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IP-Light Technologies Gen 2: Intervention Tools on IPLT for Trauma, Phobia, and Psychological Problems

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Abstract—As the fourth industrial revolution guides humanity toward the next stage of civilization, there have been various changes across multiple domains of life. The youngest generations now face a new era in which unexpected problems continuously arise and evolve. Consequently, innovation is needed, especially in psychology and technology. This innovation is important because of the increasing number of issues that plague human life, especially psychological problems, trauma, and phobias. However, modern psychology has not kept pace with these developments. Based on this, the researchers developed a tool called IP-Light Technologies. This tool was developed using a research and development approach. Product testing in the form of prototypes is limited and widely carried out in West Nusa Tenggara, West Sumatra, DKI Jakarta, and Bali. As a result of testing, the final prototype was widely produced. The perceptual light prototype comprises a set of lamps and a multiplicity of LED lights extending in horizontal wings spaced concerning the main handle; an elongated handle extending from the main handle in the opposite direction, vertically to horizontally; a linear array of illuminated displays located on the display surface of the handle; and numerous control switches mounted on the casing. The device further comprises a power supply, and control circuit wherein the LEDs on both wings are arranged in an array configured so that the combination of each bulb may project high-intensity light. A lamp clip with a spring design can be clipped on the edge of a table or any other surface.

Keywords— Product innovation; process innovation; human and illness; mental health; public health

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I. INTRODUCTION

The fourth industrial revolution era has brought various changes in various fields of life [1]-[3]. The baby boomer generation, generation X, generation Y, and generation Z now face this new age of civilization [4], [5]. Addressing human problems requires new innovations in technology and science fields [6]. This innovation is important because the issues troubling human life is only increasing while the development of approaches and techniques has failed to keep pace with existing problems. Among these are the psychological problems caused by the COVID-19 pandemic [7]-[10].

The COVID-19 pandemic in recent years has also caused psychological problems such as stress and anxiety [11]. The COVID-19 pandemic poses a global mental health risk [12]. Research has found that 53.8% of respondents believed respondents felt the psychological impact of the COVID-19 outbreak in the moderate or severe category [13]. Therefore,

stress and anxiety disorders arising during the COVID-19 outbreak are currently at a moderate to the severe stage [13-15].

Stress and anxiety during the COVID-19 pandemic are experienced by all groups, from medical personnel [16] to the general public. Individuals who experience stress and anxiety have high concerns about contracting the COVID-19 virus [17]. Furthermore, many individuals have felt troubled by the immobility that resulted from the lockdown policies that prohibited them from leaving their homes [17].

Furthermore, the level of education of individuals dealing with victims of the COVID-19 pandemic correlates with the stress level they experience [16]. Stress experienced by individuals during quarantine causes unhealthy eating patterns and reduced physical activity [18]. In addition, the COVID-19 pandemic also causes sleep disturbances for individuals [18].

The stress and anxiety experienced by individuals are caused by the variety of information about COVID-19, which

is incredibly diverse and often invalid. This distress can occur due to several factors, including news headlines that tend to be dramatized and sensationalized [19], having a close friend or relative in the neighborhood infected with COVID-19 [16], and a lockdown policy in one's area. This condition gives rise to instances of stereotyping and discrimination [20].

Stress is a condition suffered by an individual with a disorder due to psychological pressure and can be categorized as a psychological disease [21]-[23]. Stress conditions can affect emotions, thought processes, and individual conditions [24-27]. Based on research conducted on COVID-19, the disease causes various psychological disorders such as stress, anxiety, and depression for medical personnel [14], [16, 28, 29] and society in general [14].

Stress is a condition of dependence that causes physical and psychological imbalances that affect emotions, thought processes, and individual conditions [24], [30]-[34]. Individuals who experience stress tend to have irrational responses to their environment [35]-[38]. Furthermore, psychological problems of concern are the phenomenon of anxiety, especially after the New Normal era.

Anxiety can be defined as an emotional condition that causes discomfort characterized by symptoms of worry, anxiety, and fear that interfere with the individual's life [39]-[41]. For decades in some countries, anxiety has become the disease that "paralyzes" and is most likely to cause harm compared to all other medical diseases [42], [43]. Anxiety experienced due to COVID-19 is related to a lack of knowledge about COVID-19 and the presence of close people or friends who are affected by COVID-19 [16]. Suppose stress and anxiety conditions are not treated. In that case, they can potentially lead to physical disorders such as chest tightness and insomnia, and even mental disorders such as depression, endocrine disorders, and hypertension, with the potential to be as deadly as other physical pathologies [19], [43].

The COVID-19 pandemic has also caused trauma and phobia among the public [44], [45]. Physical trauma experienced by individuals due to an injury can potentially cause psychological disorders such as anxiety, depression, and post-traumatic stress disorder (PTSD) [46]. Research findings indicate that traumatic events experienced by individuals can lead to PTSD [47]. Trauma can cause personality dissociation that leads to low-level integrative actions and can lead to phobias [48]. Furthermore, phobias have become a matter of concern among children who experience PTSD [49], as trauma causes other psychological disorders. Therefore, it is necessary to address this issue by providing intervention to individuals who experience trauma, phobias, and other psychological disorders.

If the conditions of trauma, phobias, and psychological disorders are not addressed, they can interfere with the mental health of individuals. Research on techniques that can be used to intervene to alleviate this phenomenon has not yet identified effective tools. The community needs to be prepared to enter the New Normal era so they can successfully carry out their daily activities.

The New Normal era is a time to organize and begin life anew during or after the COVID-19 pandemic. One can do this by pursuing counseling and psychotherapy, work [36], education [37], social life [38], and the medical world [39]. To prepare for and overcome the psychological problems

experienced by individuals in this new era of society, the Ifdil Perceptual Light Technique was developed with a tool called IP-Light Technologies.

At the beginning of its development, this technique called for changing the color spectrum by closing the eyes with extreme hand assistance. Light therapy has been developed to be used within the scope of the medical field, but so far, no light therapy device has been created to overcome individual psychological problems [50]. Prototype perceptual light for post-traumatic and phobia referred to as desk lamp or extended lamp, use lamps with a matrix of small LED lights on extended wings. Emerging technology has recently led to many fantastic innovations in trauma healing. Those innovations contribute to decreasing the aftermath of a traumatic event, such as stress, anxiety, depression, and PTSD that substantially impact the quality of life and functioning. Many patients with PTSD, stress, anxiety and depression feel overwhelmed in situations with high levels of sensory input, such as crowded areas with complex sensory characteristics. These difficulties might be related to subtle sensory processing deficits. Therefore, IPLT is designed to reduce PTSD and phobias.

Trauma-related symptoms such as flashbacks are common among people with PTSD, and sufferers often report a depressed mood and reduced quantity and quality of sleep. Past tests of bright-light therapy indicate that its effectiveness has much to do with the time of day in which it is delivered and the frequency and duration of treatments. There is evidence that people with the most intense PTSD symptoms have what scientists call "an evening chronotype." This means the body's natural 24-hour circadian rhythm is shifted later in the day, resulting in sleep disturbances. This is why it is desirable to provide a perceptual lights layout that is logical and easy to follow in order to facilitate maintenance or modification. Thus, numerous layouts may be investigated before a final layout is developed.

This invention was designed because the light is used predominantly in the medical field. US Patent App No. 14 / 681,871, 2015 and US Patent No. 10,252,051,2019 put forward a design for a light device that also uses magnetic therapy and massage [51, 52]. US Patent 8,801,600, 2014 makes light a therapeutic stimulus by programming control of light energy and the frequency of light energy as "therapeutic light". Thus, each light has a biological or chemical effect on individual body tissues [53]. It can be interpreted that light can be a therapeutic tool for individuals. Light can be used as it also conveys healing according to the findings of US Patent 7842075B2, in which the light that enters individual body tissues is shown to have healing potential for individuals [54]. Similarly, the tool developed under the name IP-Light Technologies can be used by practicing psychologists to help heal psychological disorders.

II. MATERIALS AND METHOD

This research uses a research and development approach, in which a process is used to develop and validate educational products [50]. The IP-Light Technologies tool was developed in limited and extensive trials in West Nusa Tenggara, West Sumatra, DKI Jakarta, and Bali. Based on these tests, the IP-Light Technologies design was modified to be used widely.

A prototype circuit board testing device comprises a casing and an array of LED extending wings on both sides of the main lamp, an elongated handle extending from the main handle in the opposite direction horizontally, a linear array of illuminated displays located on the display surface of the handle, and a plurality of control switches mounted on the casing. The device also contains a power supply and control circuit.

IPLT was designed with flexible arms that are 35 cm in length and three flexible joints to change the direction, aligning and adjusting the height of the light depending on the patient. A Perceptual Light uses a regulator adapted to control the light intensity applied to patients according to the different lights' color. With the prototype of Ifdil Perceptual Light, an array of LED lights is arranged on both wings to focus on patients and cut off their connection to their surroundings. The handle extends vertically upright and, when in use, horizontally in a direction opposite to the forwardly extending array of LED. The display also comprises an array of LED from super light emitting diodes.

III. RESULTS AND DISCUSSION

The present invention provides a prototype perceptual light technique comprising a casing and an array of LED extending wings on both sides of the main lamp, an elongated handle extending from the main handle in the opposite direction horizontally, a linear array of illuminated displays being located on a display surface of the handle, and a plurality of control switches being mounted on the casing. The device further comprises a power supply and control circuit wherein the LEDs are arranged in an array configured so that the total intensity of the light may be focused on the patient. The control circuit is arranged to switch the lamp on and off and change the speed of the LED lights.

Each LED preferably has a standard diameter selected to flash the lights at the appropriate intensity securely. The device may further comprise a regulator adapted to control the lamp. The power supply is preferably a battery. Alternatively, a cable connection to a main power supply may be provided. In embodiments in which the battery is employed, the prototype may include a display to display the level of charge in the battery. In preferred embodiments, the array of LEDs is arranged to ensure connections to all of the contacts of a prototype circuit board. In this way, a discontinuity within the prototype circuit board may be identified.

The handle preferably extends vertically upright in a direction opposite to the forwardly extending array of LEDs. This enables a therapist (user) to easily observe that the device is correctly oriented so that the LEDs are focused on the patient. The design of the present invention confers several advantages. Using a handle extending upwardly from the lamps allows the prototype to be conveniently manipulated with the spring in the clip to easily grab the edge of any surface. In addition, the display may be readily observed, facilitating monitoring of the test being carried out by a therapist. Early detection of a prototype circuit board malfunction saves money and time, preventing delays in the healing process.

The invention is further described by the figures below. Figure 1 shows a front elevation of a perceptual lamp under

this invention, while Figures 2 and 3 show a rear elevation of the perceptual lamp shown in Figures 1 and 6.

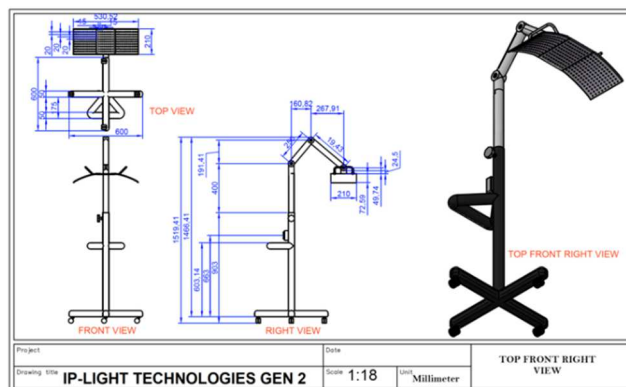


Fig. 1 Top Front Right View of IP-Light Technologies Gen 2

The device shown in Figure 6 comprises a casing, which may be molded from plastic. The lower part of the casing has a handle extending upward. The handle may be cylindrical or rectangular in cross-section and is dimensioned to fit comfortably into a user's hand. A rectangular array of LEDs is arranged on the extended wings' display surface so the user can see that the device is correctly oriented.

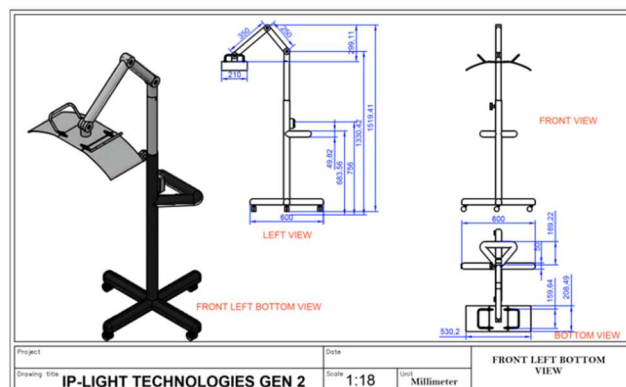


Fig. 2 Front Left Bottom View of IP-Light Technologies Gen 2

An on/off switch turns the device on or off by connecting it to an internal battery or external power supply. A voltage control knob allows the user to select one of a variety of LED colors to be applied to each LED of the array. The scale of the voltage detected and displayed can also be controlled using the knob.

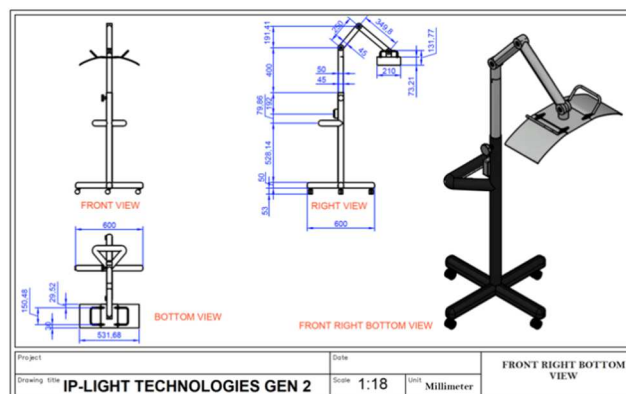


Fig. 1 Front Right Bottom View of IP-Light Technologies Gen 2

Control knobs may be used to select the speed of the LED color change to be tested. The device is grasped with the handle extending vertically, and the clip is carefully placed on the edge of any surface, such as a table. The switch turns the device on, and the desired program is selected using the knobs. The illuminated display provided by a vertical linear array of LEDs indicates the voltage received by the respective LEDs indicating the quality of the electrical contact within the circuit. After use, the on/off switch is turned off.



Fig. 4 Design IP-Light Technologies Gen 2

IPLT is designed with a height of 35cm. The basic holder of IPLT resembles a *vise* so that it can be attached to the edge of a table. The size of the LED lights compartment is 21cm x 15cm and is equipped with a couple of divider/barrier plates with a size of 10cm x 15cm. These plates serve to help patients focus on the light from the LED. The LED color changes are done manually at the site, with a selection button to turn on and change the color of LED lights at one time. There are four LED color options: green, blue, red, and white. During the treatment session, the color of the LED lights will change accordingly, with the time interval for each color lasting 3 seconds, depending on the necessity.

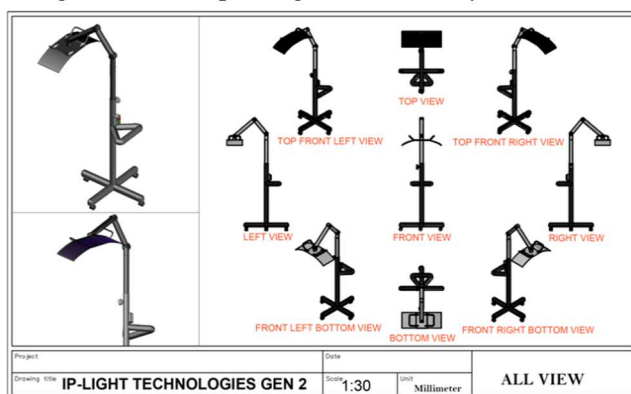


Fig. 5 IP-Light Technologies Gen 2 (All View)

IPLT was designed with flexible arms at 35 cm in length and three flexible joints to change the direction, aligning and adjusting the height of the light depending on the patient. IPLT was also made from lightweight material but is still strong and durable enough to withstand heaving usage. The handy and exclusive design makes it easy to carry to any site

or situation. These findings support potentially important sensory processing deficits, whose origins may be related to dysfunctional attention processes.

During experimental testing of a PTSD patient, a therapist turns the perceptual lamp toward the patient. Sometimes the light from the lamp must be focused on the patient. This is the function of extended wings for both sides of the main lamp. Any malfunctions may lead to a considerable waste of time that could be better used to cure the patient. The LEDs do not produce heat. LED lamps were chosen for this device because, according to the Chinese patent 201743614U, the heat produced by LED lamps feels warm, consumes less power, emits various kinds of light, does not produce high temperatures, and is reliable [55]. Based on this, IP-Light Technologies was developed using LED lights.

By offering a tool that may be utilized to lessen PTSD and anxiety, the current invention aims to solve the issue. Making new connections between trauma and more optimistic thinking to treat PTSD is the primary purpose of IP-Light Technologies, and it does this by employing light as an external resource. The use of light as a treatment has been widely practiced, although previously, many experts used sunlight as a treatment [56]. Furthermore, in the medical field, the use of light is used to treat patients [57]. The use of light has particularly proven to be effective in dermatology [58] and facial skin health [59].

Furthermore, for PTSD the interventions used include Eye Movement Desensitization and Reprocessing (EMDR) [49]. The use of light was found to be effective for treatment because different light wavelengths can suppress psychological disorders experienced by individuals [60]. IP-Light Technologies was developed as an intervention tool in the development of the IPLT, which combines technology, programming languages, and several techniques in counseling to reduce trauma, phobias, and other psychological disorders in less than 10 minutes [61].

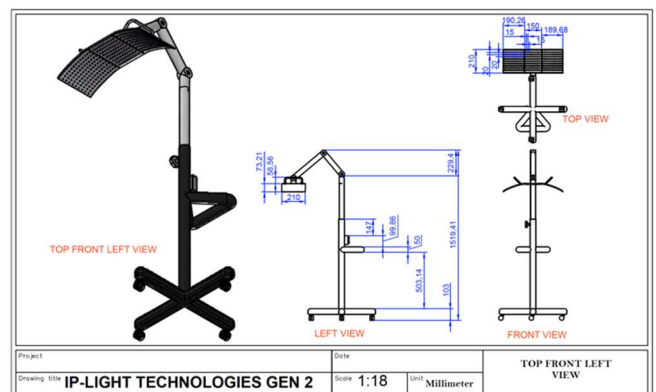


Fig. 6 Design IP-Light Technologies Gen 2 Top Front Left View

According to the IPLT view, humans are perceptual creatures. Perception is the ability to understand and interpret various events received by the senses. Brain rhythms generate perceptual cycles. This is an unavoidable consequence of the existence of brain rhythms, which can create the perception of rhythm (or, equivalently, cyclic or periodic perception) [62]-[65].

Brain rhythms can be recorded in a variety of frequency bands and at multiple scales, from single-neuron studies to whole-brain techniques such as electroencephalography

(EEG) and magnetoencephalography (MEG) [65], [66]. These rhythms play an important role in sensory, cognitive, and motor mechanisms. Then, logically, our sensory, cognitive, and motor processing abilities are expected to fluctuate rhythmically: in each oscillating cycle of a functionally important brain rhythm, there must be a more precise phase and one less suitable for the neural processes that are then considered (if only because of the oscillations) of local field potential modulating neural firing probability) [65]. In short, the brain's rhythm produces the perceptual. Therefore, individuals continuously, intentionally, and unintentionally will form perceptions.

According to IPLT, this problem occurs due to sensory processing errors. Sensory is an adjective that describes the sensation of something that is felt with the physical senses. Sensory comes from the Latin word *sentire*, which means "to perceive, to feel." Sensory can also describe nerve fibers, such as sensory neurons, that carry impulses to nerve centers in the body [61].

Sensory processing problems create difficulties in organizing and responding to information that enters through the senses [67], [68]. These problems, sometimes called sensory processing or integration disorders, can majorly impact learning and daily life. In some people, the brain has difficulty organizing and responding to sensory information. Certain sounds, sights, smells, textures, and tastes can create feelings of "sensory overload" [69].

Individual perceptions indirectly influence various problems in life because humans are perceptual creatures [70]). Individuals will have problems when the sensory information received exceeds the ability of the individual sensor to process it, enters the subconscious, and becomes a permanent subconscious value, while the incoming and stored stimulus is contrary to the value. Why do problems tend to persist? Problems resulting from a powerful stimulus are then stored in the subconscious, but the process of modification and removal is no more powerful than how the initial stimulus was received. The modifications made tend to be behavioral rather than sensory. How does IPLT work? IPLT works by modifying, replacing and changing the sensory stimulus in a powerful way that is comparable to or exceeds the initial stimulus received.

IPLT combines many techniques and approaches, including 1) Psychoanalysis; 2) Directive therapy; 3) Desensitization; 4) *Pancawaskita*; 5) Milton Ericson; 6) Gipson's Perceptual; 7) Chromotherapy; 8) Hypnotherapy; 9) Sedona Therapy; 10) Creative Therapy; 11) Impact Therapy; 12) Expressive Therapy; 13) Neuro Linguistic Programming and 14) Integrity Counseling [61]. IP-Light Technologies was developed to conduct this form of therapy effectively.

The stages in this development are activities to develop initial products (preparing IPLT design, preparation of IPLT, and evaluation equipment). The IP-Light Technologies prototype for dealing with stress and anxiety during the COVID-19 pandemic called a desk lamp or extended lamp, is a lamp that has a small LED matrix and extended wings. Recently, technology using LEDs found the latest innovation to heal trauma. These innovations have a significant effect on reducing stress, anxiety, depression, and PTSD, conditions that have an impact on function and quality of life. Many clients who experience PTSD, stress, anxiety, and depression

experience disturbances due to high sensory input; each has certain complex characteristics. The disturbance is associated with a decrease in subtle sensory processes. Therefore, the IPLT is designed to reduce PTSD, phobias, and client trauma.

Symptoms of trauma cause flashbacks, and people with PTSD also experience a depressed mood and reduced quantity and quality of sleep. The findings on using bright-light therapy showed effective results by performing treatments with a certain duration and frequency of treatment every day. The findings suggest individuals who have symptoms of PTSD often develop a condition scientists call "an evening chronotype". This means that the body's natural cycle rhythm for 24 hours shifts to the next time, causing sleep disturbances or insomnia. Therefore, the lamp layout should be logical and easy to follow for maintenance or modification. Many lamp layouts can be used before the proper final layout is found.

The design revision of IP-Light Technologies was carried out in terms of ease of delivery and use in psychological therapy and intervention. Previously, IP-Light Technologies was designed as an LED lamp with a highlight rod. In the second year, a design revision was made so that psychological interventions or therapy could be used more easily. The intervention using IPLT is a light therapy device using a yellow incandescent lamp. The outer covering used on IP-Light Technologies lamps is white. The white lights are situated so that the light is more gathered in one area when directed at the client, giving a comfortable, bright effect. Light emitters can provide simultaneous body stimulation and can provide a lasting effect.

IV. CONCLUSION

This invention relates to a device for examining and reducing stress, anxiety, depression, and PTSD. The present invention seeks to overcome these issues by providing a tool that may be used to treat PTSD and phobias. The main function of IP-Light Technologies is to modify, replace, and change the stimulation input by using the light as the outside resource and make new connections between trauma and more positive thinking to heal PTSD.

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