, 20, 27-28.

7. Claim 6

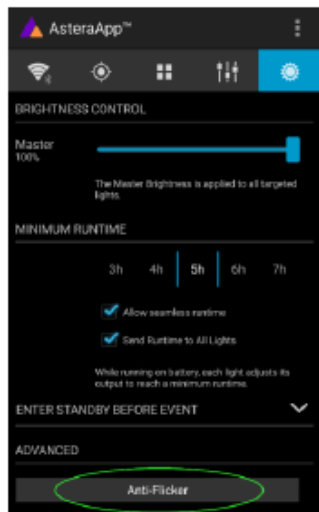
319. Claim 6 recites “The method according to claim 1, wherein the user customisable simulation parameter comprises a parameter indicative of a group consisting of: a camera recording frequency; a camera shutter speed; and a camera frame rate.” EX1001, 12:7-10.

320. It is my opinion that Astera anticipates or renders obvious Claim 6.

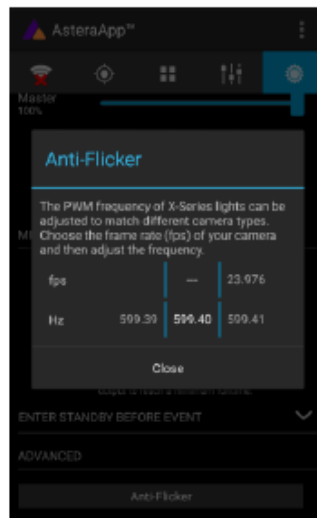
321. Astera discloses compensating for “flicker” by calculating lighting values based on user input parameters indicative of at least camera frame rate. EX1010, 32. Specifically, users can select an “Anti-Flicker” option to compensate for unwanted “flicker” that would otherwise be produced if the PWM refresh frequency of the light did not fit the camera’s frame rate. *Id.*

7.12 ANTI-FLICKER

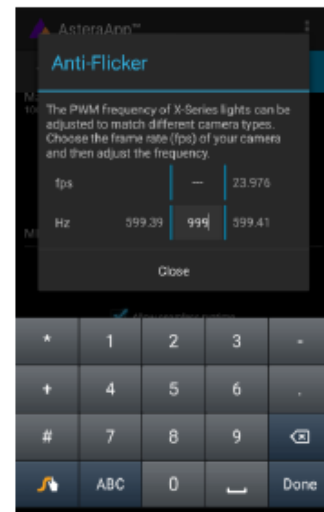
The PWM refresh rate of this light is 599.4 Hz by default. This frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera's frame rates.



Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the "Anti-Flicker".



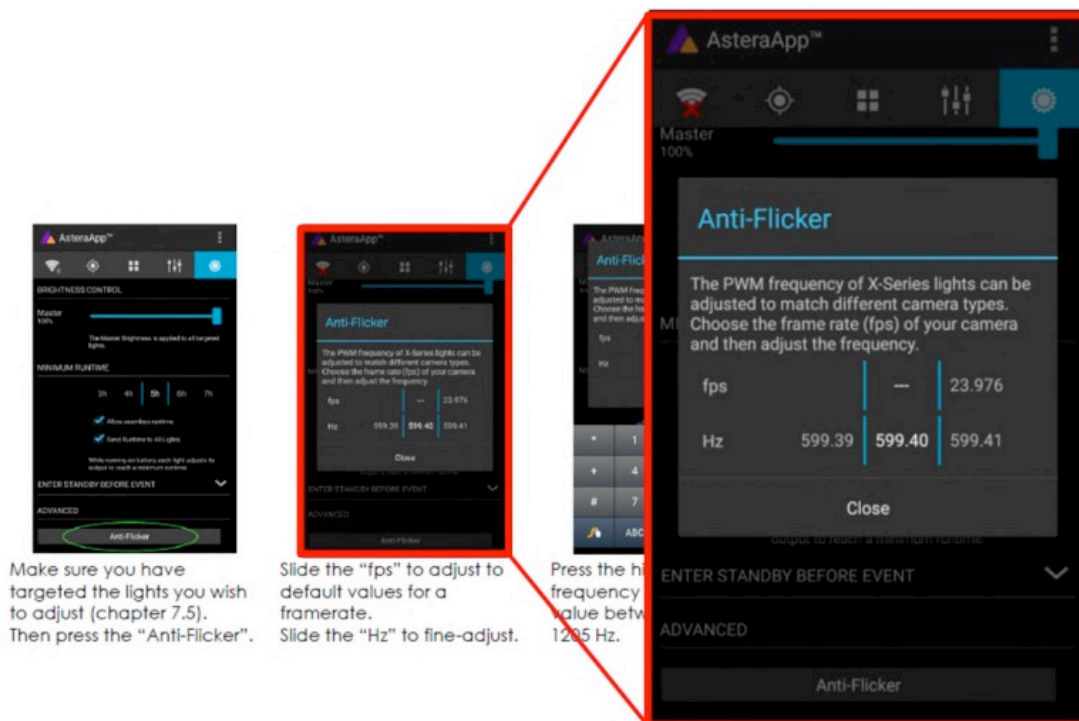
Slide the "fps" to adjust to default values for a framerate. Slide the "Hz" to fine-adjust.



Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.

Id., 32 (annotated).

322. In the Anti-Flicker menu, users may input and adjust a value for the “frame rate (fps)” of a camera, with AsteraApp suggesting default PWM refresh values for that particular frame rate. *Id.*, 32. The Anti-Flicker menu also gives users the option to “slide the ‘Hz’ to fine-adjust,” allowing users to refine the PWM refresh frequency to compensate for the particular frame rate of the camera. *Id.*



Id. (annotated). Through the Anti-Flicker menu, “the [PWM refresh] frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera’s frame rates.” *Id.*

8. Claim 7

323. Claim 7 recites

The method according to claim 1, wherein the lighting effect is designed to mimic at least one of: fire; lightning; police car light; television; a neon flickering sign; a candle; muzzle (gunshot); welding; spark/short circuit; a scan (e.g. fingerprint scanner); paparazzi flashes; fireworks; flashes (strobe); a propeller; a (nuclear) explosion; and a wormhole.

EX1001, 12:11-16.

324. It is my opinion that Astera anticipates or renders obvious Claim 7.

325. The AX10 can produce many lighting effects, including a “fire effect” which mimics fire flickering:

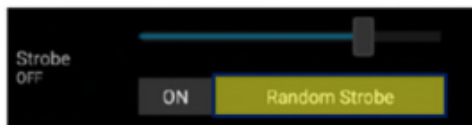


The Fire effect shows a random flickering effect. The background color and the color of the flickering effect can be adjusted.

EX1010, 28; *see also id.*, 21.

326. Moreover, a “stroboscope effect” (producing a strobe of flashes) can be added to selected effects:

AN EFFECT CAN BE HIGHLY CUSTOMIZED:



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.

Id., 27 (annotated); *see also id.*, 17.

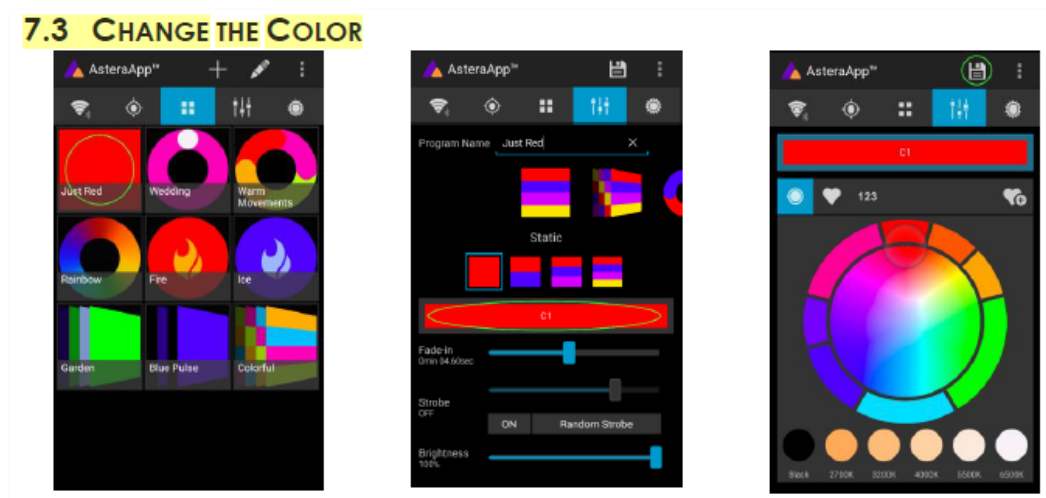
327. Further, a POSITA would understand from Astera that the AX10 would produce other claimed effects (such as a candle, lightning, welding, sparking, paparazzi flashes, fireworks, a flickering neon sign, a scan, and a police light), based on the effects it offers and its ability to generate various colors, alternate between colors, and add strobing/flashing. *Id.*, 17, 21, 27-28. For example, flashing blue and red lights simulates police lights, and irregularly timed stroboscope flash effects create the impression of lightning, paparazzi flashes, welding, and spark/short circuit effects.

9. Claim 8

328. Claim 8 recites “The method according to claim 1, wherein the lighting value comprises brightness and/or colour data.” EX1001, 12:17-18.

329. It is my opinion that Astera anticipates or renders obvious Claim 8. Users can select from different lighting effects (*e.g.*, fire, chasers, rainbow) and then customize those effects (*e.g.*, adjust speed, color, crossfade, stroboscope, brightness). *See supra* Claim Element 1d. Again, based on these user-selected, customized effects, the AX10 system calculates time varying lighting values including brightness and color information to run the desired effects. EX1010, 17, 20-21, 23-29, 32.

330. For example, “fire” is a random flickering between a “background color and the color of the flickering effect,” both of which colors can be adjusted. *Id.*, 17, 20-21, 23-29, 32. Moreover, users can adjust brightness and color for selected effects. *Id.*, 20, 24-28.



Id., 24 (annotated); *see also id.* (stating that effect patterns can be “played with a customizable color palette.”). When these effects are run, the brightness and color parameters are included in the lighting values sent to the LEDs so that they properly output the desired effect.



Each effect can be adjusted in brightness as well.

Id., 27 (annotated).

10. Claim 9

331. Claim 9 recites “The method according to claim 1, further comprising converting at least one of brightness and colour data into a lighting signal and outputting the lighting signal to the lighting device.” EX1001, 12:19-22.

332. It is my opinion that Astera anticipates or renders obvious Claim 9.

333. Users can use the Control Panel or AsteraApp to select from different lighting effects (*e.g.*, fire, chasers, rainbow) and then customize those effects (*e.g.*, adjust speed, color, crossfade, stroboscope, brightness). *See supra* Claim Elements 1p-1d. Again, based on these user-selected, customized effects, the AX10 system calculates time varying lighting values including brightness and color information to run the desired effects. EX1010, 17, 20-21, 23-29, 32.

334. The Control Panel includes a “converter” in “Standalone” mode that converts³ the selected effects and parameters into values that are sent to the standalone engine that outputs signals to the LEDs. *Id.*, 12, 17. In particular, the Control Panel offers “comprehensive control of the built in standalone engine,” which converts the brightness and color data into control signals that it outputs to the LEDs to produce the light for the effect. *Id.*, 17.

335. AsteraApp similarly includes a “converter” that converts data relating to user-selected brightness and color parameters for the lighting effects into signals that can be sent to the AX10. As noted above, the data values for color and brightness of an effect can be input in AsteraApp, which converts these values into signals representing the effect that can “be *sent to the light by the built in UHF receiver*,” where they are received by the standalone engine in the AX10 EX1010, 24, 27-28 (emphasis added); *see also id.*, 10, 17. That is, AsteraApp converts the brightness and color data for an effect into lighting values representing the effect created in AsteraApp, and outputs these lighting values to the AX10. When the

³ The '044 Patent generically describes how before lighting data is sent to the lighting device 102, to output light simulating the effect, it may be converted by a “converter,” which converts the data into a signal suitable for the particular light elements being controlled. EX1001, 8:27-39 (“lighting data converter may convert the data 106 from the lighting effect simulator 100 into a *suitable signal* for a particular light 102.” (emphasis added).)

lighting values are received by the standalone engine, the AX10 “replays [the effect] autonomously until a new effect is received.” *Id.*, 24.

11. Claim 10

336. Claim 10 recites “The method according to claim 1, wherein the controlling is for a lighting system for videography, broadcast, cinematography, studio filming and/or location filming.” EX1001, 12:23-25.

337. It is my opinion that Astera anticipates or renders obvious Claim 10.

338. The AX10 can produce many lighting effects (such as “fire,” “rainbow,” “stroboscope,” and “chase effects”). *See supra* Claim Element 1p. These effects can be used for “videography, broadcasting, cinematography, studio filming, and location filming.” As was well-known to a POSITA, Astera manufactures luminaires for film, TV, and theatrical use. EX1012, ¶2 (noting AX10 is one of Astera’s “production lighting products” and that it was shown at a “Prolight and Sound Exhibition”). Further, as was also well-known, the AX10 was designed and sold for such uses. *Id.*

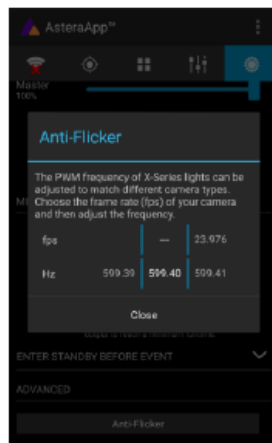
339. Moreover, Astera *expressly* teaches the AX10 produces effects captured by video cameras (used in videography, broadcasting, cinematography, and studio/location filming). The AX10 has an “Anti-Flicker” adjustment, so the light settings will “fit different *camera’s frame rates*.” EX1010, 32.

7.12 ANTI-FLICKER

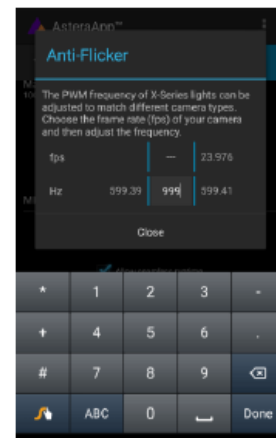
The PWM refresh rate of this light is 599.4 Hz by default. This frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera's frame rates.



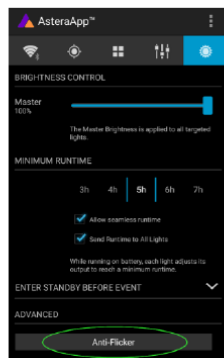
Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the "Anti-Flicker".



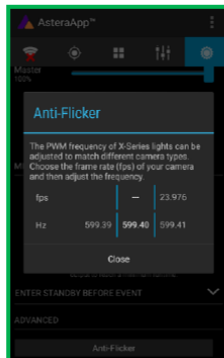
Slide the "fps" to adjust to default values for a framerate. Slide the "Hz" to fine-adjust.



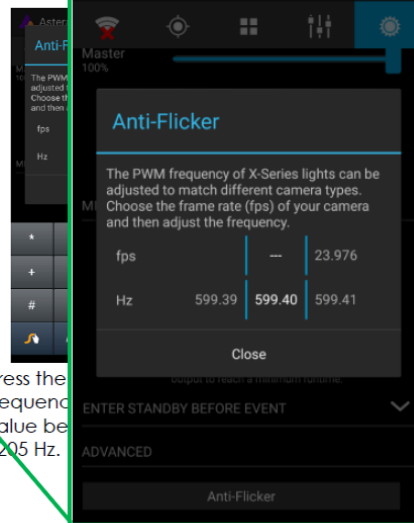
Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.



Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the "Anti-Flicker".



Slide the "fps" to adjust to default values for a framerate. Slide the "Hz" to fine-adjust.



Press the frequency value between 200 and 1205 Hz.

Id. (annotated). Fitting lights to a camera's frame rates indicates the lighting effects are intended to be captured on video camera (as opposed to a still camera), as the "flicker" avoided is an unwanted artefact that would otherwise appear on captured video.

340. Further, a POSITA would understand references to DMX control in Astera, *see, e.g., id.*, 9-10, indicate the AX10 was developed for TV, cinematography, and studio filming, as DMX is a common communication standard created by and for the entertainment lighting industry.

12. Claim 11

341. Claim 11 recites “The method according to claim 1, further comprising controlling at least one further lighting device.” EX1001, 12:26-27.

342. It is my opinion that Astera anticipates or renders obvious Claim 11.

343. The AX10 is comprised of nine “RGBAW” LEDs. EX1010, 7. The Control Panel and AsteraApp (*e.g.*, controllers) control this plurality of nine LED “lighting devices.” *See supra* Claim Elements 1p-1e.

344. In addition, when AX10 lights are controlled by AsteraApp, the “[l]ights can be grouped into sets,” so that a user-created effect “can stretch over up to 32 lights.” EX1010, 10; *see also id.*, 23.

6.4 CONTROL BY THE ASTERAAPP™

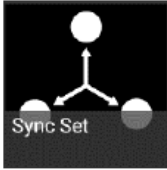
Your light has a built in standalone engine. It can display static colors or replay a number of predefined effect patterns with a customizable color palette.

With the AsteraApp™ these effects can be created and be sent to the light by the built in UHF receiver. The effects are just triggered and then each light replays it autonomously until it receives a new effect.

Lights can be grouped into sets. This way they can be controlled separately and also effects can stretch over up to 32 lights.

Id., 10 (annotated). For example, lights can be grouped together such that all lights in the same “Sync-Set” play the same effect simultaneously, based on control signals from AsteraApp:

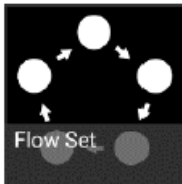
7.4.1 SYNC SET



All lights that are assigned to a Sync-Set can be controlled together. They will do exactly the same.

Id., 25. Alternatively, multiple lights can be given positions in a “Flow-Set” and “controlled together”:

7.4.2 FLOW SET



By using a Flow-Set, lights can also be controlled together. But additionally, they are assigned to positions inside the Flow-Set and so form a virtual light with several pixels. All effects, like a running light, are stretched over this virtual light.

Id., 26.

13. Claim 12

345. It is my opinion that Astera anticipates or renders obvious Claim 12.

a. Claim Element 12p

346. The preamble of Claim 12, designated Claim Element 12p herein, recites “A system adapted to control at least one lighting device to produce a range of different user customisable lighting effects, the system comprising:” EX1001, 12:30-32.

347. For purposes of this Declaration, I assume that the preamble of Claim 12 is limiting and must be considered for purposes of evaluating the validity of the claim.

348. Regardless, Astera discloses Claim Element 1p.

349. Astera discloses that the method of Claim 1 is implemented on a system that includes the AX10 lighting device as controlled by either the Control Panel on the device itself in Standalone mode, or through connection with the AsteraApp. *See supra* Claim 1.

350. Astera discloses features and functionality of the AX10, a controllable lighting fixture with an array of nine “RGBAW” (*i.e.*, red, green, blue, amber, and white) LEDs. EX1010, 7.



Id., cover (annotated).

4 SPECIFICATION	
LED power:	135W
Illuminants:	9 x 15W RGBAW Philips LEDs
Luminous Flux*:	3,350lm (at White 4000K)
Emittance*:	10,350lx (at 2m; White 4000K)
CRI*:	up to 92

Id., 7 (annotated).

351. The AX10 can be controlled via various controllers, including the Control Panel and AsteraApp. *Id.*, 9.

Control Panel on AX10 Light	Remote Control	App																				
LEGEND <table><tr><td> MENU COLOR BACK TO PREVIOUS MENU </td><td> - SPEED SCROLL DOWN </td><td> + BRIGHT SCROLL UP </td><td> ENTER PROG CHOOSE/ CONFIRM </td></tr><tr><td colspan="4">FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:</td></tr><tr><td>ENTER THE MAIN MENU</td><td>FACTORY RESET</td><td>ENTER THE MAIN MENU</td><td>ENTER THE DMX MENU</td></tr><tr><td colspan="4">HOLD THE ABOVE BUTTON FOR 2SECS TO:</td></tr><tr><td>STANDALONE MENU</td><td>ADJUST SPEED</td><td>ADJUST BRIGHTNESS</td><td>CHANGE PROGRAM</td></tr></table>	MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM	FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:				ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU	HOLD THE ABOVE BUTTON FOR 2SECS TO:				STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM		AsteraApp™ Wi-Fi Eye Grid Light Bulbs Gears STATUS Disconnect Online Connected to AsteraBox™ 000 (Firmware V5.2.9 U) Stop Sending Refresh Connection AsteraBox™ battery 97% RADIO PIN 0500 Pair with Lights
MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM																			
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:																						
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU																			
HOLD THE ABOVE BUTTON FOR 2SECS TO:																						
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM																			

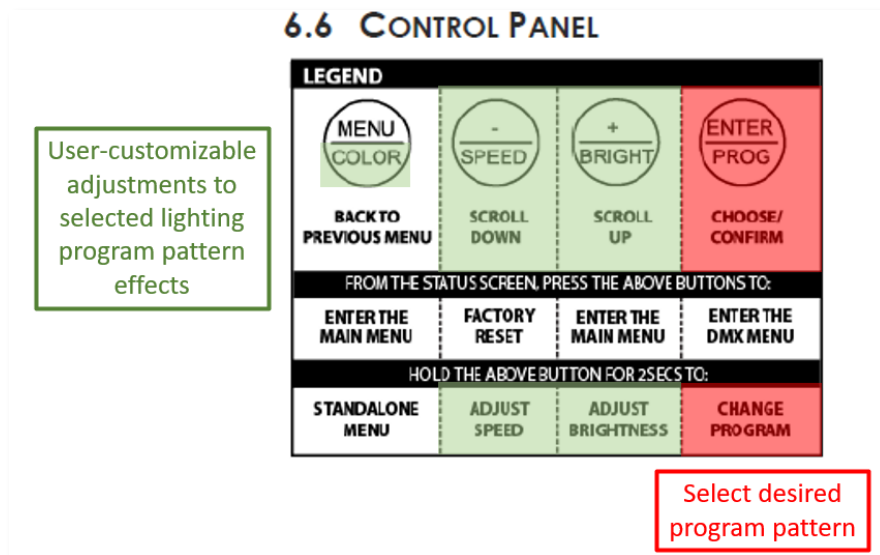
Id., 9, 11, 23.

352. The AX10 can produce different “user customizable lighting effects.” “Effect modes” offer “a comprehensive control of the built in standalone engine,” to implement “predefined programs” for effects including fire, strobe, static colors, color fades, rainbow, spiral colors. *Id.*, 17, 21.

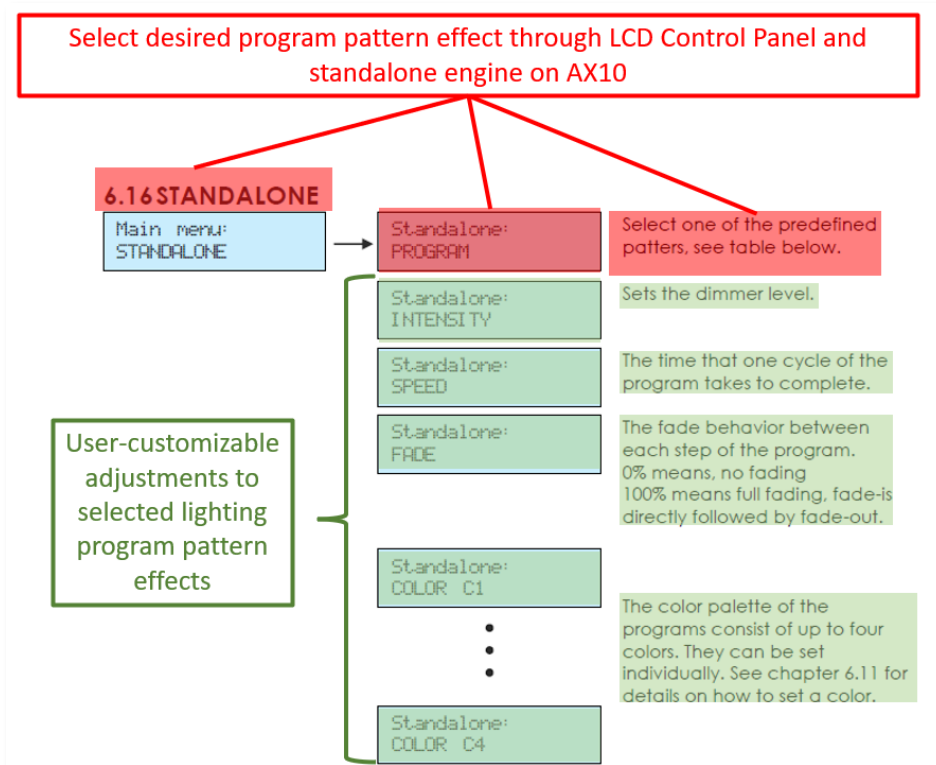
Name	Pattern
ONE COLOR STATIC	A static color is displayed on the whole virtual light.
TWO COLOR STATIC	The virtual light is split into two halves and two colors are displayed.
THREE COLOR STATIC	The virtual light is split into three parts and three colors are displayed.
FOUR COLOR STATIC	The virtual light is split into four parts and four colors are displayed.
ONE COLOR FADE	For all FADE programs, the whole color palette of four colors is used. Those colors are faded in and out one by one. Here, the whole virtual light shows the same color.
TWO COLOR FADE	The virtual light is split and shows two colors at a time.
THREE COLOR FADE	The virtual light is split and shows three colors at a time.
FOUR COLOR FADE	The virtual light is split and shows four colors at a time.
SIMPLE RUNNING	A running light; the background and the running pixels color can be set.
DOUBLE RUNNING	Two pixels are running in opposite direction.
TWO COL RUNNING	The two pixels are of different color even.
FLAG RUNNING	A three color flag is running over the background color.
DOUBLE FLAG RUNNING	Two flags are running over background in opposite direction.
SPIRAL 4 COLORS	The color is changed pixel by pixel. All four colors are used one after the other.
SPIRAL 2 COLORS	The color changes between color 1 and 2 from the outside to the inside, pixel by pixel.
RAINBOW	A rainbow effect is displayed.
FIRE	The fire effect is a random flicker between two colors, background and flickering color.

Id., 21.

353. Users can customize these effects. *Id.*, 8, 11, 13, 20, 24-29. The Control Panel allows users to “select” an effect and modify it by adjusting: (i) intensity to set a dimmer level; (ii) speed to change the time to complete one cycle; (iii) fade time between program steps; and (iv) color. *Id.*, 20.



Id., 11 (annotated).



Id., 20 (annotated).

354. Similarly, users can select and customize effects including “running lights,” “fire,” “rainbow,” “chaser effects” and “stroboscope” through AsteraApp.

Id., 27-28.

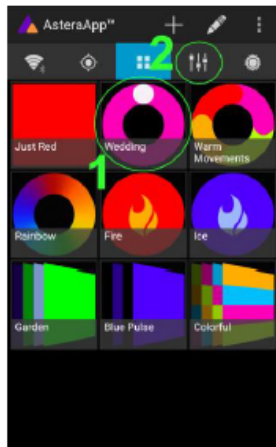
7.7 LIST OF EFFECTS

The effects' patterns are pre-defined and cannot be modified by the user. They are pre-programmed inside of each light. Still they can be parameterized. These effects are:

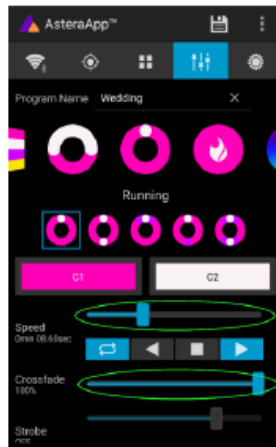
	Several variations of running lights are available.
	The Fire effect shows a random flickering effect. The background color and the color of the flickering effect can be adjusted.
	The rainbow effect shows a color change through all colors. Only its speed can be adjusted.
	Chaser effects provide an efficient means to create dancefloor lighting. The static chaser exchanges the color of the lights according to the tapped-in beat. The colors are randomly chosen. The effect can be adjusted to show up to 4 different colors at a time.
	The Moving Chasers overlay the static chaser by a second movement of the four displayed colors over the available positions of a Flow-Set. This gets mostly interesting if the Moving Strobe is chosen. Then, only some of the positions strobe and they are moving. So the strobe effect moves over the Flow-Set.

Id., 28 (annotated). Selected effects can then be customized by adjusting parameters including: (i) “speed” for “the effect to complete one cycle,” (ii) “crossfade” between steps, (iii) “speed” of a “stroboscope” effect, (iv) “brightness,” and (v) “color”:

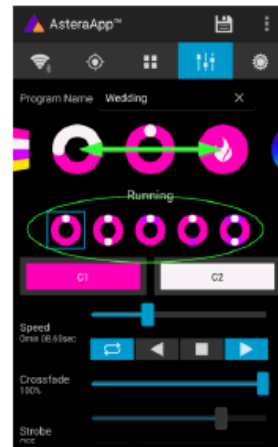
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).

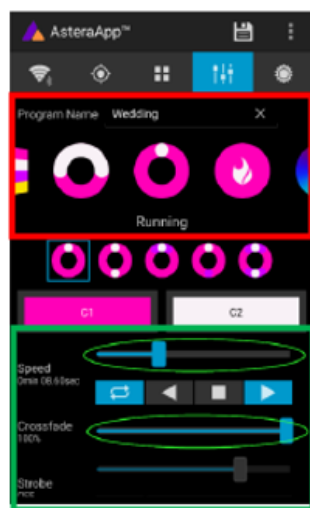


Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.



Effects

Customization Parameters

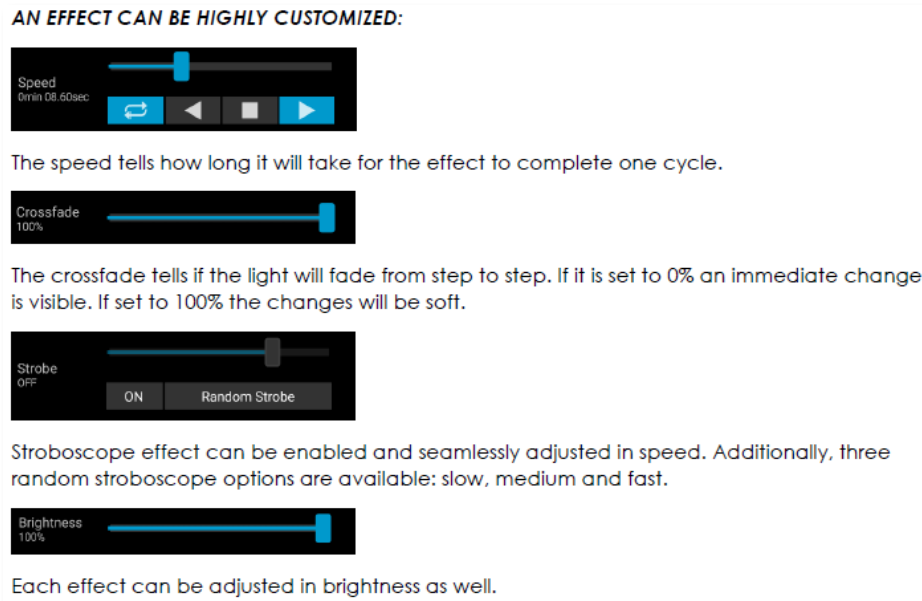
Speed
0min 08.60sec

Crossfade
100%

Strobe
OFF

Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.

Id. (annotated).



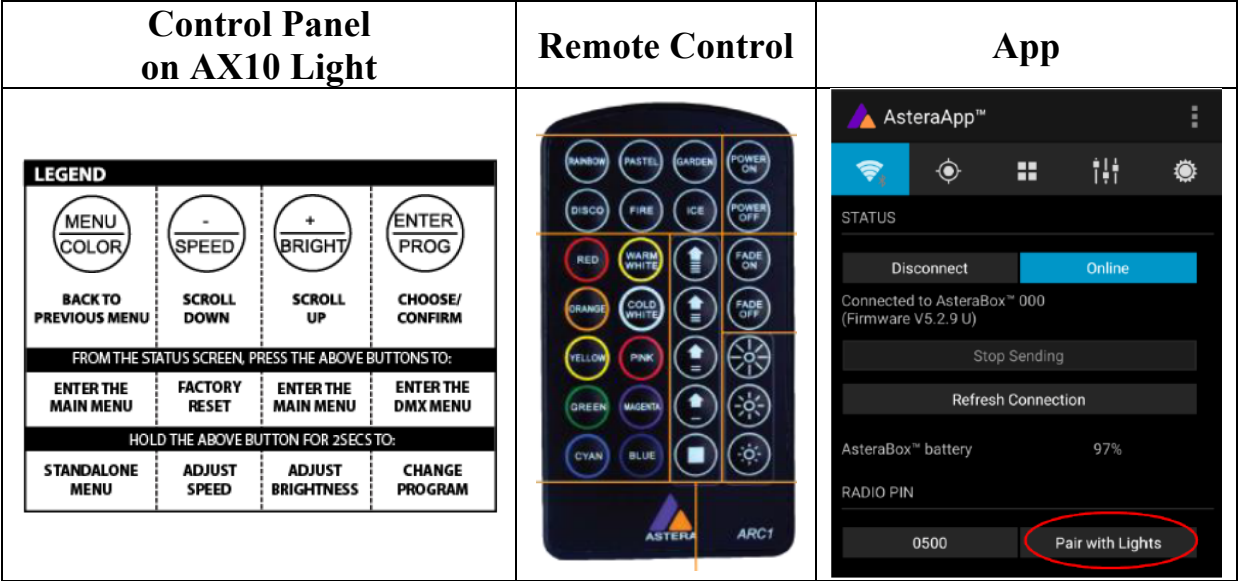
Id.

b. Claim Element 12a

355. Claim Element 12a recites “an input interface adapted to receive user input of at least one user input simulation parameter to customise a lighting effect;” EX1001, 12:33-35.

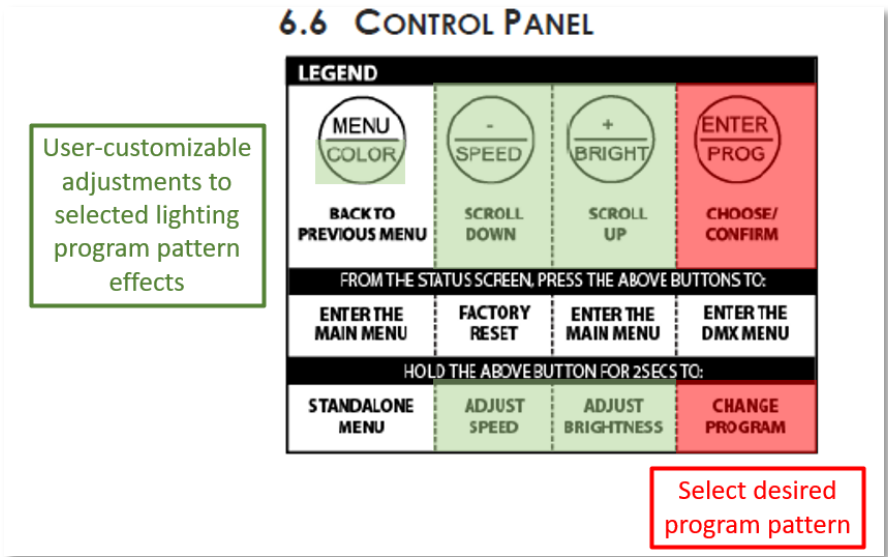
356. Astera discloses Claim Element 12a.

357. The AX10 receives user inputs through multiple user interfaces:

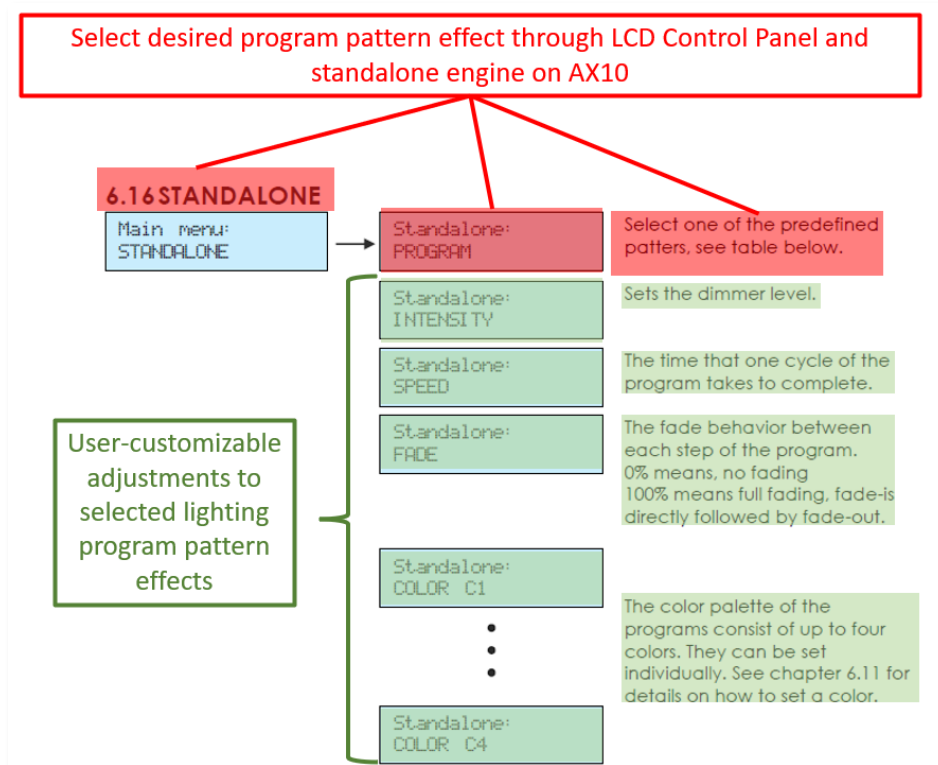


EX1010, 9, 11, 23. Users can select desired effects and input parameters through interfaces on the Control Panel or AsteraApp. *Id.*, 8, 11, 13, 20, 24-29.

358. The Control Panel includes an LCD interface that “receives” user selections of a lighting program (*e.g.*, those listed on page 21) and parameters of: (i) intensity; (ii) speed of a cycle of the program; (iii) fade time between steps; and (iv) color selections. *Id.*, 20.



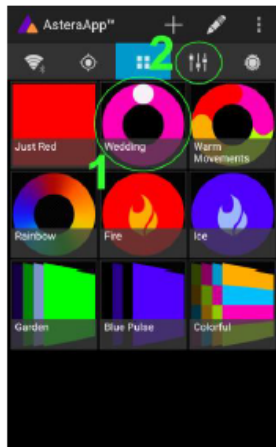
Id., 11 (annotated).



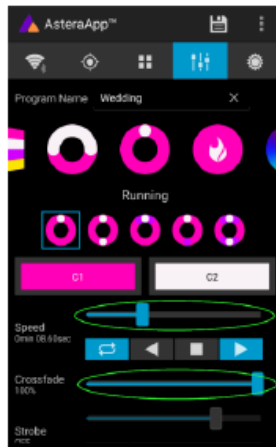
Id., 20 (annotated). These selections are received by the Control Panel, which then adjusts the effect accordingly. *See supra* Claim Element 12p.

359. Similarly, with AsteraApp, programs of effects, such as “wedding,” may be selected and “highly customized.” EX1010, 27. In particular, different “effects” may be selected from a main screen, and the user can then “enter the editor” where the user is provided options to customize parameters of the effect. *Id.* Any user inputs of adjustments to the effect parameters are received by AsteraApp through the user interface. *Id.*

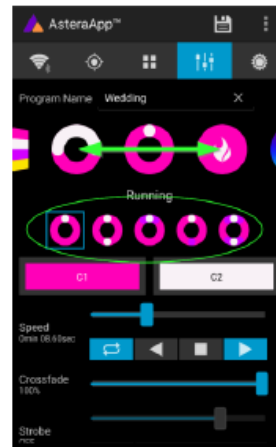
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.

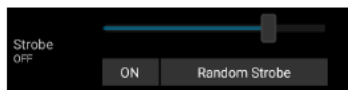
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

Id.

360. In addition, Astera discloses that pre-defined effect patterns, such as “fire,” “fading colors,” and “rainbow,” may be selected, with the user then being able to adjust parameters of the effect that are received by AsteraApp. *Id.*, 28. For example, if a “fire” effect is selected as part of a program, the user can adjust at least the “background” and “flickering” colors, and if a “rainbow” effect is included, then the “speed” can be adjusted. *Id.* Finally, for all effects, Astera discloses a “master brightness” control that can adjust the brightness of any lights that would run an effect. *Id.*, 31.

c. Claim Element 12b

361. Claim Element 12b recites “a memory adapted to store said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated; and” EX1001, 12:36-39.

362. Astera discloses Claim Element 12b.

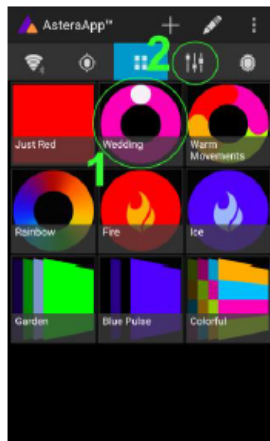
363. In Astera, the simulation parameter depends on the user-selected pre-programmed light effect (*e.g.*, fire, rainbow, chaser), as customized by any desired random strobing, speed, brightness, or color parameters. *See supra* Claim Element 12a. The speed, fade, color, stroboscope, and brightness selectable menu options are based on the user-selected effect and are presented as parameters for adjusting the particular selected effect. EX1010, 20-21,24-28. For example, when “rainbow” is selected a “speed” parameter can be generated, and when “fire” is selected

parameters to generate the “random flicker” and set the background and flickering effect colors are generated. *Id.*, 28.

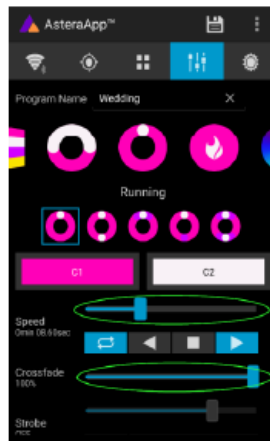
364. The effects and user adjustments made to them may also be “saved back to the main screen by pressing the save button.” EX1010, 27. Users may select an effect (like “fire” or “wedding”) and modify it by changing simulation parameters (like “colors,” “speed,” “stroboscope,” and “brightness”). *Id.*; *see also id.*, 25. When the user is done, she can click the disk icon in AsteraApp, saving the modified effect parameters. *Id.*, 27.⁴

⁴ Moreover, Astera discloses that a user’s adjustments for “Anti-Flicker” are preserved, or saved, once entered into AsteraApp. EX1010, 32. By “preserving” the Anti-Flicker adjustments, these settings are also saved and recalled when the lamps are powered back on.

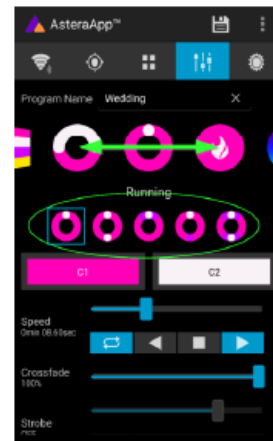
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

Id. (annotated).

365. Once saved to the main screen, these stored effects (with their modified parameters) can later be recalled and played. *Id.*, 10, 24, 30; *see also infra* Claim Element 12c. Saving within AsteraApp (a program stored in memory) therefore saves to a “memory,” as saving within the main menu must save to a memory so that the saved effect can later be recalled and replayed.

366. Similarly, when operating the AX10 through the Control Panel on the lighting device, a POSITA would understand that any user selected effects and adjusted parameters are “saved” to a memory within the AX10. From the Control Panel, users can make Standalone mode selections of programs (*i.e.*, effects) and

parameter adjustments. EX1010, 11, 14, 17, 20-21; *see also supra* Claim Element 12a. For example, a user can select a program, and then adjust and set an “intensity” parameter for the program. EX1010, 20. After setting the intensity, a user can also adjust “speed,” and then “fade” parameters of the same program. *Id.* Each of these parameter selections must be stored in memory; otherwise, a user would not be able to change one parameter and then make another selection to change a different parameter prior to finalizing the effect and outputting it from the light.

367. Further, the Control Panel provides an option for users to “reset” the settings of the device, including “resetting” the Standalone settings set for any particular user-customized effect and program. EX1010, 12, 22. That the Standalone settings, which include the selected effect and any adjusted parameters. *id.*, 12 (“reset all user settings to default”), 20-22, can be “reset” to default values indicates those parameters must be stored in memory on the device. That is, the user selected parameter settings are stored and saved until they are changed or reset to default.

d. Claim Element 12c

368. Claim Element 12c recites

an effect simulator adapted to:
recall from said memory said at least one stored user input simulation
parameter; and

EX1001, 12:40-42.

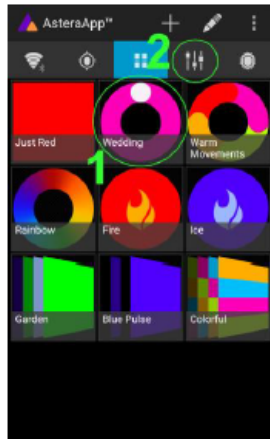
369. Astera discloses Claim Element 12c.

370. The stored user input parameters, *see supra* Claim Element 12b, are recalled from memory prior to, and during, the output of desired effects from the AX10.⁵

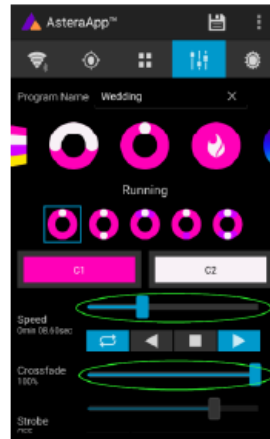
371. In AsteraApp, stored effects (with their modified parameters) can be recalled, with lighting values calculated based on the recalled effect and parameters so the effect can be played later. EX1010, 24, 27, 30. For example, adjusted program effects such as “Wedding” may be “saved back to the main screen,” from which they can later be recalled, played, or further adjusted. *Id.*, 27. The saved programs of “effects” are represented by “tiles” on a main screen where they can be selected and recalled. *Id.*, 30.

⁵ The '044 contains a single reference to storing and recalling parameters, stating “[i]t should be appreciated that due to the nature of the light 102, the effects may be customised by a user, for example, the frequency/speed, peak/minimum brightness or colour/colour temperature may be dynamically changed, and/or made to vary over time in a customised manner. ***Such user input simulation parameters may be stored in memory 220 and recalled from the memory 220 at a later time.*** The effects may be triggered on cue (for example from a director) by sending a signal over a wired remote trigger or wireless device.” EX1001, 9:27-36.

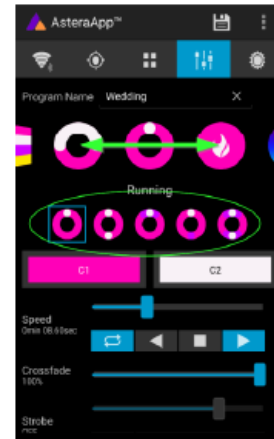
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



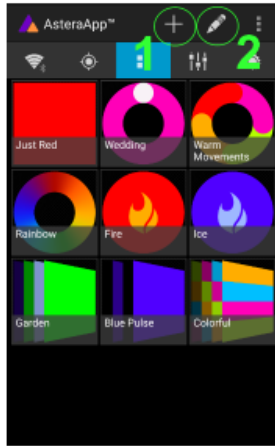
The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

Id., 27.

7.9 THE MAIN SCREEN

Here each program is represented by a tile. Those tiles can be edited and freely positioned. Several pages of tiles are available.



To move or delete a tile, press the pen icon (2). A popup will show the available actions. To add a new program tile, press the "+" icon (1).



While adding a tile, either a default "Static Red" or the currently running program can be selected. Additionally, special function tiles are available.

Id., 30.

372. Again, the stored effects and adjusted parameters are saved to a memory, *see supra* Claim Element 12b, and when they are recalled, they are recalled from this same memory.

373. Similarly, in Standalone mode implemented through the Control Panel, saved user parameter settings are "recalled" for the AX10 to "replay" and "display" the customized effect programs with the lights. EX1010, 10, 17, 20-21; *see also id.*, 7 (indicating the AX10 may be "operating under a previous setting.").

e. Claim Element 12d

374. Claim Element 12d recites “calculate a time varying lighting value based on said recalled simulation parameter;” EX1001, 12:43-44.

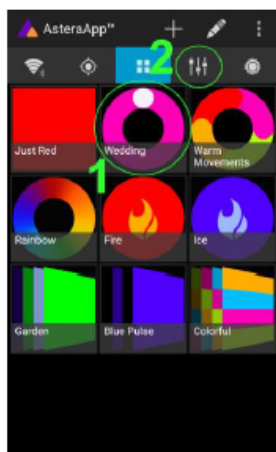
375. Astera discloses Claim Element 12d.

376. The Control Panel and AsteraApp include effect simulators to calculate time varying lighting values for generating special effects based on recalled simulation parameters. EX1010, 9-11, 13, 17, 21, 24.

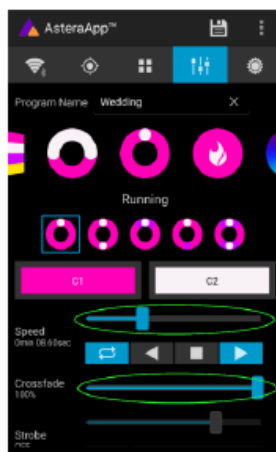
377. The Control Panel allows users to “select” from predefined effects, and then adjust parameters including intensity (to set a brightness level), speed (to change the time to complete one cycle), fade time, and color. *Id.*, 20. As noted above, these effects with adjusted parameters are stored and recalled from the AX10 (via the Control Panel) in order for the user to make selections and adjustments and play the desired effect. *See supra* Claim Elements 12b-12c. The Control Panel creates data characterizing the adjusted lighting effect based on the recalled effect settings, in the form of values and settings for the LEDs to “display these effects properly with [the] light.” EX1010, 12, 17, 20-21. The “standalone engine” then causes the LEDs to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” *Id.*, 24; *see also id.*, 10, 17. For effect patterns, the values vary with time to change the output of the LEDs, creating the effect. *Id.*

378. Similarly, in AsteraApp, users can select from different lighting effects, such as “fire,” “chasers,” “rainbow” and “stroboscope.” *Id.*, 23-24, 27-28; *see supra* Claim Element 12p. Selected effects can then “be highly customized,” to adjust parameters including: (i) “speed” of how long it will take to complete one cycle, (ii) “crossfade” between steps, (iii) random “stroboscope” speed, and (iv) “brightness.” EX1010, 27. Users can also select and customize colors for effects “with a customizable color palette,” and certain effects, like “fire effect,” allow a user to “adjust” the colors making up the effect. *Id.*, 24, 28.

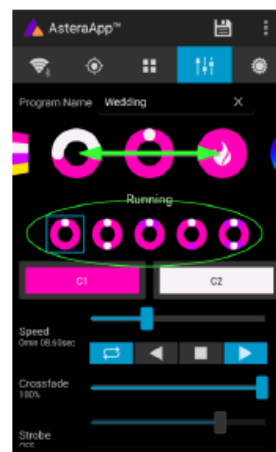
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.

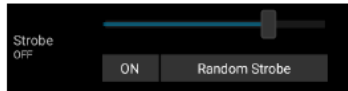
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

Id.

379. These selections may be saved and recalled for later use, such that the recalled parameters are used to calculate the time varying lighting value. EX1010, 10, 24, 30. For example, after recalling saved effects, AsteraApp calculates time varying lighting values, including brightness and color information, for these user-customized effects. *Id.*, 23-29. AsteraApp can “send complex effects” to the lights and can be “used to adjust the lights remotely” by sending controls (which are lighting values). *Id.*, 23. Thus, based on recalled user parameters, “effects can be created and can be sent to the light by the built in UHF receiver,” where the effects are “triggered” and replayed at each light. *Id.*, 23.

f. Claim Element 12e

380. Claim Element 12e recites “wherein the effect simulator is adapted to output said calculated time varying lighting value to the at least one lighting device thereby to simulate a lighting effect.” EX1001, 12:45-47.

381. Astera discloses Claim Element 12e.

382. Both the Control Panel and AsteraApp output time-varying lighting values for the AX10 to “display these [selected] effects properly with [its] light.” EX1010, 21.

383. The Control Panel “Main Menu” allows users to select “STANDALONE” mode, where the Control Panel will “set the parameters of the standalone engine” in the AX10. *Id.*, 12, 17. In “STANDALONE,” the Control Panel allows users to select a desired effect program and adjust parameters of intensity, speed, fade, and color. *Id.*, 20-21; *see also supra* Claim Element 12a. When a user then wants the lights to play the effect, the “standalone engine” outputs the lighting values to the LEDs to cause them to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” EX1010, 24; *see also id.*, 10, 17. For effect patterns, the output values vary with time to change the output of the LEDs, creating the effect. *Id.*

384. With AsteraApp, users can select from different effects (*e.g.*, fire, chasers, rainbow) and customize them (*e.g.*, adjust speed, crossfade, stroboscope,

brightness). *See supra* Claim Element 12a. When a user wants to play an effect, the calculated lighting values for that effect are output from AsteraApp to the AX10 lighting device. EX1010, 24. (“With the AsteraApp these effects can be created and *be sent to the light by the built in UHF receiver*,” where they are received by the standalone engine in the AX10.” (emphasis added)); *see also id.*, 10, 17. That is, AsteraApp outputs the lighting values representing the adjusted effect to the AX10 light. When the lighting values are received by the standalone engine, the AX10 “replays [the effect] autonomously until a new effect is received.” *Id.*, 24.

14. Claim 13

385. Claim 13 recites “The system according to claim 12, wherein the system is adapted to control at least one further lighting device.” EX1001, 12:48-49.

386. It is my opinion that Astera anticipates or renders obvious Claim 13.

387. The AX10 is comprised of nine “RGBAW” LEDs. EX1010, 7. The Control Panel and AsteraApp (*e.g.*, controllers) control this plurality of nine LED “lighting devices.” *See supra* Claim Elements 12p-12e.

388. In addition, when AX10 lights are controlled by AsteraApp, the “[l]ights can be grouped into sets,” so that a user-created effect “can stretch over up to 32 lights.” EX1010, 10; *see also id.*, 23.

6.4 CONTROL BY THE ASTERAAPP™

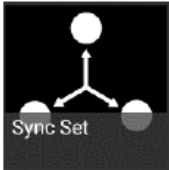
Your light has a built in standalone engine. It can display static colors or replay a number of predefined effect patterns with a customizable color palette.

With the AsteraApp™ these effects can be created and be sent to the light by the built in UHF receiver. The effects are just triggered and then each light replays it autonomously until it receives a new effect.

Lights can be grouped into sets. This way they can be controlled separately and also effects can stretch over up to 32 lights.

Id., 10 (annotated). For example, lights can be grouped together such that all lights in the same “Sync-Set” play the same effect simultaneously, based on control signals from AsteraApp:

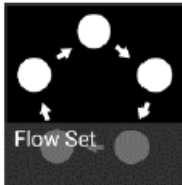
7.4.1 SYNC SET



All lights that are assigned to a Sync-Set can be controlled together. They will do exactly the same.

Id., 25. Alternatively, multiple lights can be given positions in a “Flow-Set” and “controlled together”:

7.4.2 FLOW SET



By using a Flow-Set, lights can also be controlled together. But additionally, they are assigned to positions inside the Flow-Set and so form a virtual light with several pixels. All effects, like a running light, are stretched over this virtual light.

Id., 26.

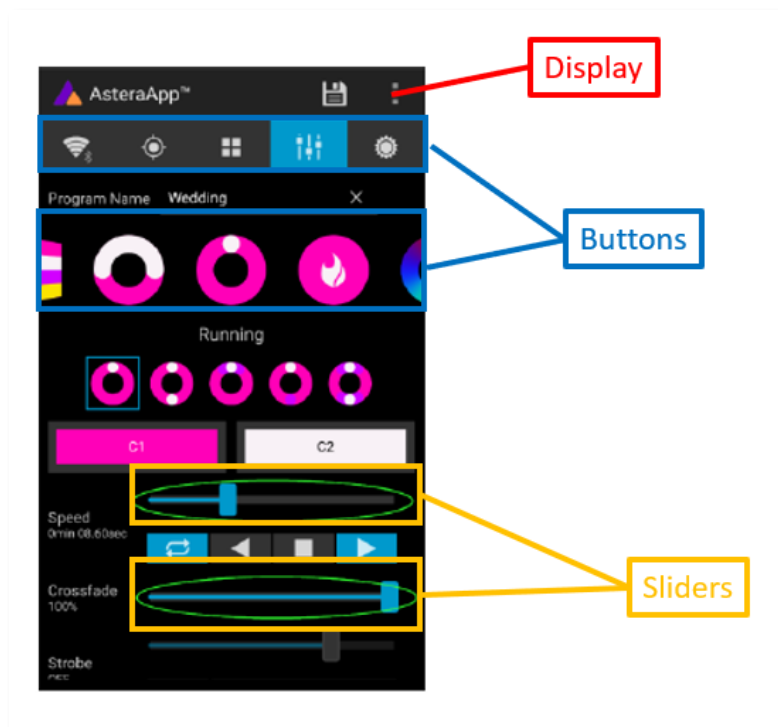
15. Claim 14

389. Claim 14 recites “The system according to claim 12, further comprising an input interface and wherein the input interface comprises at least one

of: a wireless communication interface; a dial; a slider; a display and buttons.”
EX1001, 12:50-53.

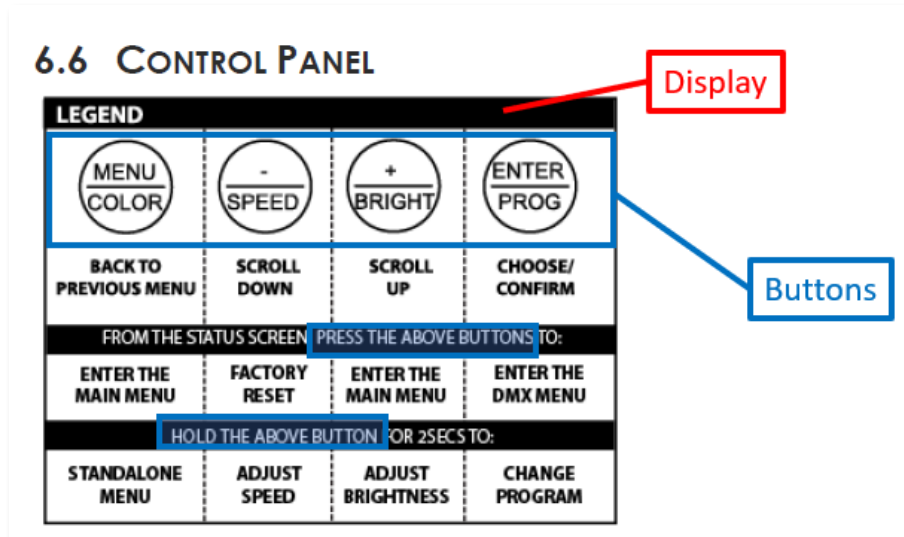
390. It is my opinion that Astera anticipates or renders obvious Claim 14.

391. The AX10 has multiple user interfaces to receive inputs, including Control Panel and AsteraApp. *See supra* Claim Element 12a. AsteraApp comprises a wireless interface, EX1010, 24, as well a display, sliders, and buttons:



Id., 27 (annotated).

392. The Control Panel on the AX10 includes an interface having a display and buttons:



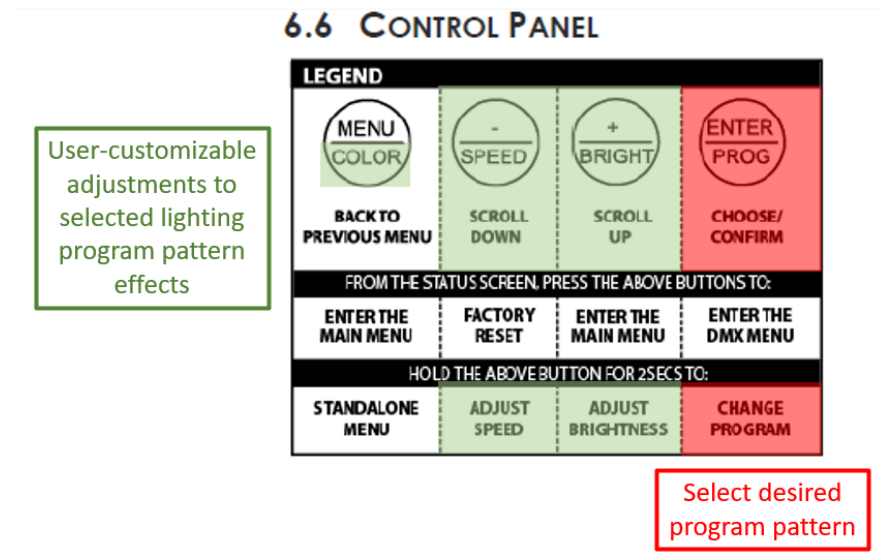
Id., 11 (annotated).

16. Claim 15

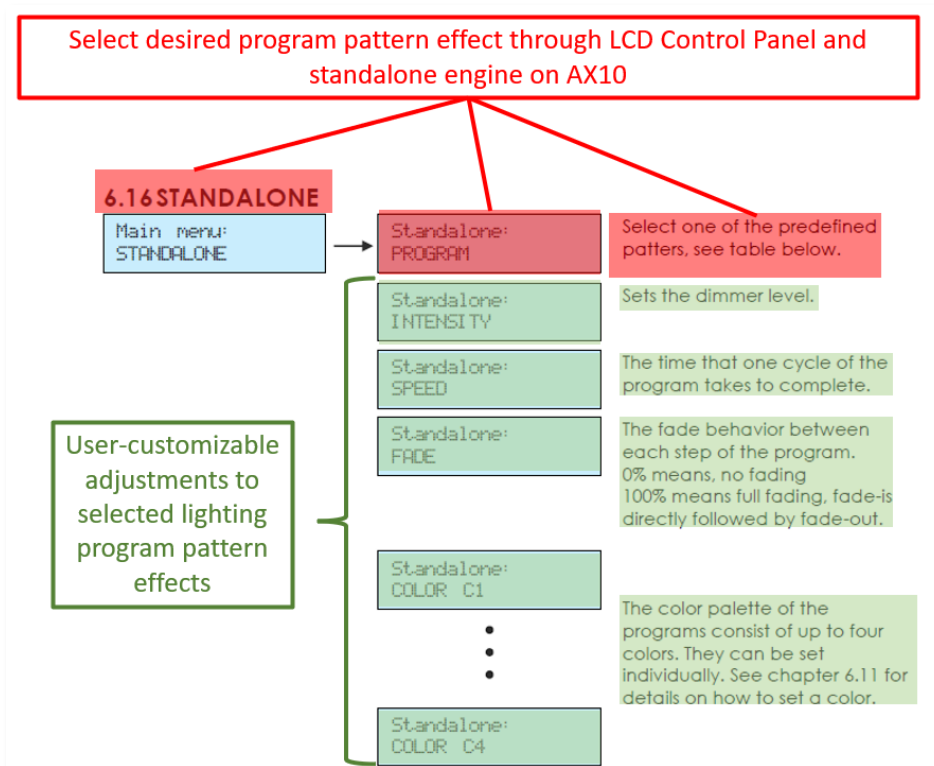
393. Claim 15 recites “The system according to claim 12, wherein said at least one lighting device is integrated in a combined unit.” EX1001, 12:54-55.

394. It is my opinion that Astera anticipates or renders obvious Claim 15.

395. The AX10 includes LED lights. EX1010, 7. The AX10 “can be controlled in several ways,” including a Control Panel user interface, memory, and standalone engine on the AX10 itself. *Id.*, 9, 20; *see also supra* Claim 12. More specifically, the AX10 “has a built in ***standalone engine***. It can display static colors or replay a number of predefined effect patterns with a customizable color palette.” EX1010, 10 (emphasis added). Additionally, using the Control Panel, a user can “adjust speed,” “adjust brightness,” and select a new lighting effect program (“change program”), among other things:



Id., 11 (annotated).



396. Further, it would have been obvious to a POSITA to provide the AsteraApp interfaces and functionality, including selecting effect programs, editing parameters, and saving and recalling effects to a main screen directly on the Control Panel. A POSITA would have recognized that, as explained in Astera, the Control Panel and AsteraApp are two ways of controlling the same AX10 light. EX1010, 9. Astera expressly discloses a user can make many of the same selections and adjustments, such as selecting effects and modifying speed, intensity, and fade of those effects. *Id.*, 11, 17, 20-21, 27-28. A POSITA would have recognized that providing the AsteraApp interfaces and functionality on the Control Panel of the AX10 itself would allow for expanded options and functionality through controls on the device itself, such as allowing saving and editing programs as icons on a main screen or making “Anti-Flicker” adjustments. Thus, modifying the Control Panel to include the interfaces and functionality of AsteraApp would have been trivial, simply including a different type of touch screen interface to make selections and save adjustments, in the same way the Control Panel LCD menu already allows certain selections and adjustments. Such modification would yield a predictable result, as only the source of the instructions (coming from the Control Panel rather than a remote AsteraApp) would change; the content and result of those instructions as implemented by the standalone engine would not.

397. A POSITA would have been motivated to add AsteraApp functionality to the interface on the AX10, given the need for ease of transport and to minimize need for additional equipment and controllers when filming. Including AsteraApp functionality would allow a user operating the device with the Control Panel, rather than through a smartphone, to make necessary adjustments during operation without having to use additional controllers. Moreover, adding AsteraApp features to the Control Panel would allow different users to operate the same light and make necessary adjustments and selections, including recalling previously edited effect programs, without each separate user having to download and use AsteraApp.

17. Claim 16

398. Claim 16 recites “The system according to claim 12, wherein the at least one lighting device comprises a lighting device for videography, broadcast, cinematography, studio filming and/or location filming.” EX1001, 12:56-59.

399. It is my opinion that Astera anticipates or renders obvious Claim 16.

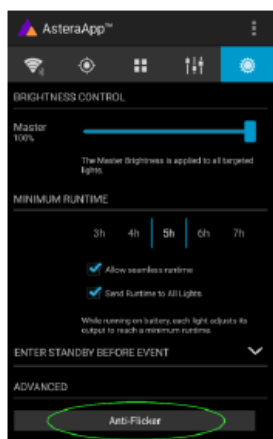
400. The AX10 can produce many lighting effects (such as “fire,” “rainbow,” “stroboscope,” and “chase effects”). *See supra* Claim Element 12p. These effects can be used for “videography, broadcasting, cinematography, studio filming, and location filming.” As was well-known to a POSITA, Astera manufactures luminaires for film, TV, and theatrical use. EX1012, ¶2 (noting AX10 is one of Astera’s “production lighting products” and that it was shown at a “Prolight

and Sound Exhibition”). Further, as was also well-known, the AX10 was designed and sold for such uses. *Id.*

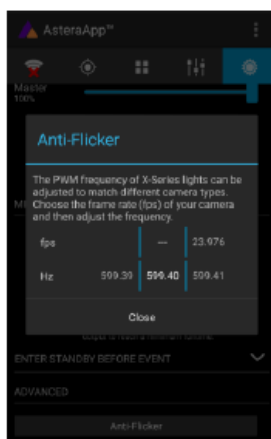
401. Moreover, Astera *expressly* teaches the AX10 produces effects captured by video cameras (used in videography, broadcasting, cinematography, and studio/location filming). The AX10 has an “Anti-Flicker” adjustment, so the light settings will “fit different *camera’s frame rates.*” EX1010, 32.

7.12 ANTI-FLICKER

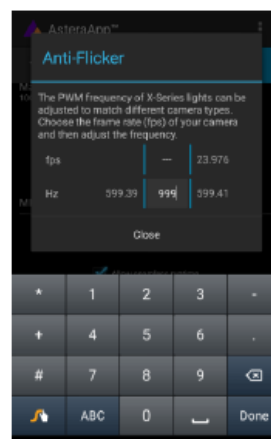
The PWM refresh rate of this light is 599.4 Hz by default. This frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera's frame rates.



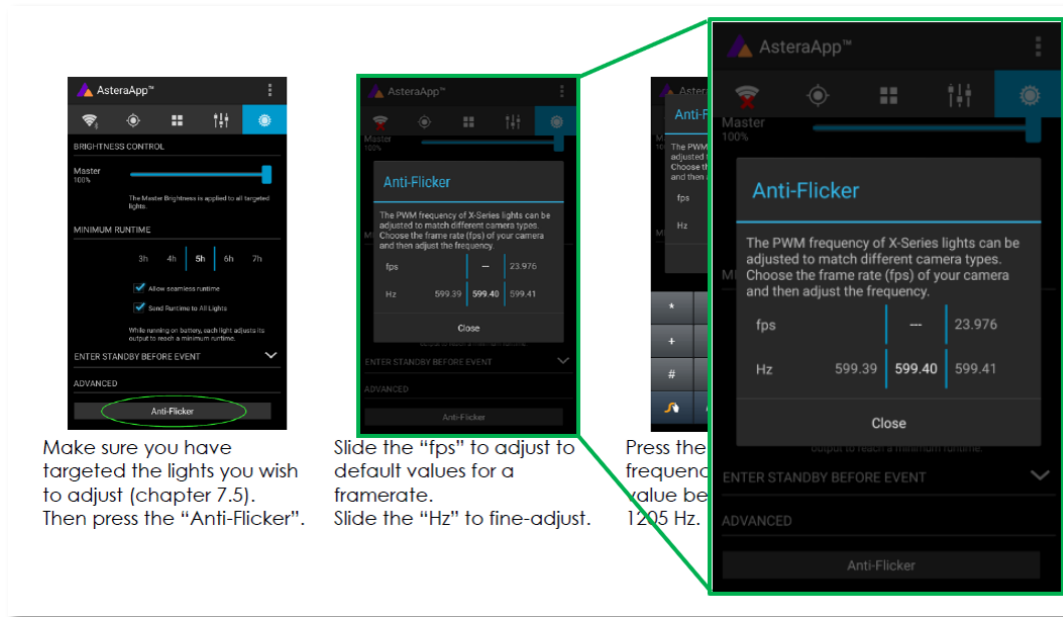
Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the “Anti-Flicker”.



Slide the “fps” to adjust to default values for a framerate. Slide the “Hz” to fine-adjust.



Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.



Id. (annotated). Fitting lights to a camera's frame rates indicates the lighting effects are intended to be captured on video camera (as opposed to a still camera), as the "flicker" avoided is an unwanted artefact that would otherwise appear on captured video.

402. Further, a POSITA would understand references to DMX control in Astera, *see, e.g., id.*, 9-10, indicate the AX10 was developed for TV, cinematography, and studio filming, as DMX is a common communication standard created by and for the entertainment lighting industry.

18. Claim 17

403. Claim 17 recites "The system according to claim 12, wherein the at least one lighting device comprises at least one light emitting diode." EX1001, 60-62.

404. It is my opinion that Astera anticipates or renders obvious Claim 17.

The AX10 includes “9 x 15W RGBAW Philips LEDs [*i.e.*, light emitting diodes].” EX1010, 7.

4 SPECIFICATION	
LED power:	135W
Illuminants:	9 x 15W RGBAW Philips LEDs
Luminous Flux*:	3,350lm (at White 4000K)
Emittance*:	10,350lx (at 2m; White 4000K)

Id. (annotated).

19. Claim 18

405. Claim 18 recites “A lighting device according to claim 17, wherein the at least one lighting device is used for videography, broadcast, cinematography, studio filming and/or location filming.” EX1001, 12:63-65.

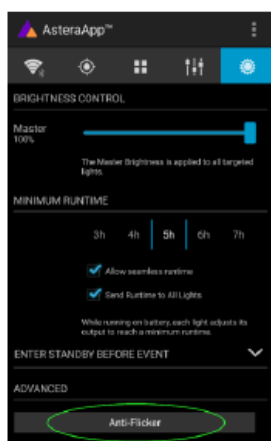
406. It is my opinion that Astera anticipates or renders obvious Claim 18.

407. The AX10 can produce many lighting effects (such as “fire,” “rainbow,” “stroboscope,” and “chase effects”). *See supra* Claim Element 12p. These effects can be used for “videography, broadcasting, cinematography, studio filming, and location filming.” As was well-known to a POSITA, Astera manufactures luminaires for film, TV, and theatrical use. EX1012, ¶2 (noting AX10 is one of Astera’s “production lighting products” and that it was shown at a “Prolight and Sound Exhibition”). Further, as was also well-known, the AX10 was designed and sold for such uses. *Id.*

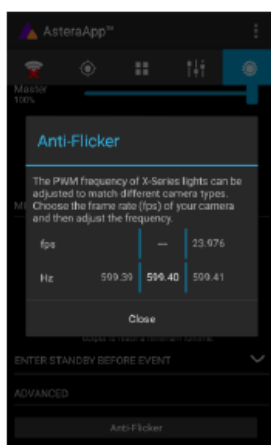
408. Moreover, Astera *expressly* teaches the AX10 produces effects captured by video cameras (used in videography, broadcasting, cinematography, and studio/location filming). The AX10 has an “Anti-Flicker” adjustment, so the light settings will “fit different *camera’s frame rates*.” EX1010, 32.

7.12 ANTI-FLICKER

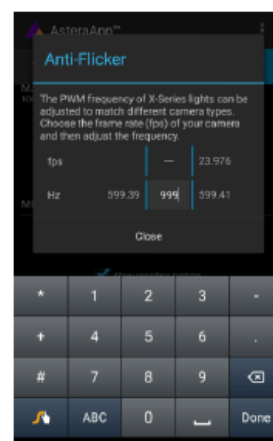
The PWM refresh rate of this light is 599.4 Hz by default. This frequency can be freely adjusted between 200 Hz and 1205 Hz to fit different camera's frame rates.



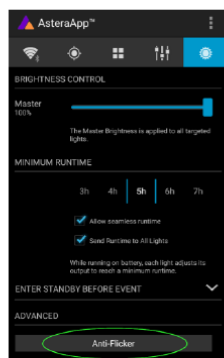
Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the “Anti-Flicker”.



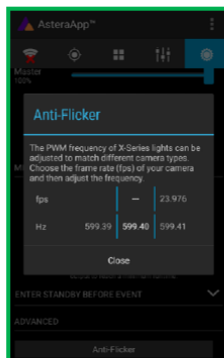
Slide the “fps” to adjust to default values for a framerate. Slide the “Hz” to fine-adjust.



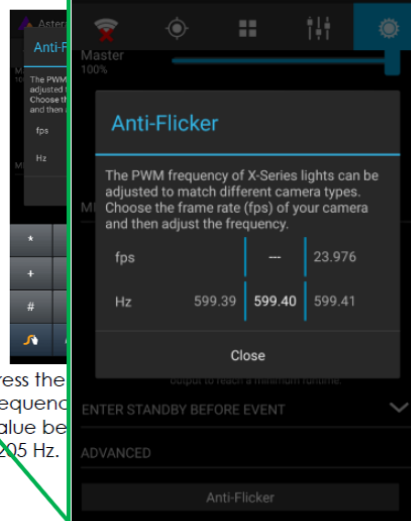
Press the highlighted frequency to enter a custom value between 200 and 1205 Hz.



Make sure you have targeted the lights you wish to adjust (chapter 7.5). Then press the “Anti-Flicker”.



Slide the “fps” to adjust to default values for a framerate. Slide the “Hz” to fine-adjust.



Press the frequency value between 200 and 1205 Hz.

Id. (annotated). Fitting lights to a camera's frame rates indicates the lighting effects are intended to be captured on video camera (as opposed to a still camera), as the "flicker" avoided is an unwanted artefact that would otherwise appear on captured video.

409. Further, a POSITA would understand references to DMX control in Astera, *see, e.g., id.*, 9-10, indicate the AX10 was developed for TV, cinematography, and studio filming, as DMX is a common communication standard created by and for the entertainment lighting industry.

20. Claim 19

410. It is my opinion that Astera anticipates or renders obvious Claim 19.

a. Claim Element 19p

411. The preamble of Claim 19, designated Claim Element 19p herein, recites "A computer program product comprising software code for controlling a lighting device to produce a range of different user customisable lighting effects the computer program product is adapted to perform, when executed, the steps of:" EX1001, 12:66-13:3.

412. For purposes of this Declaration, I assume that the preamble of Claim 19 is limiting and must be considered for purposes of evaluating the validity of the claim.

413. Regardless, Astera discloses Claim Element 19p.

414. Astera expressly discloses the method of Claim 1 can be performed by a “software program” as in claim 19. The Control Panel and AsteraApp are computer programs and perform their functions based on software code. AsteraApp is a mobile application, in the form of code, that is downloaded and run on a mobile device. The Control Panel is implemented through software-based programming in the AX10 itself. *Id.* The AX10 includes “firmware version 5.2.20.” EX1010, 2, 12, 22. A POSITA would understand that firmware is software programmed into a read-only memory, and that this firmware implements the programming and control of the AX10.

415. Astera discloses features and functionality of the AX10, a controllable lighting fixture with an array of nine “RGBAW” (*i.e.*, red, green, blue, amber, and white) LEDs. EX1010, 7.



Id., cover (annotated).

4 SPECIFICATION

LED power:	135W
Illuminants:	9 x 15W RGBAW Philips LEDs
Luminous Flux*:	3,350lm (at White 4000K)
Emitance*:	10,350lx (at 2m; White 4000K)
CRI*:	up to 92

Id., 7 (annotated).

416. The AX10 can be controlled via various controllers, including the Control Panel and AsteraApp. *Id.*, 9.

Control Panel on AX10 Light	Remote Control	App																				
LEGEND <table><tr><td> MENU COLOR BACK TO PREVIOUS MENU </td><td> - SPEED SCROLL DOWN </td><td> + BRIGHT SCROLL UP </td><td> ENTER PROG CHOOSE/ CONFIRM </td></tr><tr><td colspan="4">FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:</td></tr><tr><td>ENTER THE MAIN MENU</td><td>FACTORY RESET</td><td>ENTER THE MAIN MENU</td><td>ENTER THE DMX MENU</td></tr><tr><td colspan="4">HOLD THE ABOVE BUTTON FOR 2SECS TO:</td></tr><tr><td>STANDALONE MENU</td><td>ADJUST SPEED</td><td>ADJUST BRIGHTNESS</td><td>CHANGE PROGRAM</td></tr></table>	MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM	FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:				ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU	HOLD THE ABOVE BUTTON FOR 2SECS TO:				STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM		
MENU COLOR BACK TO PREVIOUS MENU	- SPEED SCROLL DOWN	+ BRIGHT SCROLL UP	ENTER PROG CHOOSE/ CONFIRM																			
FROM THE STATUS SCREEN, PRESS THE ABOVE BUTTONS TO:																						
ENTER THE MAIN MENU	FACTORY RESET	ENTER THE MAIN MENU	ENTER THE DMX MENU																			
HOLD THE ABOVE BUTTON FOR 2SECS TO:																						
STANDALONE MENU	ADJUST SPEED	ADJUST BRIGHTNESS	CHANGE PROGRAM																			

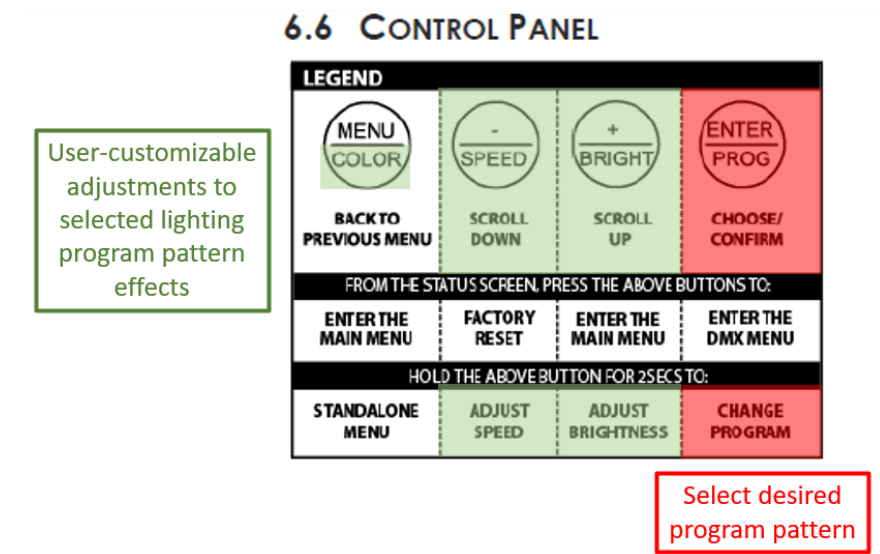
Id., 9, 11, 23.

417. The AX10 can produce different “user customizable lighting effects.” “Effect modes” offer “a comprehensive control of the built in standalone engine,” to implement “predefined programs” for effects including fire, strobe, static colors, color fades, rainbow, spiral colors. *Id.*, 17, 21.

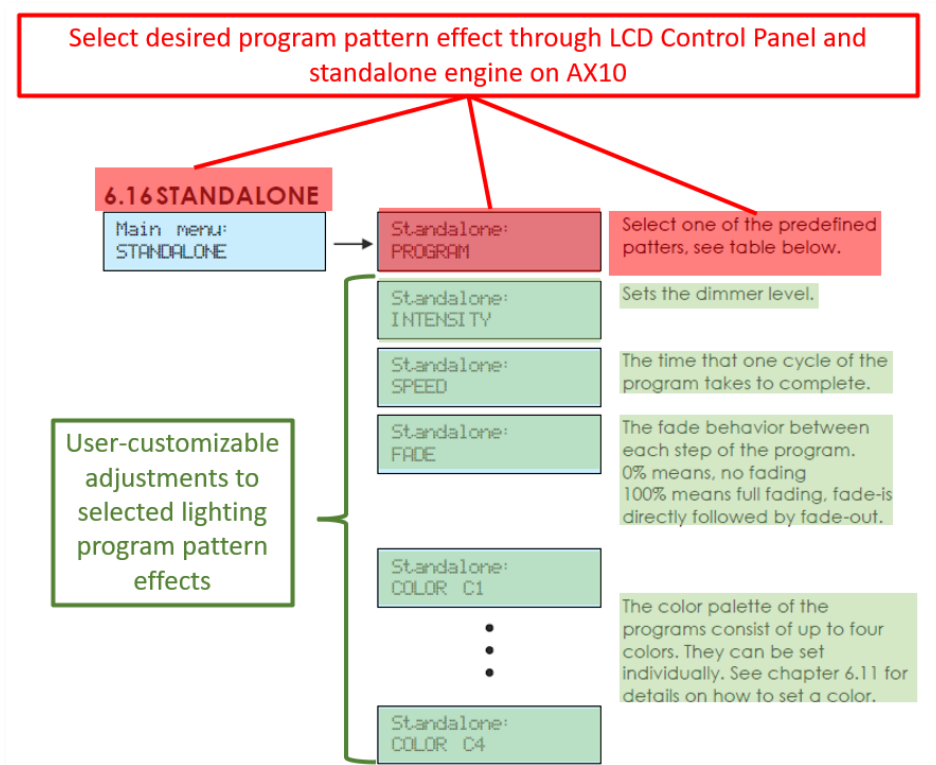
Name	Pattern
ONE COLOR STATIC	A static color is displayed on the whole virtual light.
TWO COLOR STATIC	The virtual light is split into two halves and two colors are displayed.
THREE COLOR STATIC	The virtual light is split into three parts and three colors are displayed.
FOUR COLOR STATIC	The virtual light is split into four parts and four colors are displayed.
ONE COLOR FADE	For all FADE programs, the whole color palette of four colors is used. Those colors are faded in and out one by one. Here, the whole virtual light shows the same color.
TWO COLOR FADE	The virtual light is split and shows two colors at a time.
THREE COLOR FADE	The virtual light is split and shows three colors at a time.
FOUR COLOR FADE	The virtual light is split and shows four colors at a time.
SIMPLE RUNNING	A running light; the background and the running pixels color can be set.
DOUBLE RUNNING	Two pixels are running in opposite direction.
TWO COL RUNNING	The two pixels are of different color even.
FLAG RUNNING	A three color flag is running over the background color.
DOUBLE FLAG RUNNING	Two flags are running over background in opposite direction.
SPIRAL 4 COLORS	The color is changed pixel by pixel. All four colors are used one after the other.
SPIRAL 2 COLORS	The color changes between color 1 and 2 from the outside to the inside, pixel by pixel.
RAINBOW	A rainbow effect is displayed.
FIRE	The fire effect is a random flicker between two colors, background and flickering color.

Id., 21.

418. Users can customize these effects. *Id.*, 8, 11, 13, 20, 24-29. The Control Panel allows users to “select” an effect and modify it by adjusting: (i) intensity to set a dimmer level; (ii) speed to change the time to complete one cycle; (iii) fade time between program steps; and (iv) color. *Id.*, 20.



Id., 11 (annotated).



Id., 20 (annotated).

419. Similarly, users can select and customize effects including “running lights,” “fire,” “rainbow,” “chaser effects” and “stroboscope” through AsteraApp.

Id., 27-28.

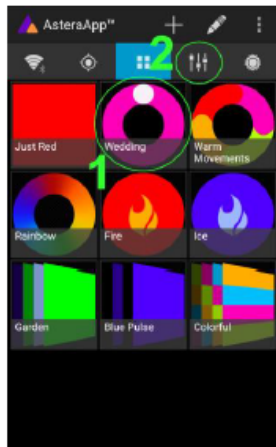
7.7 LIST OF EFFECTS

The effects' patterns are pre-defined and cannot be modified by the user. They are pre-programmed inside of each light. Still they can be parameterized. These effects are:

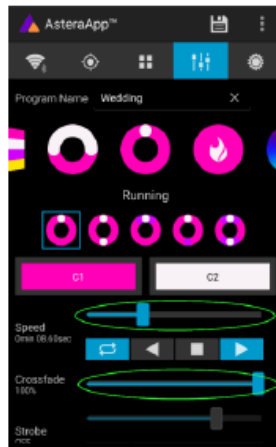
	Several variations of running lights are available.
	The Fire effect shows a random flickering effect. The background color and the color of the flickering effect can be adjusted.
	The rainbow effect shows a color change through all colors. Only its speed can be adjusted.
	Chaser effects provide an efficient means to create dancefloor lighting. The static chaser exchanges the color of the lights according to the tapped-in beat. The colors are randomly chosen. The effect can be adjusted to show up to 4 different colors at a time.
	The Moving Chasers overlay the static chaser by a second movement of the four displayed colors over the available positions of a Flow-Set. This gets mostly interesting if the Moving Strobe is chosen. Then, only some of the positions strobe and they are moving. So the strobe effect moves over the Flow-Set.

Id., 28 (annotated). Selected effects can then be customized by adjusting parameters including: (i) “speed” for “the effect to complete one cycle,” (ii) “crossfade” between steps, (iii) “speed” of a “stroboscope” effect, (iv) “brightness,” and (v) “color”:

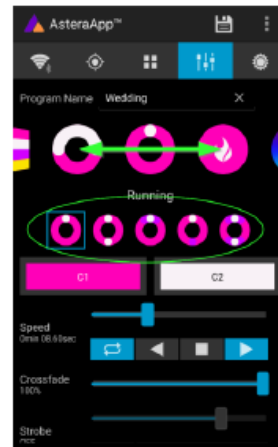
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).

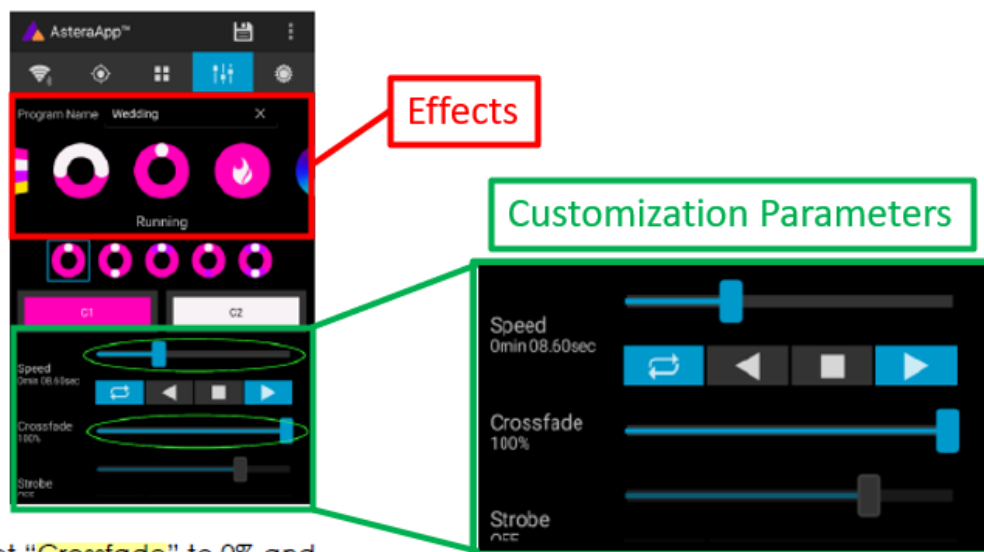


Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



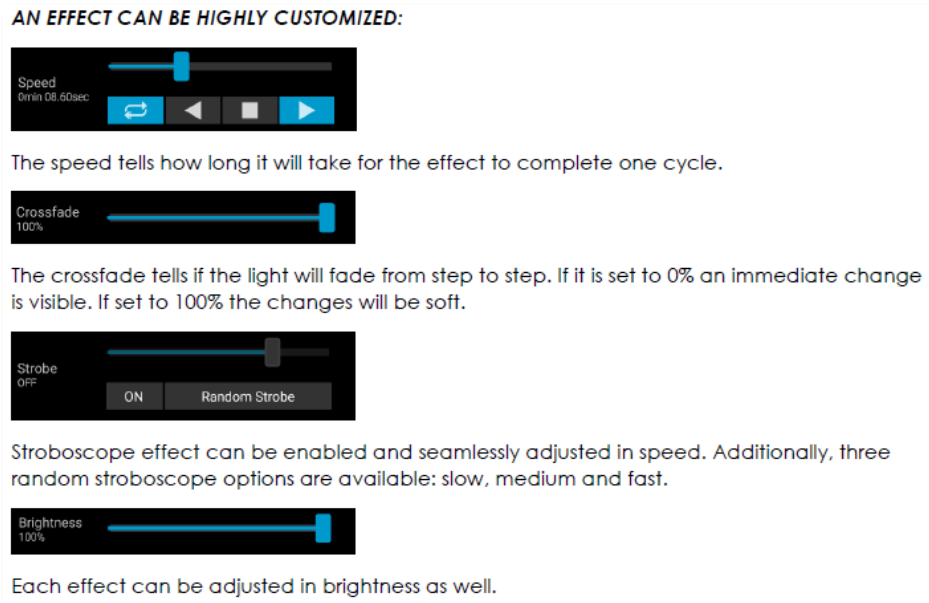
The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.

Id. (annotated).



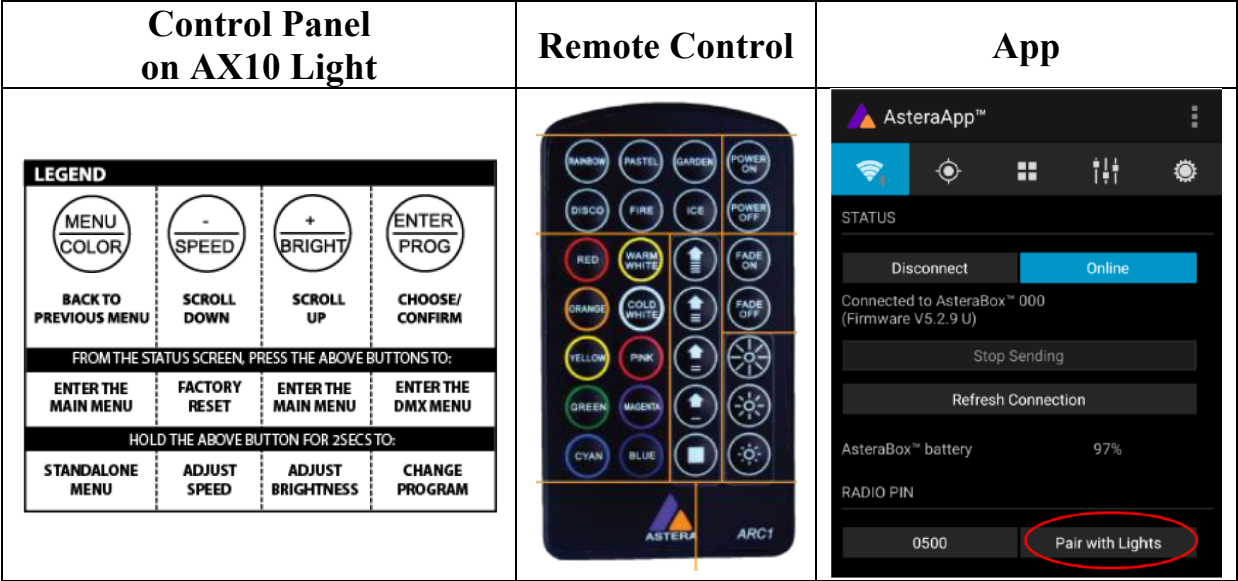
Id.

b. Claim Element 19a

420. Claim Element 19a recites “receiving user input of at least one user input simulation parameter to customise a lighting effect;” EX1001, 13:4-5.

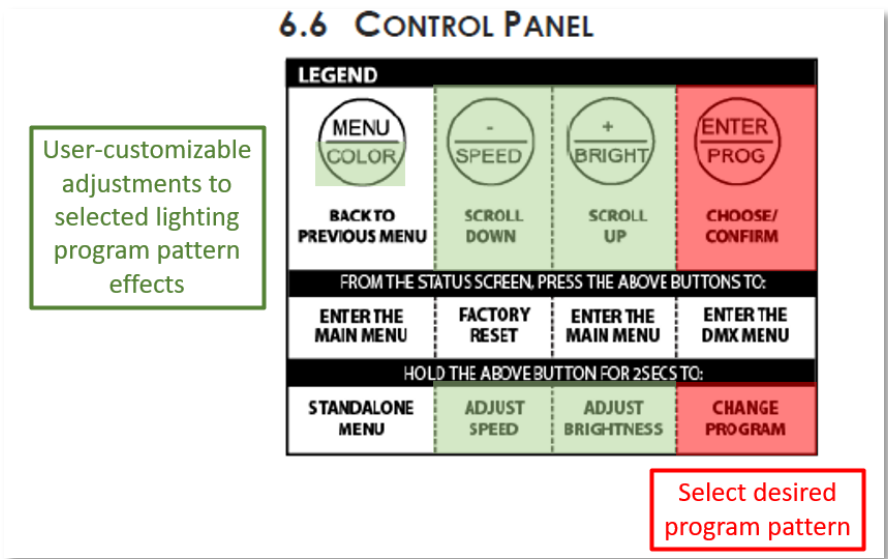
421. Astera discloses Claim Element 19a.

422. The AX10 receives user inputs through multiple user interfaces:

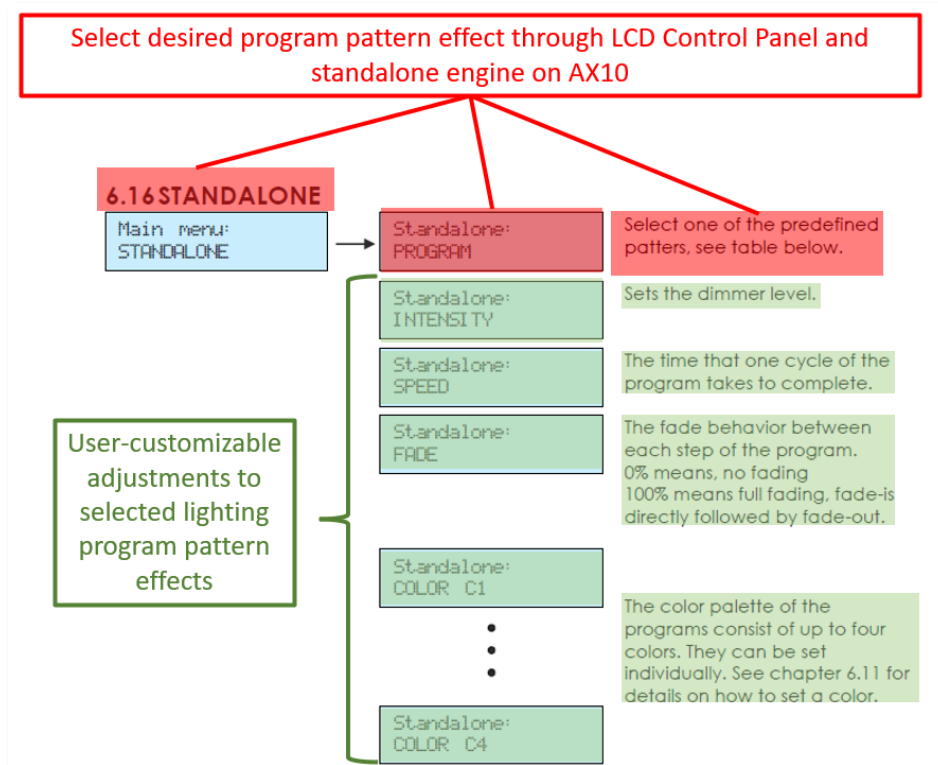


EX1010, 9, 11, 23. Users can select desired effects and input parameters through interfaces on the Control Panel or AsteraApp. *Id.*, 8, 11, 13, 20, 24-29.

423. The Control Panel includes an LCD interface that “receives” user selections of a lighting program (*e.g.*, those listed on page 21) and parameters of: (i) intensity; (ii) speed of a cycle of the program; (iii) fade time between steps; and (iv) color selections. *Id.*, 20.



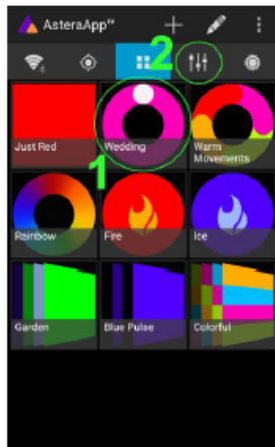
Id., 11 (annotated).



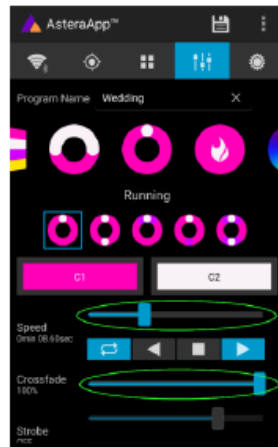
Id., 20 (annotated). These selections are received by the Control Panel, which then adjusts the effect accordingly. *See supra* Claim Element 19p.

424. Similarly, with AsteraApp, programs of effects, such as “wedding,” may be selected and “highly customized.” EX1010, 27. In particular, different “effects” may be selected from a main screen, and the user can then “enter the editor” where the user is provided options to customize parameters of the effect. *Id.* Any user inputs of adjustments to the effect parameters are received by AsteraApp through the user interface. *Id.*

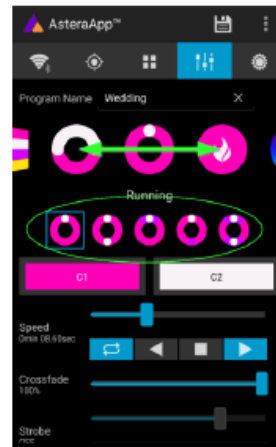
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.

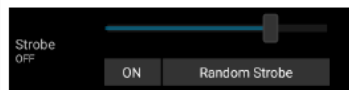
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

Id.

425. In addition, Astera discloses that pre-defined effect patterns, such as “fire,” “fading colors,” and “rainbow,” may be selected, with the user then being able to adjust parameters of the effect that are received by AsteraApp. *Id.*, 28. For example, if a “fire” effect is selected as part of a program, the user can adjust at least the “background” and “flickering” colors, and if a “rainbow” effect is included, then the “speed” can be adjusted. *Id.* Finally, for all effects, Astera discloses a “master brightness” control that can adjust the brightness of any lights that would run an effect. *Id.*, 31.

c. Claim Element 19b

426. Claim Element 19b recites “storing in memory said at least one user input simulation parameter, said at least one user input simulation parameter depending on the lighting effect being simulated;” EX1001, 13:6-9.

427. Astera discloses Claim Element 19b.

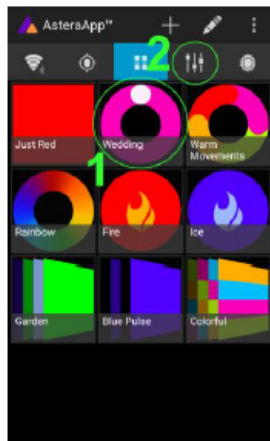
428. In Astera, the simulation parameter depends on the user-selected pre-programmed light effect (*e.g.*, fire, rainbow, chaser), as customized by any desired random strobing, speed, brightness, or color parameters. *See supra* Claim Element 19a. The speed, fade, color, stroboscope, and brightness selectable menu options are based on the user-selected effect and are presented as parameters for adjusting the particular selected effect. EX1010, 20-21,24-28. For example, when “rainbow” is selected a “speed” parameter can be generated, and when “fire” is selected

parameters to generate the “random flicker” and set the background and flickering effect colors are generated. *Id.*, 28.

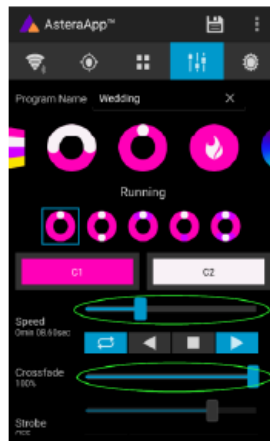
429. The effects and user adjustments made to them may also be “saved back to the main screen by pressing the save button.” EX1010, 27. Users may select an effect (like “fire” or “wedding”) and modify it by changing simulation parameters (like “colors,” “speed,” “stroboscope,” and “brightness”). *Id.*; *see also id.*, 25. When the user is done, she can click the disk icon in AsteraApp, saving the modified effect parameters. *Id.*, 27.⁶

⁶ Moreover, Astera discloses that a user’s adjustments for “Anti-Flicker” are preserved, or saved, once entered into AsteraApp. EX1010, 32. By “preserving” the Anti-Flicker adjustments, these settings are also saved and recalled when the lamps are powered back on.

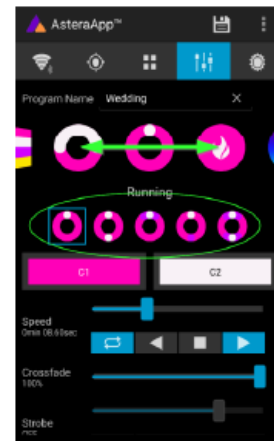
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

Id. (annotated).

430. Once saved to the main screen, these stored effects (with their modified parameters) can later be recalled and played. *Id.*, 10, 24, 30; *see also infra* Claim Element 19c. Saving within AsteraApp (a program stored in memory) therefore saves to a “memory,” as saving within the main menu must save to a memory so that the saved effect can later be recalled and replayed.

431. Similarly, when operating the AX10 through the Control Panel on the lighting device, a POSITA would understand that any user selected effects and adjusted parameters are “saved” to a memory within the AX10. From the Control Panel, users can make Standalone mode selections of programs (*i.e.*, effects) and

parameter adjustments. EX1010, 11, 14, 17, 20-21; *see also supra* Claim Element 19a. For example, a user can select a program, and then adjust and set an “intensity” parameter for the program. EX1010, 20. After setting the intensity, a user can also adjust “speed,” and then “fade” parameters of the same program. *Id.* Each of these parameter selections must be stored in memory; otherwise, a user would not be able to change one parameter and then make another selection to change a different parameter prior to finalizing the effect and outputting it from the light.

432. Further, the Control Panel provides an option for users to “reset” the settings of the device, including “resetting” the Standalone settings set for any particular user-customized effect and program. EX1010, 12, 22. That the Standalone settings, which include the selected effect and any adjusted parameters. *id.*, 12 (“reset all user settings to default”), 20-22, can be “reset” to default values indicates those parameters must be stored in memory on the device. That is, the user selected parameter settings are stored and saved until they are changed or reset to default.

d. Claim Element 19c

433. Claim Element 19c recites “recalling from said memory said at least one stored user input simulation parameter;” EX1001, 13:10-11.

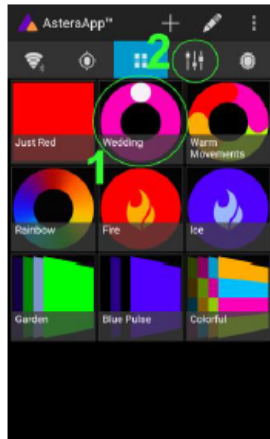
434. Astera discloses Claim Element 19c.

435. The stored user input parameters, *see supra* Claim Element 19b, are recalled from memory prior to, and during, the output of desired effects from the AX10.⁷

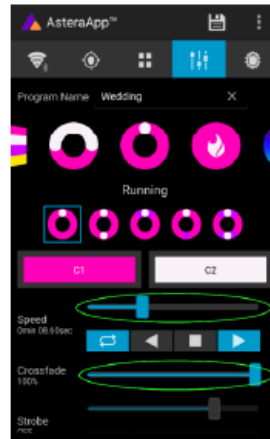
436. In AsteraApp, stored effects (with their modified parameters) can be recalled, with lighting values calculated based on the recalled effect and parameters so the effect can be played later. EX1010, 24, 27, 30. For example, adjusted program effects such as “Wedding” may be “saved back to the main screen,” from which they can later be recalled, played, or further adjusted. *Id.*, 27. The saved programs of “effects” are represented by “tiles” on a main screen where they can be selected and recalled. *Id.*, 30.

⁷ The '044 contains a single reference to storing and recalling parameters, stating “[i]t should be appreciated that due to the nature of the light 102, the effects may be customised by a user, for example, the frequency/speed, peak/minimum brightness or colour/colour temperature may be dynamically changed, and/or made to vary over time in a customised manner. ***Such user input simulation parameters may be stored in memory 220 and recalled from the memory 220 at a later time.*** The effects may be triggered on cue (for example from a director) by sending a signal over a wired remote trigger or wireless device.” EX1001, 9:27-36.

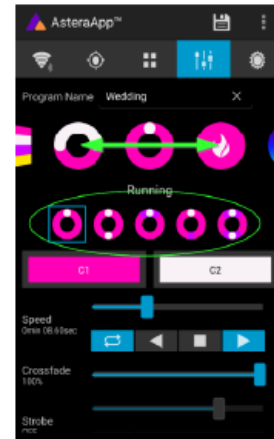
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press "Wedding" (1), then enter the editor (2).



Set "Crossfade" to 0% and "Speed" to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



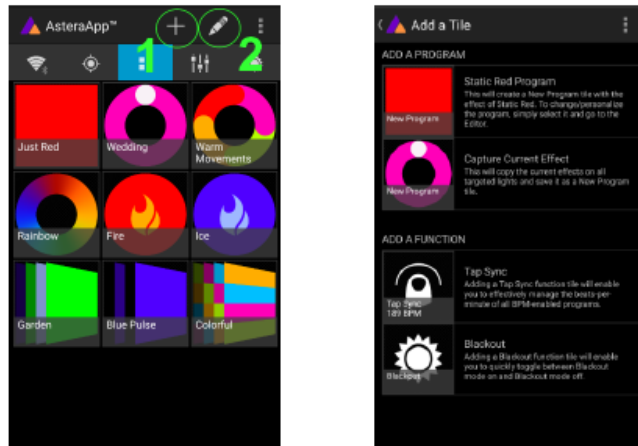
The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

After the effect is adjusted, it may be saved back to the main screen by pressing the save button.

Id., 27.

7.9 THE MAIN SCREEN

Here each program is represented by a tile. Those tiles can be edited and freely positioned. Several pages of tiles are available.



To move or delete a tile, press the pen icon (2). A popup will show the available actions. To add a new program tile, press the "+" icon (1).

While adding a tile, either a default "Static Red" or the currently running program can be selected. Additionally, special function tiles are available.

Id., 30.

437. Again, the stored effects and adjusted parameters are saved to a memory, *see supra* Claim Element 19b, and when they are recalled, they are recalled from this same memory.

438. Similarly, in Standalone mode implemented through the Control Panel, saved user parameter settings are "recalled" for the AX10 to "replay" and "display" the customized effect programs with the lights. EX1010, 10, 17, 20-21; *see also id.*, 7 (indicating the AX10 may be "operating under a previous setting.").

e. Claim Element 19d

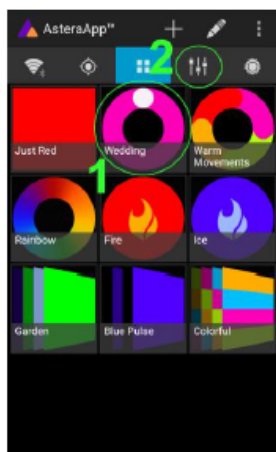
439. Claim Element 19d recites “calculating, using an effect simulator, a time varying lighting value based on said recalled simulation parameter; and” EX1001, 13:12-14.

440. The Control Panel and AsteraApp include effect simulators to calculate time varying lighting values for generating special effects based on recalled simulation parameters. EX1010, 9-11, 13, 17, 21, 24.

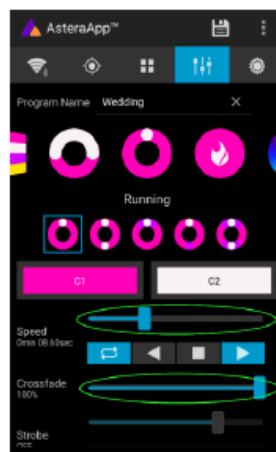
441. The Control Panel allows users to “select” from predefined effects, and then adjust parameters including intensity (to set a brightness level), speed (to change the time to complete one cycle), fade time, and color. *Id.*, 20. As noted above, these effects with adjusted parameters are stored and recalled from the AX10 (via the Control Panel) in order for the user to make selections and adjustments and play the desired effect. *See supra* Claim Elements 19b-19c. The Control Panel creates data characterizing the adjusted lighting effect based on the recalled effect settings, in the form of values and settings for the LEDs to “display these effects properly with [the] light.” EX1010, 12, 17, 20-21. The “standalone engine” then causes the LEDs to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” *Id.*, 24; *see also id.*, 10, 17. For effect patterns, the values vary with time to change the output of the LEDs, creating the effect. *Id.*

442. Similarly, in AsteraApp, users can select from different lighting effects, such as “fire,” “chasers,” “rainbow” and “stroboscope.” *Id.*, 23-24, 27-28; *see supra* Claim Element 19p. Selected effects can then “be highly customized,” to adjust parameters including: (i) “speed” of how long it will take to complete one cycle, (ii) “crossfade” between steps, (iii) random “stroboscope” speed, and (iv) “brightness.” EX1010, 27. Users can also select and customize colors for effects “with a customizable color palette,” and certain effects, like “fire effect,” allow a user to “adjust” the colors making up the effect. *Id.*, 24, 28.

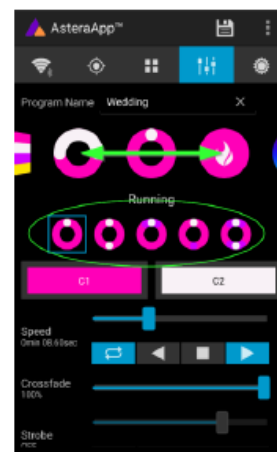
7.6 CHANGING THE EFFECT



On the AsteraApp™ main screen, press “Wedding” (1), then enter the editor (2).



Set “Crossfade” to 0% and “Speed” to around 2 seconds. You should see a clean running light now. The White light will run over a pink background.



The effect can be changed by sliding the effect picker and choosing a sub-effect below it. Again the colors can be adjusted, too.

Id., 27.

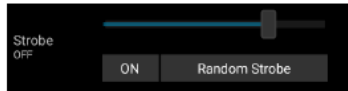
AN EFFECT CAN BE HIGHLY CUSTOMIZED:



The speed tells how long it will take for the effect to complete one cycle.



The crossfade tells if the light will fade from step to step. If it is set to 0% an immediate change is visible. If set to 100% the changes will be soft.



Stroboscope effect can be enabled and seamlessly adjusted in speed. Additionally, three random stroboscope options are available: slow, medium and fast.



Each effect can be adjusted in brightness as well.

Id.

443. These selections may be saved and recalled for later use, such that the recalled parameters are used to calculate the time varying lighting value. EX1010, 10, 24, 30. For example, after recalling saved effects, AsteraApp calculates time varying lighting values, including brightness and color information, for these user-customized effects. *Id.*, 23-29. AsteraApp can “send complex effects” to the lights and can be “used to adjust the lights remotely” by sending controls (which are lighting values). *Id.*, 23. Thus, based on recalled user parameters, “effects can be created and can be sent to the light by the built in UHF receiver,” where the effects are “triggered” and replayed at each light. *Id.*, 23.

f. Claim Element 19e

444. Claim Element 19e recites “outputting to said lighting device said time varying lighting value thereby to simulate a lighting effect.” EX1001, 13:15-16.

445. Both the Control Panel and AsteraApp output time-varying lighting values for the AX10 to “display these [selected] effects properly with [its] light.” EX1010, 21.

446. The Control Panel “Main Menu” allows users to select “STANDALONE” mode, where the Control Panel will “set the parameters of the standalone engine” in the AX10. *Id.*, 12, 17. In “STANDALONE,” the Control Panel allows users to select a desired effect program and adjust parameters of intensity, speed, fade, and color. *Id.*, 20-21; *see also supra* Claim Element 19a. When a user then wants the lights to play the effect, the “standalone engine” outputs the lighting values to the LEDs to cause them to “display static colors or replay a number of predefined effect patterns with a customizable color palette.” EX1010, 24; *see also id.*, 10, 17. For effect patterns, the output values vary with time to change the output of the LEDs, creating the effect. *Id.*

447. With AsteraApp, users can select from different effects (*e.g.*, fire, chasers, rainbow) and customize them (*e.g.*, adjust speed, crossfade, stroboscope, brightness). *See supra* Claim Element 19a. When a user wants to play an effect, the calculated lighting values for that effect are output from AsteraApp to the AX10

lighting device. EX1010, 24. (“With the AsteraApp these effects can be created and be *sent to the light by the built in UHF receiver*,” where they are received by the standalone engine in the AX10.” (emphasis added)); *see also id.*, 10, 17. That is, AsteraApp outputs the lighting values representing the adjusted effect to the AX10 light. When the lighting values are received by the standalone engine, the AX10 “replays [the effect] autonomously until a new effect is received.” *Id.*, 24.

CERTIFICATION

I reserve the right to supplement my opinions as appropriate if the Patent Owner alleges or offers any purported evidence of any secondary considerations of non-obviousness.

I hereby 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 knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Executed this 10 day of September, 2024

Respectfully submitted,



APPENDIX A

P. Morgan Pattison
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Experience

Solid State Lighting Services, Inc. **November 2007 - Present**
Founder/President- Provide technical, strategic, and market expertise in the areas of LEDs, OLEDs, Lighting, Solid State Lighting (SSL), displays, and optoelectronic materials and devices. LED device, lighting, and materials product development. Horticultural lighting research and strategy. Light pollution measurement, evaluation, and mitigation. LED and lighting product failure and reliability evaluation. Manage research on human and animal physiological responses to light. Scout and evaluate new technologies for investment.

U.S. Department of Energy **January 2006 – November 2007**
National Energy Technology Laboratory, Morgantown WV
Project Manager- Managed DOE funded R&D projects in SSL including LED and OLED lighting technologies. Managed solicitation and selection of new funded R&D projects. Identified priority areas of research necessary for advancement of SSL efficiency, performance, and price.

University of California, Santa Barbara **September 2000 – January 2006**
Graduate Student Researcher- Doctoral thesis research under Professor Shuji Nakamura (Nobel Prize in Physics 2014) on GaN based micro-cavity light emitting diodes. Research included: epitaxial structure design and growth by MOCVD, semiconductor process development, materials characterization, and electro-optical device characterization. Additional areas of research included UV LEDs, vertical cavity surface emitting laser (VCSEL), and edge emitting laser diodes.

Cymer Laser, San Diego **November 1996 – May 2000**
Laser Test Engineer- Tested and developed test methodology for production and prototype KrF and ArF excimer lasers used in deep UV photolithography for manufacturing of advanced semiconductor products. Testing included optical characterization and full system troubleshooting. Test development of new electrical and optical test methodologies to improve test cycle, Labview automation of test procedures, and development of test documentation.

Education

Ph.D. Materials Science, Electronic and Photonic Materials
University of California, Santa Barbara, 2006
Thesis: *Fabrication and Characterization of Gallium Nitride Based Micro-Cavity LEDs*
M.S. Electrical Engineering, Electronics and Photonics
University of California, Santa Barbara, 2003
B.S. Electrical Engineering, Electronic Devices and Materials
University of California, San Diego, 1996

Expertise

Optoelectronic materials and devices, lighting, LED, OLED, UV-LEDs, Germicidal UV application, R&D and technology evaluation, μ LED-LED-OLED-Quantum Dot display technology, medical lighting, SSL product evaluation and selection, LED lighting product development, R&D Management, technology roadmapping, technical meeting moderation, technical writing, IP evaluation, trial expert witness, lighting color evaluation and selection, advanced lighting performance evaluation, Energy Star LED lighting testing, photometric characterization and testing, R&D Management, Federal R&D funding processes, R&D Proposal review and evaluation, ESCO contracts and performance measurement & verification (M&V), horticultural lighting, wildlife responses to light, human physiological responses to light

Accreditations, Affiliations, and Professional Societies

Fellow - Illuminating Engineering Society (IES)

Chair – Outdoor Nighttime Environments (ONE) Committee

Voting Member – IES Horticultural Lighting Committee

Oregon State University, Civil and Construction Engineering, Courtesy Faculty

Lighting Certified (LC) by National Council on Qualifications for Lighting Professionals

Member - International Society of Horticultural Scientists (ISHS)

Member – International Dark-Sky Association (IDA)

Member – International Society for Optics and Photonics (SPIE)

Member – American Society of Agricultural and Biological Engineers (ASABE)

Project Management Professional (PMP) *Lapsed*, Project Management Institute (2006)

U.S. Government Contracting Officer's Representative (COR) (2006)

Leadership

Senior Technical and Strategic Advisor to DOE SSL R&D Program

Lead writer of DOE SSL R&D Opportunities, R&D Plan, and Multi-Year Program Plan

Technical content supervisor of annual DOE SSL R&D Workshops

Manage organization of DOE SSL topical R&D meetings on: LED devices and materials, OLEDs, luminaire integration, roadway lighting, germicidal ultraviolet (UV) LEDs, human physiological responses to light, domesticated and wild animal responses to light, roadway and area lighting, and horticultural lighting

New business creation/development – *Action Spectrum*, *Ultra-Yield Solutions*, *Guidance LED*, *Zuli*, *Canvas*, *Intellilight/Next*, *SSLS, Inc.*, *Diel Lighting Science*, *Blue Laser Fusion*

Scientific Advisory Board member to *GLASE (Greenhouse Lighting and System Engineering)*, NYSERDA funded controlled environment agriculture R&D program

Technical Advisory Committee of Resource Innovation Institute

Advisory Board Member of *Phosphor Global Summit* annual meeting

Advisor to *Cyclotron Road* – Clean Technology Incubator at Lawrence Berkeley National Lab

Project sponsor for Senior Design Course at UCSB (2011-2012)

1. Design and development of spectro-goniophotometer
2. Design and development of smartphone light controller (co-founder and original board member of resulting company renamed *Zuli*)

Designed, fabricated, and characterized world's first gallium nitride microcavity LED

Fabricated and characterized world's first gallium nitride semipolar LED

Publications

Minimizing Ecological Impacts of Marine Energy Lighting. Reilly, C. E., Larson, J., Amerson, A. M., Staines, G. J., Haxel, J. H., & Pattison, P. M. (2022). *Journal of Marine Science and Engineering*, 10(3), 354.

Department of Energy SSL Manufacturing Status and Opportunities (2022)

Photon Efficacy in Horticulture. Kusuma, P, Pattison, PM, Bugbee, B. (2021) Chapter 7 in *Plant Factory: Basics, Applications and Advances*

A Review of Human Physiological Responses to Light: Implications for the Development of Integrative Lighting Solutions. Vetter, C, Pattison, PM, Houser, K, Herf, M, Phillips, AJK, Wright, KP, Skene, DJ, Brainard, GC, Boivin, DB, Glickman, G. (2021) *Leukos*

DOE 2020 LED Manufacturing Supply Chain. Lee, K, Nubbe, V, Rego, B, Hansen, M, Pattison, M. *U.S. DOE Lighting R&D Program*. July 2021.

Recommended Practice: Horticultural Lighting, An American National Standard. ANSI/IES RP-45-21. *Illuminating Engineering Society*. June 2021.

Energy Savings Potential of SSL in Agricultural Applications. Lee, K, Elliott, C, and Pattison, PM. *U.S. DOE Lighting R&D Program*. June 2020.

From physics to fixtures to food: current and potential LED efficacy. Kusuma, P, Pattison, PM, and Bugbee, B. (2020) *Horticultural Research*. 7, 56.

What's next for LEDs. Pattison, PM (2019) *Electroindustry*. March/April 2019.

Building the evidence outside the lab. Pattison, PM (2018) *Lighting Design & Application*. December

LEDs for photons, physiology and food. Pattison, PM, Tsao, JY, Brainard, GC, Bugbee, B. (2018) *Nature*. 563, 493-499.

LEDs for Horticulture: More than Meets the Eye. Pattison, PM. (2018) *Lighting Design & Application*. August.

LED lighting efficacy: Status and directions. Pattison, PM, Hansen, M, Tsao, JY. (2018) *Comptes Rendus Physique*. 19, 134-145.

Energy Savings Potential of SSL in Horticultural Applications. Stober, K, Lee, K, Yamada, M, and Pattison, PM. *U.S. DOE Lighting R&D Program*. December 2017.

Department of Energy Solid State Lighting R&D Opportunities/Plan, lead author (2022, 2019, 2018, 2017, 2016, 2015)

Light-emitting diode technology status and directions: opportunities for horticultural lighting. Pattison, PM, Tsao, JY, Krames, MR. (2016) *Acta Horticulturae*. 1134, 413-426.

Status of SSL Product Development and Future Trends for General Illumination. Katona TM, Pattison PM, Paolini S. (2016) *Annual Review of Chemical and Biomolecular Engineering* 7 (1).

The Blue LED Nobel Prize: Historical context, current scientific understanding, human benefit. Tsao, J, Han, J, Haitz, R, Pattison, PM. (2015) *Annalen der Physik* 527, No. 5–6, A53–A61.

Department of Energy SSL R&D Multi-Year Program Plan (2008-2014)

Department of Energy SSL Manufacturing Roadmap (2009-2014)

Gallium nitride based microcavity light emitting diodes with 2 lambda effective cavity thickness. Pattison, P. M., David, A., Sharma, R., Weisbuch, C., DenBaars, S., & Nakamura, S. (2007). *Appl. Phys. Lett*, 90, 031111.

First-moment analysis of polarized light emission from InGaN/GaN light-emitting diodes prepared on semipolar planes. Masui, H., Baker, T. J., Sharma, R., Pattison, P. M., Iza, M., Zhong, H., Nakamura, S., & DenBaars, S. P. (2006). *Japanese journal of applied physics*, 45(9L), L904.

Gallium nitride based micro-cavity light emitting diodes emitting at 498 nm. Pattison, P. M., Sharma, R., David, A., Waki, I., Weisbuch, C., & Nakamura, S. (2006). *Physica Status Solidi (a)*, 203(7), 1783-1786.

Demonstration of a semipolar (10 (1) over-bar (3) over-bar) InGaN/GaN green light emitting diode. Sharma, R., Pattison, P. M., Masui, H., Farrell, R. M., Baker, T. J., Haskell, B. A., Wu, F., DenBaars, S.P., Speck, J.S., & Nakamura, S. (2005). *Applied Physics Letters*, 87(23).

Micro cavity effect in GaN-based light-emitting diodes formed by laser lift-off and etch-back technique. Fujii, T., David, A., Schwach, C., Pattison, P. M., Sharma, R., Fujito, K., Margalith, T., DenBaars, S.P., Weisbuch, C., & Nakamura, S. (2004). *Japanese journal of applied physics*, 43(3B), L411.

292 nm AlGaIn single-quantum well light emitting diodes grown on transparent AlN base. Hanlon, A., Pattison, P. M., Kaeding, J. F., Sharma, R., Fini, P., & Nakamura, S. (2003). *Japanese journal of applied physics*, 42(6B), L628.

Higher efficiency InGaIn laser diodes with an improved quantum well capping configuration. Hansen, M., Piprek, J., Pattison, P. M., Speck, J. S., Nakamura, S., & DenBaars, S. P. (2002). *Applied physics letters*, 81(22), 4275-4277.

Presentations

U.S. Fish & Wildlife Service Light Pollution & Bird Collisions expert panel, Workshop on Disorder in Semiconductor Physics and Devices 2024, University of Cincinnati IRIS 2023 Working Group, IES Raleigh Section “Horticultural Lighting – A Growing Opportunity”, IES Street and Area Lighting Conference 2022, National Park Service Science and Technology – Skyglow Measurements at Channel Islands National Park 2022, UCSB Nitride Seminar 2022, International SSL Alliance 2021 General Assembly, The Limits of Food Production – Vertical Farming 2021, Horticonn 2020, U.C. Davis Energy and Efficiency Institute, California Energy Administration, 2020 DOE Lighting R&D Workshop, Charleston Catholic High School STEM Seminar, East Tennessee State University Physics and Astronomy Seminar, IES Rocky Mountain Section – CU Boulder, 2019 DOE SSL R&D Workshop, Harvard ES-173 Guest Lecture, U.S. DOE Building Technologies Office Brown Bag Seminar, U.C. Santa Barbara Nitrides Seminar 2018, Phosphor Global Summit 2018, West Virginia State University – Biology Seminar, East Tennessee State University Entrepreneur Club 2018, IES Aviation

Lighting Committee Meeting 2017 (Best Technical Paper), ICCEA Panama 2017, NCERA 101 Controlled Environment Agriculture meeting, DOE SSL R&D Workshop 2017, The College of New Jersey Physics Colloquium, DOE SSL R&D Workshop 2017, NREL 2016, Harvard University Engineering Seminar, LightSym 2016, DOE SSL R&D Workshop 2016, DOE SSL Technology development Workshop 2015, DOE SSL R&D Workshop 2015, IDTechX Internet of Things Applications, Phosphor Global Summit 2014, International Conference on Nitride Semiconductors 2013, IES Illuminate Philadelphia 2012, Strategies in Light 2012, Energy Efficiency Expo 2011, Tennessee Association of Physical Plant Administrators 2011, East Tennessee State University Faculty Development Sustainability Seminar 2011, LED Discovery 2010, Think Tomorrow Today 2008, International Conference on Nitride Semiconductors 2005, International Symposium on Blue Lasers and Light Emitting Diodes 2004, Fall Materials Research Society 2001.

Patents

Technique for growth and fabrication of semipolar (Ga, Al, In, B) N thin films, heterostructures, and devices. #9793435, #9231376, #8686466, #7846757, #10529892

Lighting unit having lighting strips with lighting elements and a remote luminescent material. #8491165

Lighting unit with heat dissipating chimney #8360607

Lighting unit with indirect light source #8684566 B2

System for monitor and control of equipment. #9432210

Semiconductor light emitting device #8227820, #8643036

Etching technique for the fabrication of thin (Al, In, Ga) N layers. #7795146

Semiconductor micro-cavity light emitting diode. Application # 11/510,240 (abandoned), WO2007025122