Smart Luminaire - A Multi-functional Intelligent Desk Lamp for Health and Convenience

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Abstract

Zhiyao Xuanqing is an intelligent multi-functional desk lamp with various features such as intelligent reminders, weather forecasts, posture correction, voice assistants, and wireless charging. It enables users to develop healthier eye habits, more convenient lifestyles, and more intelligent lighting experiences while using the desk lamp. By combining user experience design with intelligent technology, it guides a healthy lifestyle. This product is a more innovative work that enhances traditional industrial products through modern technological design, thereby improving human health and achieving a more perfect experience.

Keywords

Zhiyao Xuanqing，LED；Desk Lamp；Consumption；Healthy Living；14th Five-Year Plan.

1. Social Background

As a common lighting tool, desk lamps provide us with lighting anytime and anywhere and are widely present in people's social lives. They can be found in various settings such as studying, working, and daily life. However, in today's society where people's demands for various aspects of life are increasing, ordinary desk lamps have many obvious shortcomings. For example, they cannot provide more information or be timed to turn on and off. This leads us to challenge the development of multi-functional desk lamps.

1.1. High Power Consumption of Desk Lamp Lighting in China

With the rapid development of society, energy consumption is increasing, and lighting accounts for a relatively large proportion of electricity consumption in people's daily lives. According to statistics, in 2016, China's lighting electricity consumption accounted for 15% of the total annual electricity generation (over 10 billion kWh), with desk lamps consuming a significant portion. Due to the fact that some users do not turn off the lights when leaving, a large amount of electricity is wasted. At the same time, most desk lamps currently use incandescent light bulbs as light sources, which have a relatively short lifespan and produce difficult-to-dispose-of waste, making them increasingly unable to meet the energy-saving and emission reduction demands of today's society.

LED lights can help to solve some of the problems of incandescent bulbs. When electrons and holes recombine, visible light is emitted. LED light sources are made using this principle, and they emit cold light, have high conversion efficiency (close to 60%), low working voltage (around 3V), low energy consumption, good controllability, and no radiation. At the same brightness, LED energy consumption is only 10% of incandescent bulbs and 5% of fluorescent lamps. The lifespan of LED lights can reach 100,000 hours, which is ten times that of fluorescent

lamps and 100 times that of incandescent bulbs. Moreover, the cost of LED light sources is only one-tenth of incandescent bulbs, making it a wise choice to use LED light sources for desk lamps.

1.2. Desk lamps have single functions

That sounds like a great idea! By incorporating a microcontroller into the design, you can add a variety of useful functions to the traditional desk lamp. Some possible features could include adjustable brightness levels, a timer for automatically turning the lamp off after a certain amount of time, a USB charging port, a temperature and humidity sensor, and even voice control using a smart assistant like Amazon Alexa or Google Assistant.

Additionally, you can also explore adding a sleek and modern design to your lamp, with options for customization and personalization to fit with different room styles and aesthetics. With the increasing demand for smart home devices, a multi-functional desk lamp could definitely appeal to a wide range of consumers.

Of course, the actual design and features of the lamp would depend on factors such as cost, ease of use, and practicality, but incorporating a microcontroller into the design would certainly provide a lot of flexibility and potential for innovation. Good luck with your project!

(1)High Demand for Healthy Living

According to data from the National Health Commission, the overall myopia rate among children and adolescents in China was as high as 53.6% in 2018. In 2020, data released by the Ministry of Education showed that compared with 2019, the myopia rate of primary and secondary school students increased by 11.7% during the epidemic period.

From this perspective, smart desk lamps that protect eyesight by eliminating harmful blue light have become an essential tool to meet the healthy vision needs of children.

Under the influence of the epidemic, people are spending more and more time at home, relying increasingly on electronic products. Adults work from home, and students attend classes online. This increases the amount of time we spend in contact with electronic products, which means that we must consider the goal of protecting our eyesight, especially for those who sit for long hours studying or working.

Valid questionnaires collected from online surveys show that the age group who are most concerned about children's health are young parents who have generally received a good higher education, and they focus on the positive impact of lighting on the physical and mental health of the next generation. This trend also represents the great potential of future children's products and products used by teenagers.

2. Industry Background

(1) Multi-functional desk lamps are still rare

In today's life, desk lamps are designed to beautify their appearance rather than focusing on their functions. This has led to the emergence of a new high-efficiency desk lamp that has many advantages over ordinary button-type desk lamps. Multi-functional smart desk lamps combine lighting, energy saving, automatic brightness adjustment, setting time reminders, wireless charging, and posture correction functions in one. It tends to be more user-friendly and optimizes people's lifestyles: at night, its voice assistant switch function makes it more convenient for people to use, eliminating the trouble of groping for the light at night; when no one is using it, it can automatically turn off the light to save energy, which is good for the environment; the posture correction function helps to prevent nearsightedness, and it can be said to be a "smart healthcare teacher" for studying, working, and living. Our multi-functional smart desk lamps are divided into two modes: automatic

(2) The Current State of Desk Lamps Worldwide

Overall, the global desk lamp industry has been growing rapidly in recent years. In China, there are over 5000 companies that produce LED lighting fixtures, but most of them focus on low-end products with low added value and profits. However, some companies are accelerating their technological innovation to improve production efficiency and quality. Since 2010, the average sales volume of LED desk lamps in China has increased by 35% per year, and the penetration rate in households overseas is as high as 80%.

In terms of market demand, customers are increasingly seeking personalized and environmentally friendly desk lamps with diverse functions. Desk lamps are no longer just a simple lighting tool but are developing towards modularity, decoration, and high-efficiency energy-saving features. In the global lighting industry, European countries have always led the trend in lamp design, emphasizing the emotional resonance between people and products. Japanese companies such as Panasonic and Toshiba also rank among the world's leaders in lighting product research and development.

In automatic mode, various functions can be realized, and human-machine interaction can be achieved by simply speaking and conveying voice signals. Manual mode is used for people who are not used to using automatic mode or in emergency situations where the microcomputer in the desk lamp fails. In manual mode, the smart desk lamp is used just like an ordinary desk lamp.

3. Policy Background

(1) "Healthy China 2030" Plan

In order to improve the health and living standards of the people, the "Healthy China 2030" plan was issued by the Central Committee of the Communist Party of China and the State Council in 2016, which clearly states that the principle of health first should be followed. Based on the national conditions, the concept of promoting health is integrated into the whole process of formulating and implementing public policies, accelerating the formation of a lifestyle, ecological environment and economic and social development model that is conducive to health, and realizing the benign coordinated development of health and economic and social development.

At the same time, the principle of scientific development is also emphasized, which means grasping the development laws in the health field, adhering to the principle of prevention first, combining prevention and treatment, giving equal emphasis to both traditional Chinese medicine and Western medicine, transforming the service mode, building an integrated medical and health service system, promoting the transformation of health services from extensive development based on scale expansion to intensive development based on quality and efficiency improvement, promoting the complementary and coordinated development of traditional Chinese medicine and Western medicine, and improving the level of health services.

(2)The "14th Five-Year Plan"

The "14th Five-Year Plan" places the priority of ensuring people's health in the strategic position of development, adheres to the principle of prioritizing prevention, deeply implements the Healthy China Action, improves national health promotion policies, and strengthens the national public health protection network, providing the people with comprehensive and lifelong health services.

Fig 1 The "14th Five-Year Plan"

4. Entrepreneurship Basics

(1) "14th Five-Year Plan" for Intelligent Manufacturing Guided by Xi Jinping's thoughts on socialism with Chinese characteristics for a new era, fully implementing the spirit of the 19th National Congress of the Communist Party of China and the second, third, fourth, fifth, and sixth plenary sessions of the 19th Central Committee of the Communist Party of China, and based on the new development stage, the new development concept is fully, accurately, and comprehensively implemented to construct a new development pattern. Deepening reform and opening up, coordinating development and security, focusing on the deep integration of new-generation information technology and advanced manufacturing technology, and implementing intelligent manufacturing engineering in-depth, striving to enhance innovation capability, supply capability, support capability, and application level, accelerating the construction of the intelligent manufacturing development ecosystem, continuously promoting the digital transformation, network collaboration, and intelligent reform of the manufacturing industry, and providing strong support for promoting the high-quality development of the manufacturing industry, accelerating the construction of a manufacturing power, developing the digital economy, and building new international competitive advantages. Basic principles: Adhere to innovation-driven. Take technological self-reliance and self-improvement as the strategic support for the development of intelligent manufacturing, strengthen collaborative innovation among industry, academia, and research, focus on breakthroughs in key core technologies and system integration technologies, support enterprises, universities, research institutes, etc. to form consortia, conduct technology, process, equipment, software and management, mode innovation, and enhance core competitiveness.

(2) National Recognition of High-tech China now regards high-tech industries as "sunrise" industries and has implemented special "industrial bias" policies in funding, taxation, imports and exports, and raw material supply to provide targeted support and guidance, laying a solid foundation for the development of high-tech industrial development zones.

Acknowledgments

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