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Smart Paper Light: Providing Convenient Lighting For Children, The Elderly And People With Disability

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Abstract

In the current era, smart technology is widely used in household appliances. Electronic home lighting devices are a lighting system because they provide light to those in need. A smart, user-friendly lighting system is very important when used at home, especially for young children, the elderly and people with disabilities, while current smart lights cannot meet that requirement. This requirement is due to inconvenient mobility and current household lighting that does not promote a healthy lifestyle and a perfect user experience. This study has three objectives. The first objective is to determine the need for smart home lighting for families with the elderly, young children and/or people with disabilities. The second objective is to analyse the main factors in the production process of home lighting systems that facilitate the user's mobility. The third is to create and design a smart lamp that promotes a healthy and friendly lifestyle. The researcher conducted project-based research which is a well-suited approach to apply to solving real- world problems and challenges to acquire a deeper understanding of the lighting issue. The Purposive sampling method was conducted by sort listing 6 families which do have young children, elderly and or disabled members to have an in-depth interview with the representative of the family, and applied Thematic Analysis to identifying, analysing, and reporting themes within data. The design was developed based on research, paper-based lighting using a network of Internet of Things (IoT) devices with an artificial intelligence human temperature sensor. The light shade design is based on the Chinese character 福 (which symbolises blessing in Chinese culture). For the evaluation stage of project-based research, this artificial intelligence human temperature sensor paper lamp proven its function and usability by being awarded a bronze medal in 2022 and presently this product is ready to be launched to the market. The research implication of this study is to obtain raw data by sorting the needs of the family with young children, elderly and or disabled members. The contribution of the theoretical implication is to provide theoretical knowledge of the demand and appeal of the family. The practical implication is that the researcher has managed to design and develop paper-based lighting using a network of Internet of Thing (loT) devices with an artificial intelligence human temperature sensor; the lampshade is based on the Chinese character which symbolises blessing in Chinese culture. Future research on smart home appliances can be further developed to resemble the current lanterns and the lights can be combined to incorporate DIY LED lights to better improve the quality of the living environment.

Keywords: Smart Paper Lamp，Internet of Things (IoT)，Kongming sky lantern.

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1. Introduction

1.1 Background Of The Study

One of the most important home electronics is the lighting system because itprovides light to everyone in this modern society. A user-friendly smart lighting systemat an affordable price is important for home use to increase home security, especially forthose at home. This is especially important for young children, the elderly, and peoplewith disabilities (Cheng et al., 2020). Recently, dramatic changes in the age structure

ofthe population, declining birth rates, and population ageing have been reported in China(Peng, 2011), accompanied by significant progress in prolonging life. Therefore, to meetthe needs of these population groups in the country, many electronic devices and homeappliances have been designed and manufactured (Turjamaa et al., 2019).

1.1.1 People In Need Of Assistant –Young Children, The Elderly And People WithDisabilities

Working adults are busy during the day and most of the time, young children, theelderly and people with disabilities at home are the family members left at home beforethe working adult tries to return. In China. According to statistics, more than 25% of theworld's population, equivalent to 1.8 billion out of 7 billion people, were adolescentsunder 14 years old in 2020 (World Bank, 2022). However, out of a total of 7.5 billionpeople living in this world, 962 million people will belong to the elderly group (World Bank, 2022). Statistics from the World Health Organization (WHO, 2022) predict that by2050, the number of people over 60 years old will exceed the number of children under14 years old for the first time (See Figure 1). This is also reflected in China, where the totalpopulation of the elderly, children and one billion people with disabilities is nowincreasing (Zhang et al., 2021), as shown in Figure 1.2.

Aging has become a serious problem in today's global community. Many emptynesters live alone, and older adults often do not receive appropriate care immediatelywhen needed. Furthermore, social institutions alone cannot meet the welfare needs ofelderly people living alone at home.

Figure 1. WHO: Number of people over 60 to double by 2050

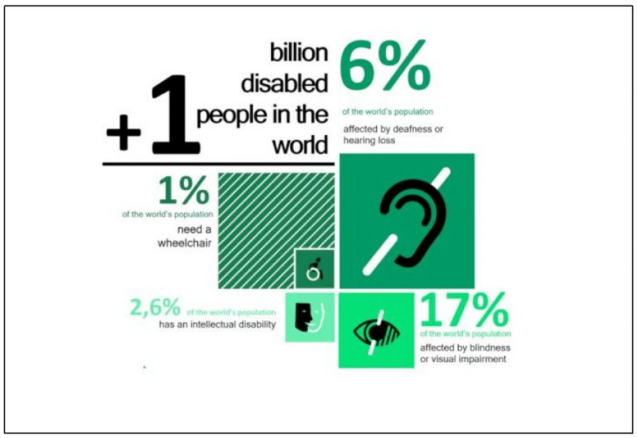

Figure 2. Disability With Reduced Mobility

1.1.2 Mobility of elderly and disabled people in the family

Mobility is one of the biggest obstacles for the elderly or disabled when it comesto lighting. Many elderly or disabled people may have difficulty walking, making itdifficult for them to reach switches or adjust lights in a room. This can lead to feelings ofloneliness and dependence on others, both of which are linked to a decline in a person'smental and physical health.

1.1.3 Basic household appliances have artificial intelligence, like lights

The rapid development of artificial intelligence provides a feasible and effectivesolution to solve the problem of elderly people living independently, ensuring securityand smart, effective automatic control at home (Kivimäki et al., 2020). Currently,challenges include production constraints, cost issues and accessibility for vulnerableusers. Additionally, there is a lack of research regarding the development of optimizedAPP lighting scene coding solutions in mobile applications, and the integration of sensingcomponents has not been effectively conveyed to the end user of the lighting system.Considering the physical function characteristics of the elderly as well as the decline oftheir physiological functions and the existing residential lighting conditions, the use ofintelligent lighting control has also been proven to be effective in people's daily lives.People with disabilities, especially in dark environments at night (Ramlee et al., 2012).Previous research has demonstrated that a smart lamp control algorithm based on a humantemperature sensor design can be used to monitor human body temperature (Liu et al.,2019). The magnitude of the signal can be determined by the user's location (Santos et al.,2007). The actuator includes a capillary tube and a power source (Figure 1.3). Previousstudies have demonstrated the feasibility and effectiveness of the system described aboveas well as its control algorithms using a single depth sensor and inertial measurementunits. Sparse (IMU) to capture real-time performance (Von Marcard et al., 2017).

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1.1.4 Smart home needs

The demand for the smart home market is increasing to meet consumer needs, andsmart lighting systems are one of the starting points for smart homes. Currently, smartlighting and control companies are thriving thanks to the development trend of smartcontrol systems. This brings huge growth opportunities for the entire industry. It is clearthat today's consumer lighting needs are no longer limited to lighting but also extend tocustomised and personalised lighting solutions. China's smart lighting market continuedto grow from 2016 to 2020. According to the analysis and calculation of 168 networkreports, China's LED smart lighting market scale reached 20 billion yuan in 2020.From the perspective of China's smart lighting market development, China's smartlighting industry is influenced by industrial policy, technological progress

andurbanisation as well as rapid development. Each business is also in a phase of activedevelopment. Despite rapid development, China's artificial intelligence lighting industryfaces challenges such as competing for uniformity and lagging behind industry technical5standards. These factors pose challenges to the development of Chinese enterprises andthe smart lighting industry.Despite the development of smart lighting systems in China, the elderly andpeople with disabilities are still always overlooked when designing and installing smartlighting systems. When designing new lighting products, designers and manufacturersmust take into account the specific requirements of people with special needs to ensurethat their products are accessible to all community members (see Figure 1.3).

1.2 Problem Statement

Lighting manufacturers face challenges due to the research and production costsrequired to invent new, cheaper household lamps. Typically, many traditional companiesinvest a lot of capital and labour in deploying the intellectual component while stillmeeting the aesthetics of customers and market needs. The market needs a smart and userfriendlylighting system for home use, especially for the elderly, children and disabledpeople, because current smart lamps cannot meet the needs. their needs due to impractical6portability and current household lamps that do not promote a healthy lifestyle. (HamaKareem, 2019) and perfecting the user experience (Hama Kareem, 2019). The problemstatements are: understand the need for smart home lighting for families with the elderly,young children and/or people with disabilities. At the same time, designing andmanufacturing home lighting solutions facilitates users' mobility and can promote ahealthy and friendly lifestyle.

1.3 Research Question

The research questions for this study are:

1. How to determine smart home lighting needs for families with young children,the elderly and/or people with disabilities.
2. How to analyse the main factors in the production of home lighting to facilitatethe user's movement.
3. How to create and design a smart lamp that promotes a healthy and friendlylifestyle.

1.3 Research Objectives

The main objectives of this study are:

1. Determine the need for smart home lighting for families with young children, theelderly and/or people with disabilities.7
2. Analyse the key factors in the production of home lighting that facilitate usermobility and has the potential to promote a healthy and friendly lifestyle.
3. Create and design a smart lamp that promotes a healthy and friendly lifestyle.

1.4 Significance Of The Study

The significance of this study is:1. Research on smart paper lighting control systems has led to the development oftemperature sensing technology for contactless lighting control. In addition, 5Gartificial intelligence technology can be used to automate lighting systems, andnew design elements can be introduced into lantern designs to bring diversity tothe lamp and lighting market. The lanterns are becoming more and more uniform.This approach can help ensure and satisfy consumer demand for user-friendlylighting products by both integrating into smart lighting systems and supportinghealthy lifestyles, facilitating user movement.2. By integrating traditional Chinese cultural elements, blessing symbols, and usingpaper as lampshades, the stress of the elderly can be reduced through elementsfamiliar to them, such as traditional Chinese lanterns (Butollo and Ten Brink,2018). Like in traditional Chinese culture, lanterns are used as light sources.3. This research applies aesthetic elements from traditional culture and combinesthem with contemporary aesthetics to create a combination and harmony betweenthe old and the new. This combination is used in lighting design and modelling tocreate more practical, simple and efficient lighting systems, incorporating atemperature-sensing lighting control system that can extend life longevity andreduce overall costs (Energy and Construction, 2013).

2. Research Methodology

2.1 Qualitative Methods

This research has two stages, the first stage is product design, which is a smart home lighting lamp. For the

second stage, qualitative methods were employed to understand the acceptance of the target users on this product. At this stage, I distributed questionnaire and interviewed 15 respondents in China, where I then analyzed the data from these questionnaires and interview results.

2.2 Developing Interview Questions and Observational Cues

This research has two stages, the first stage is product design, which is a smart home lighting lamp. For the second stage, qualitative methods were employed to understand the acceptance of the target users on this product. At this stage, I distributed questionnaire and interviewed 15 respondents in China, where I then analyzed the data from these questionnaires and interview results (D. W. Stewart et al., 2014).

2.3 Sampling

For this research, 15 respondents were chosen randomly among the Chinese community in China to obtain their opinions and acceptance on this new designed smart lamp.

2.4 Target Population

Regarding the distribution of the target audience of this study, the elderly, childrenand people with disabilities are the main groups, accounting for about 70% (includingchildren), technology enthusiasts account for about 15%, and the remaining 5%. In termsof consumer age, it seems that young people are the main consumers of smart homes(Computer Applications Magazine, 2018) because smart homes offer high-tech products,such as many types of motion control devices for humans (Dang et al., 2020), practical,efficient, smart, and has convenient features that young people seek and often findattractive. In addition, young people have significant economic potential and tend to focuson quality of life and a personalised living environment, in addition to concerns abouttaking care of elderly parents and newborns. From the perspective of academic education,the request for smart home installation is mainly concentrated amongst individuals withhigher education levels and higher income levels, especially those with unchanginglifestyles and accepting smarter products (Daiet al., 2018).

In terms of gender, men are the main smart home consumer group in China,accounting for about 60%, while women make up the remaining 40%. Furthermore,marital status also plays an important role in the demand for smart homes, in whichmarried families are more interested in smart homes (85%), while unmarried householdsare more interested in smart homes (85%), while unmarried households are moreinterested in smart homes, suspension accounts for 15%. From an urban developmentperspective, the main smart home market is currently concentrated in first- and secondtiercities. From this description, it can be inferred that the main smart home users willmost likely benefit from the following groups of individuals:

For this study, the main users of smart home would most likely benefit the following groups of individuals:

1.Babies from 10 months old to children up to 8 years old

2. Elderly over 60 years old

3. People who have difficulty walking

2.5 Respondent Selection Criteria

The interview was conducted on 15 respondents selected randomly. They are all nationality and from different regions of the country. They were interviewed about their opinions on the new smart paper based lamp appliances. For this research, only the elderly, children, and the disabled people were interviewed to obtain the data for this research.

2.6 Data Collection

For this design the preferred method of data collection was an interview-based and observation data collection methods. We had to consider that most of the respondent were either handicapped, had difficulty reading, or would not be able to concentrate for long hours before the researcher could get an answer from them. Stewart and Shamdasani (2014) thought on the focus groups when it comes to formulating questions for the interview formed the basic to which the research on the design was followed.

Besides conducting interview with respondents, the researcher also employed observational method to understand more about how the respondents think about the designed lighting product.

3. Development And Design

3.1 Design

Notably, the most popular products and services featured interfaces that could be easily customized to meet the

needs of customers with varying levels of expertise and preferences. It is for this reason that UCD is deemed to be the best strategy for this research project, which was targeted at certain users who had unique characteristics that affected how well certain goods worked in terms of usability and were used by the majority of people.

The design will be started by drawing a general design on a 595x841 mm paper which gives a general outlook of the final use of metals. This gives the length of which is to be strictly be adhered. With every curve and dissection of the metal rods kept similar. Fixed in this place they are welled together to represent the final output as from figure… thus giving the metallic body its final outlook.

For this design taking from the aspects of the kongming lantern we thus consider a new lamp design, with similar features to achieve similar effects t the user just as Kongming Lamps. From this reason we will consider a metallic frame which will be the aid of the holder of the lamp in place. The feeling to be acquired from this design is that of the traditional Kongming Lamps. This then suggest that from the aspects of weight, and the lighting structure will have to take on the traditional aspects.

From the traditional lanterns which are able to use bamboo, wire based and fitted with a candle. For this frame we will use aluminum alloys (that is wrought aluminum). As they are produced by smelting pure aluminum ingots which are later rolled into a metal rod. Having that the total length of the whole rod to be 1360 mm with the diameter to the rod being indicated at 4mm.

The idea of the lamp shape and function is illuatrated in Figure. 3 below.

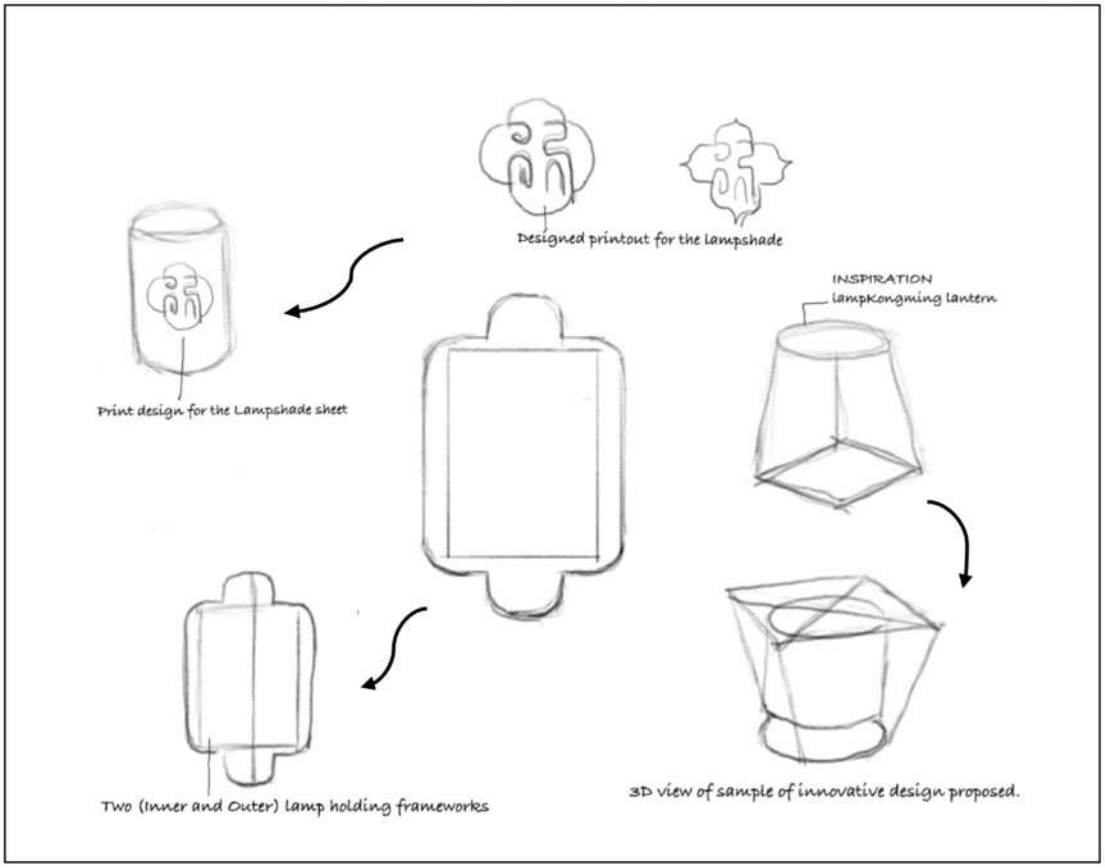

Figure 3. The idea of lamp shape and function

3.2 Description of the Paper Material

Currently, the rice paper is the primary raw material used to make famous paper bags that are drawn with hide fiber, while the primary raw material for Qian'an mulberry paper is mulberry skin. All that is lacking is a difference in intensity and wettability between the different kinds of existing paper; for heavy pens to be used in painting and calligraphy, as well as the necessity of profit from China ink repeatedly, typically can't achieve its requirement; pulling force is insufficient; moisten black has a weak impact; the growth of its influential influence on calligraphy and painting art; and the raw material resources of rice paper and mulberry paper are not numerous; as a result, production is restricted. The application of paper to a lampshade frame is among the simplest methods. A lampshade-sized sheet of handmade paper can be found at most art supply stores(See Figure. 4).

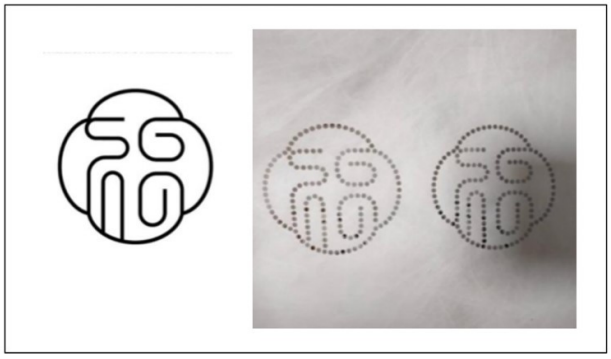

Figure 4. The idea of lamp shape and function

For this high-quality paper, the fibers (also known as Kozo) are stripped and beaten to separate out the longer, tougher fibers. The Mulberry Colors are full of life and texture, thanks to their unique floating strands of fiber and their vibrant color variety. Prior to being adhered to the framework, this paper can also be decorated by having elaborate patterns (of the Logo like pattern) and designs punched, perforated, and carved into it.

3.3 Procedure to Dress Up the Lamp

The mulberry paper was laid out on the desk. The bottom corner of the paper is one inch above the bottom edge of the frame for the finest presentation of round shades. When turning the frame, be careful to start on a rib. Move one inch away from the side of the paper with the frame. Draw a line with a marker pen that is an inch from the top and bottom of the frame while turning the frame the same amount in both directions. The majority of round and angled colours will result in a C form if you attempt to create a C shape out of them. Frames with flat sides was traced by placing the paper against the frame. When determining the paper's final dimensions, add an extra inch on all sides. The wires were with mulberry paper. The mulberry paper template was used to apply the paper to the lampshade. Cut shapes from paper to create lamp covers. A light with a flat side may consist of four or more parts. The lamp shade flipped upside down. A vertical rib should be glued using hot glue on the outside.

Position the paper so that its height is cantered, and then cut it so that there are equal amounts of paper above and below the top and bottom of the shade. The paper was pressed into the hot glue that has been applied along the outer perimeter of the top and bottom frame. Clip the paper and glue together using bulldog clips, spacing them out at 2-inch intervals along the frame's outside corners. Pre-fit the paper and cut it so that the side edge overflows your starting edge by 1/4 to 1/2 inch at the very end of the lamp. Hot glue was applied to the frame's top and bottom, as well as the edge of the remaining piece of paper's underside. Bull clamps can be used to hold paper and glue together. The clamps were removed after 4 hours.

The panel joints were adhered to flat-faced frames with glue. Simply trim the paper along the ribs to cover the adhesive rib. The paper at the top and bottom should protrude half an inch past the frame. After the glue has dried, apply the remaining panels, making sure to overlap the paper. Trim the paper so that there is only a half-inch of extra paper at the top and bottom for both flat and rounded frames. The paper must have a notch cut out where it will wrap around the diagonal members of the lamp frame.

Apply hot glue all the way around the inside of the top of the frame, then press the paper into place. The paper should be secured using bulldog clips. Create a new border for the bottom. For four hours, put the lamp away so that the glue can dry. Flat-sided frames need ribbon or trim applied to their unfinished edges. When gluing the ribbon, fold over the top and bottom edges. Apply glue to the underside and the top of the completed layer, and then add the underlayer and the top layer such that they overlap the folded ribbon by 1/2 inch at the very tip. The final design was completed (See Figure. 5).

Figure 5. The Final Design and the Bronze Award

4. Intelligent Technology And Electronic Technology

4.1 Intelligent Technology (Use of PIR Sensors)

Everything is controlled by the PIR sensor, which is also commonly referred to as a passive infrared sensor. The infrared light emitted by humans is the primary source of energy for the system. PIR sensors, also known as passive infrared sensors, are extensively employed in today's sophisticated security systems to detect human movement. Infrared (IR) light is the name given to electromagnetic waves that have a wavelength that ranges from 0.7 micrometers to 300 micrometers. There is sufficient evidence to support the hypothesis that people are the sources of infrared heat.

The infrared radiation that is emitted by human bodies that are at rest has a wavelength that ranges from 10 to 12 micrometers. Passive infrared (PIR) sensors are electronic devices that monitor variations in infrared light in order to identify whether motion is present. It has a total of three pins linked to it (gate, drain and source). In response to the detection of a change in the PIR radiation, the signal pin receives a high. A crystalline substance is used in the construction of the infrared detecting photoelectric (PIR) sensor. This material, when subjected to heat, produces a surface electric charge.

The subsequent change in charge is brought about as a result of the various radiation wavelengths that impact the crystalline surface. The components of the sensor are sensitive to a broad variety of radiation; however, a filter window restricts their sensitivity to a range between 8 and 14 micrometers, which is the optimal range for the radiation emitted by human bodies. The primary element of a PIR is a pyroelectric sensor that is responsible for determining the level of infrared radiation present. Everything gives out some amount of background radiation, and the amount of radiation increases in direct proportion to the temperature (R. Windisch, et al., 2017).

In reality, the sensor of the motion detector is made up of two separate components. Because we are more concerned with motion (change) than with IR levels at their typical levels. Both halves of the wire are constructed such that they work in opposition to one another. This for the elderly and the disable and children would be a plus considering it is made to get their relative temperature and light. It is possible for the output to go from being high to being low if one side of the device is exposed to a different amount of infrared light than the other.

In addition to the pyroelectric sensor, there are also other components present. These components include resistors and capacitors. PIR sensors might be of tremendous use in a wide variety of uncomplicated goods and projects, particularly those that require the knowledge that someone has either left, entered, or is approaching the area. They come with a diverse selection of lenses, may be purchased at a low price, and run with a low amount of power. It is important to keep in mind that PIRs might be triggered by objects such as domestic animals, and that the lens is frequently set to a certain sweep and distance (although it can be hacked someplace).

Experimenting with new things is required. You may determine the degree to which these statistics are comparable to one another by contrasting them with the statistics provided by the Parallax PIR sensor. PIRs may work in a comparable fashion, but their specifications might vary quite a bit from one another.

The circuit for the power supply converts 230-volt, 50-hertz AC electricity into 16-volt DC power. This is made feasible by using full wave rectifiers with a step-down transformer of 16-0-16 Centre tapping. To smooth out the ac current, a capacitor can be used as a passive filter (See Fig. 6).

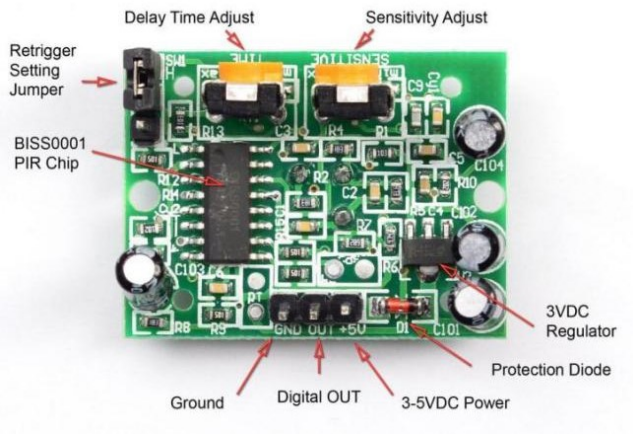

Figure 6. PIR sensor

1. 20 feet is the maximum detectable range (6 meters) 110 degrees by 70 degrees is the detecting angle.
2. Rectangular dimension.
3. The sale price for $10.00.
4. While activated (for motion detection), the signal is a high-voltage (3V) digital pulse, and when inactive, it is a low-voltage signal (no motion detected). Each sensor has a distinct pulse length that is controlled by the resistors and capacitors on the PCB.
5. Most modules (which frequently feature a 3.3V regulator) require an input voltage range of 5V to. 12V, however 5V is advised in case the regulator's specs differ.

To accomplish this, a window comparator and a differential amplifier have been used. A differential amplifier is used to amplify the signal from the PIR sensor. Amplification is used to raise the PIR sensor's output from its natural 3.3 volts to 5 volts. This voltage is sent into the window comparator and compared with the other two inputs' references. As a result, the PIR sensor's reaction will dictate whether diodes D1 and D2 are biased forward or backward. That's how the transistor's input is controlled. This switch regulates the base current at the transistor, which in turn controls the flow of power to the relay that operates the lights and camera, thanks to the output of the window comparator. Only one of the operational amplifier's inputs has been connected to the amplifier up to this point. We have used both the "inverting" and "non-inverting" input terminals to boost a single input signal. Another input has been grounded. Another common type of operational amplifier circuit is the Differential Amplifier, which takes use of the fact that a standard operational amplifier has two inputs: one for inverted signals and one for non-inverted signals.

A window comparator has been used to compare the PIR sensor output after it has been differentially amplified. Amplification raises the 3.3-volt PIR sensor output to 5 volts. The window comparator compares this voltage to the two input reference voltages. In order to control the transistor's input dependent on the output of the PIR sensor, diodes D1 and D2 are forward or reverse biased, respectively. The output of the window comparator controls the base current at the transistor, which controls the flow of energy to the relay of lights.

4.2 Electronic Lighting System

Safe, green, and devoid of hazardous mercury, LED lighting is a great choice. The product of this design has the following features:

- Highly Effective LED Lighting

You can get the same amount of illumination with a 40 to 100 watt incandescent bulb. Without sacrificing aesthetics or the environment, our LED lighting offers efficiency and enables consumers to save hundreds of dollars over the course of the light's lifespan.

1. Energy saves

Use LED lighting to conserve energy and turn off the lights when you're not using them. The average power consumption of MultiSource Technologies' LED lights is about 10%, which is 50% less than a CFL and 90% less than that of an incandescent light.

2. Spend less and use LED lighting

How much money can one lamp save you? Running a 60-watt bulb for 50,000 hours in the United States would cost $325 in power alone. In the same case, operating the light for 50,000 hours will only cost $60 due to the LED lights' average power consumption of just 10 Watts.

3. Longevity

A person might never switch another bulb.

The researcher used only the highest quality LEDs, therefore their lifespan is unparalleled. Install one LED light, and you can expect it to last for 50,000 hours. This will also end outages and the need to repair and dispose of bulbs. hence, when used in ceilings.

4. A Light Generation

50,000 hours –It has a lifespan that is 50 times longer than a standard incandescent bulb and 5 times longer than a typical compact fluorescent lamp. In fact, a single LED lamp would survive for almost 23 years if it was used for 6 hours a day, every day. One might never again have to change a lightbulb.

5. Conclusions And Future Developments

Based on the qualitative survey, most respondents agreed to purchase this designed lamp and even recommend to others to buy it. Lanterns have served several purposes for the Chinese people throughout the centuries, including providing illumination and serving as basic paper decorations. In the testing stage, this lamp is able to be detected by human temperature and monitored using wifi remotely. However, more importantly, lanterns have come to represent prosperity, prestige, and good fortune. Although paper lamps are commonly used by kids at home and at school, they are also extremely helpful for the elderly and those with disabilities. In particular, persons with dementia or other specific requirements can benefit greatly from programmable sensory lighting for the home.

The use of paper as the lamp cover is more comfortable to be used for all populations because it provides softer light and it doesn't hurt human eyes. The design of this lamp carries significant meaning to many Chinese families because the character "Fu" symbolizes prosperity and wellness for the family, which can cause the family be more harmony and healthier in terms of relationships and mental health, particularly for the targeted groups of this research. Light has effects on more than just what we see (image, shape, intensity, perception, contrast, etc.). It also has effects on our bodies and minds, which can affect our health and happiness.

In this case, illumination is the key. Using this technique, you can bring attention to architectural features, interior design, artwork, textures, and more in a way that is reminiscent of when the Kongming lanterns were in place. People may have an easier time locating familiar things, locations, and structures if those regions are highlighted to help call attention to the elderly and disabled giving them some peace of mind of where they are as to be a place of comfort just as their traditional homes.

The design has given basis of further designs and incorporation of better designs based on the respondents to this design. More so this design is mostly based on the incorporating of a traditional lamp which can further be developed to resemble the actual lantern and still maintain the full understanding of traditional feeling whenever the lamp turns on which also can incorporate the DIY LEDs which allows one to select the type of light colour emitted and the scenery present more so summer and winter patterns. The use of PIR can be further developed and coded to specific conditions such as to what extent is considered when there is winter, on hot summer days. Furthermore, the lamp cannot be limited to only to the lighting feature but also integrate some sense of moving capability with the sensory detecting the IR from the human body thus no collusion to provide maximum lighting with minimal hustle.

References

Y. Cheng, C. Fang, J. Yuan, and L. Zhu, "Design and application of a smart lighting system based on distributed wireless sensor networks," Applied Sciences, vol. 10, no. 23, p. 8545, DOI: 10.3390/app10238545, 2020.

R. Turjamaa, A. Pehkonen, and M. Kangasniemi, "How smart homes are used to support older people: An integrative review," International Journal of Older People Nursing, vol. 14, no. 4, p. e12260, 2019.

Zhang, X., Jeong, S. Y. S., & Chan, S. (2021). Advance care planning for older people inmainland China: An integrative literature review. International Journal of OlderPeople Nursing, 16(6), e12409.

Kivimäki, T., Stolt, M., Charalambous, A., & Suhonen, R. (2020). Safety of older peopleat home: An integrative literature review. International Journal of Older PeopleNursing, 15(1), e12285. DOI: 10.1111/opn.12285

Ramlee, R. A., Tang, D. H. Z., & Ismail, M. M. (2012, September). Smart home systemfor disabled people via wireless Bluetooth. In 2012 International Conference onSystem Engineering and Technology (ICSET) (pp. 1-4). IEEE. DOI:10.1109/ICSEngT.2012.6339347

Liu, J., Liu, H., Chen, Y., Wang, Y., & Wang, C. (2019). Wireless sensing for human activity: A survey. IEEE Communications Surveys & Tutorials, 22(3), 1629-1645.DOI: 10.1109/COMST.2019.2934489

Von Marcard, T., Rosenhahn, B., Black, M. J., & Pons-Moll, G. (2017). Sparse inertialposer: Automatic 3d human pose estimation from sparse imus. In Computergraphics forum (Vol. 36, No. 2, pp. 349-360). DOI: 10.1111/cgf.13131

Kivimäki, T., Stolt, M., Charalambous, A., & Suhonen, R. (2020). Safety of older peopleat home: An integrative literature review. International Journal of Older PeopleNursing, 15(1), e12285. DOI: 10.1111/opn.12285

Ramlee, R. A., Tang, D. H. Z., & Ismail, M. M. (2012, September). Smart home systemfor disabled people via wireless Bluetooth. In 2012 International Conference onSystem Engineering and Technology (ICSET) (pp. 1-4). IEEE. DOI:10.1109/ICSEngT.2012.6339347

Santos, V., Bartolomeu, P., Fonseca, J., & Mota, A. (2007, July). B-live-a homeautomation system for disabled and elderly people. In 2007 International82symposium on industrial embedded systems (pp. 333-336). IEEE. DOI:10.1109/SIES.2007.4297355

N. Cross, "Engineering design methods: strategies for product design," John Wiley & Sons, 2021.

X. Zhang, S. Y. S. Jeong, and S. Chan, "Advance care planning for older people in mainland China: An integrative literature review," International Journal of Older People Nursing, vol. 16, no. 6, p. e12409, 2021.

T. Kivimäki, M. Stolt, A. Charalambous, and R. Suhonen, "Safety of older people at home: An integrative literature review," International Journal of Older People Nursing, vol. 15, no. 1, p. e12285, DOI: 10.1111/opn.12285, 2020.

I. Chew, D. Karunatilaka, C. P. Tan, and V. Kalavally, "Smart lighting: The way forward? Reviewing the past to shape the future," Energy and Buildings, vol. 149, pp. 180-191, DOI: 10.1016/j.enbuild.2017.04.083, 2017.

J. M. Torrington and P. R. Tregenza, "Lighting for people with dementia," Lighting Research & Technology, vol. 39, no. 1, pp. 81-97, DOI: 10.1177/1477153514560423, 2007.

C. Pettersson, I. Malmqvist, S. Gromark, and H. Wijk, "Enablers and barriers in the physical environment of care for older people in ordinary housing: A scoping review," Journal of Aging and Environment, vol. 34, no. 3, pp. 332-350, DOI: 10.1080/02763893.2019.1683671, 2020.

W. Boonsong, N. Senajit, and P. Prasongchan, "Contactless Body Temperature Monitoring of In-Patient Department (IPD) Using 2.4 GHz Microwave Frequency via the Internet of Things (IoT) Network," Wireless Personal Communications, Nov. 2021, doi: https://doi.org/10.1007/s11277-021-09438-4.

S. Buder and M. Hamilton, "7 Lantern Festivals That'll Brighten Your Life," AFAR Media, Nov. 14, 2022. [Online]. Available: https://www.afar.com/magazine/lantern-festivals-thatll-brighten-your-life

S.-H. Tsaur, Y.-C. Wang, C.-R. Liu, and W.-S. Huang, "Festival attachment: antecedents and effects on place attachment and place loyalty," International Journal of Event and Festival Management, vol. 10, no. 1, pp. 17-33, DOI: 10.1108/ijefm-02-2018-0014.

J. A. Hama Kareem, "The impact of intelligent manufacturing elements on product design towards reducing production waste," International Journal of Engineering Business Management, vol. 11, DOI:

10.1177/1847979019863955, 2019.

Butollo, F., & Ten Brink, T. (2018). A great leap? Domestic market growth and localstate support in the upgrading of China's LED lighting industry. GlobalNetworks, 18(2), 285-306. DOI: 10.1111/glob.12160

D. W. Stewart and P. N. Shamdasani, "Focus groups: Theory and practice," vol. 20, Sage publications, 2014.

R. Windisch, G. Heidel, U. Binder, and K. Bergenek, "Impact of spectral features of common LED lighting systems on TM-30 color indices," Optics Express, vol. 25, no. 3, pp. 1824-1830, 2017.