Research Article

Application Sof Infrared Rays And Desigining A System For Controlling Infrared Rays System

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Abstract: Infrared rays have many applications in our life and in home applications. Remote control for TVs, air conditioner and other home applications are just several examples, but there are many more applications in manufacturing and in industrial production and factories. This paper uses mainly description, qualitative analysis and analytical and synthesis methods. It is necessary for factories, experts, engineers to set up and design a system for controlling infrared rays. We need to control both release of infrared rays and collection of infrared rays and through its operation. Also a risk management system need to be set up for controlling bad effects from infrared rays release and collection. Our results can be used to advise to set up or design a control system for infrared rays.

Key words: infrared rays, control system, applications, design

JEL: O30, O32, O33

1. Introduction

In our house, life and esp., in industrial manufacturing and factories, there are many applications of infrared rays release and collection.

For instance, infrared rays release application such as :

Matting plastic products

Drying and curing coating

Drying electronic printed circuits

The transmitters are available as fast, medium, and short wavelength infrared transmitters. Therefore, the optimum wavelength can be selected for the material to be heated.

Our paper will present more applications and design of infrared rays release and collection system and give out suggestions. We structure the paper with introduction, literature review, methodology, main results, discussion and conclusion.

2. Literature review

Demsey et al (19960 pointed that N ear-infrared spectrometry is being applied in the solution of problems in many areas of biomedical and pharmaceutical research, including cardiovascular radiology, brain imaging, formulation, quality/process control, and even clinical trials. The technique can also play a role in the biotechnology industry in the nondestructive analysis of small quantities of expensive materials. This report first defines near-IR spectrometry and imaging and then describes its application to atherosclerosis and stroke research.

And Wells et al (2005) said A novel method for damage-free, artifact-free stimulation of neural tissue using pulsed, low-energy infrared laser light is presented. Optical stimulation elicits compound nerve and muscle potentials similar to responses obtained with conventional electrical neural stimulation in a rat sciatic nerve model. Stimulation and damage thresholds were determined as a function of wavelength using a tunable free electron laser source (λ=2 to 10 μm) and a solid state holmium:YAG laser (λ=2.12 μm). Threshold radiant exposure required for stimulation varies with wavelength from 0.312 J/cm2 (λ=3 μm) to 1.22 J/cm2 (λ=2.1 μm).

Next, Lee et al (2006) found content of collagen and elastin produced by the fibroblasts increased after infrared radiation, and that this increase was proportional to the duration of irradiation exposure. Following 6 months of treatment, all patients reported good (51-75%) improvements in skin texture and roughness. Additionally, patients noted fair (25-50%) improvement in color tone of the skin; however, improvements in hyperpigmented lesions were not observed. Objective medical evaluation of the patients indicated that roughness and laxity were

fairly improved, but there was no significant improvement in hyperpigmented lesions. Histological examination failed to reveal any differences as well.

Sood et al (2009) stated that The smart grid of the future, while expected to affect all areas of the electric power system, from generation, to transmission, to distribution, cannot function without an extensive data communication system. Smart grid has the potential to support high levels of distributed generation (DG); however the current standards governing the interconnection of DG do not allow the implementation of several applications which may be beneficial to the grid.

Then Jaber et al (2012) pointed that a new infrastructure of a combined Worldwide Interoperability for Microwave Access (WiMAX) and Dedicated Short-Range Communications (DSRC) link layer is proposed with the purpose of reducing simultaneous WiMAX connections.

Then, Tsai and Hamblin (2017) described Infrared (IR) radiation is electromagnetic radiation with wavelengths between 760 nm and 100,000 nm. Low-level light therapy (LLLT) or photobiomodulation (PBM) therapy generally employs light at red and near-infrared wavelengths (600–100 nm) to modulate biological activity. Many factors, conditions, and parameters influence the therapeutic effects of IR, including fluence, irradiance, treatment timing and repetition, pulsing, and wavelength. Increasing evidence suggests that IR can carry out photostimulation and photobiomodulation effects particularly benefiting neural stimulation, wound healing, and cancer treatment.

Beside, Cristiano (2019) mentioned Infrared rays, that comprise NIR, MIR and FIR rays, are increasingly used for enhancing athletic performance and muscle recovery but also for neuromuscular rehabilitation and in sports medicine. Infrared-based devices frequently used on athletes include infrared thermal blankets, infrared lipo laser paddles (soft-laser), infrared heat lamps, infrared bands, infrared saunas, infrared pens, far infrared-emitting ceramic or stone beads and far infrared-emitting apparel (technical sportswear).

3. Methodology

Method and data

This paper uses mainly description, qualitative analysis and analytical and synthesis methods.

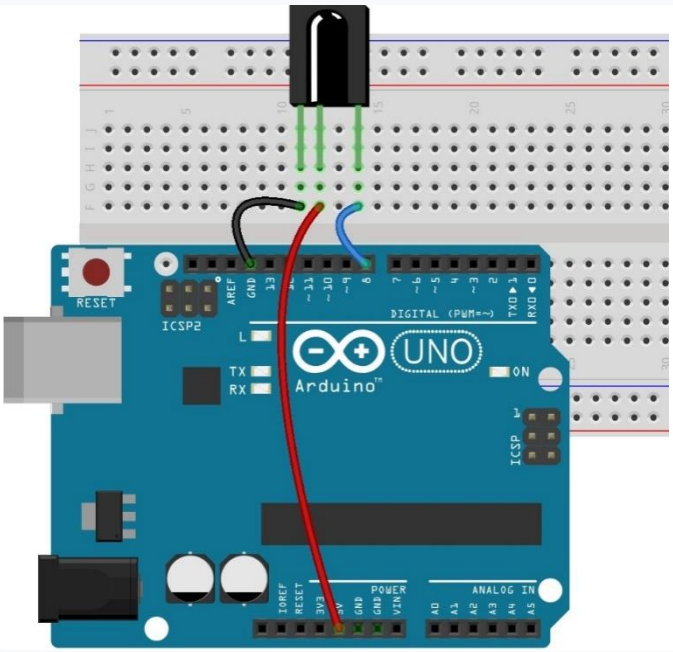
We also use relevant theories and practices of infrared rays system, release and collection.

4. Main results

4.1 Applications of infrared rays

In many electrical appliance control applications, remote control is the one that people use the most today because of its versatility and convenience! The remote control we see most is the remote control of the TV now we want to control other devices such as lights, fans, water pump motors, televisions, computers ... by pink waves. Except this is not much different from our TV remote but we have to isolate the control and power!

Figure 1 - Illustration remote system



4.2 Infrared light [separator]

Infrared light (infrared light) is light that cannot be seen with the naked eye, with wavelengths ranging from 0.86μm to 0.98μm. Infrared rays travel at the speed of light.

Infrared rays can transmit multiple signal channels. It is widely used in industry. The amount of information can reach 3 mega bits / s. The amount of information transmitted with infrared light is many times larger than the electromagnetic bars that people still use.

Infrared rays are easily absorbed, poor penetrating ability. In infrared remote control, the infrared beam emits narrow, directional, so when retracted in the right direction.

Infrared waves have important properties like light (convergence through lenses, focal lengths ...). Normal light and infrared light differ very clearly in the penetration of matter.

There is matter that we see it under a dull gray color but with infrared light it becomes transparent. Because the semiconductor material is "transparent" to infrared light, the infrared ray is not weakened as it passes through the semiconductor layers to go out.

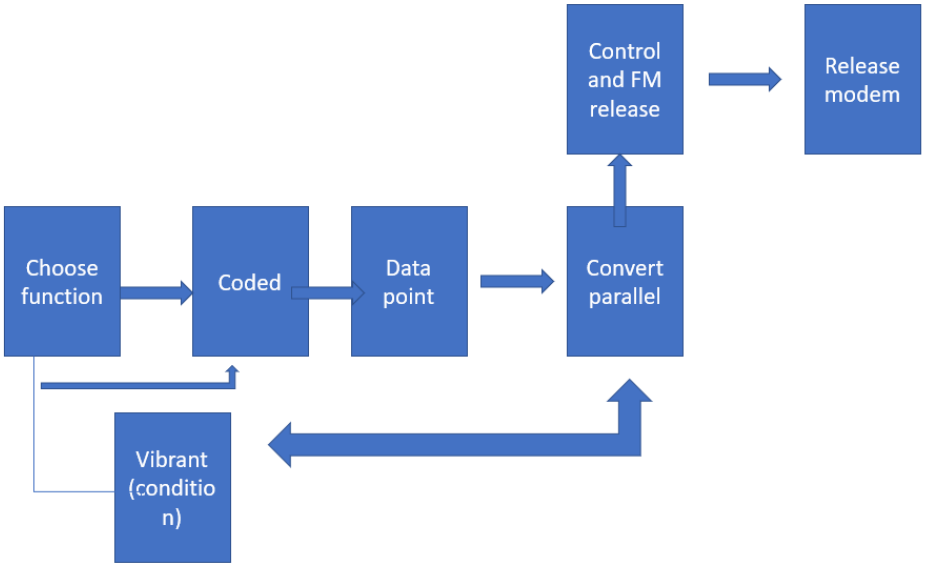
4.3 **Principle of infrared transceiver**

Infrared radiation is received or emitted by many different means, which can receive infrared rays from sunlight. Many things can emit infrared rays such as: radiators, electric furnaces, lamps, human body, ... To be able to transmit infrared rays well, it is imperative to use stable transmitters and receivers to determine whether it is impulse or noise. The best working frequency is between 30 KHz and 60 KHz, but usually uses around 36 KHz. Infrared light transmits 36 times / 1 second when transmitting level 0 or level.

Using a frequency of 36 KHz to transmit infrared signals is easy, but difficult to receive and decode must use a filter so that the output signal is square pulse, if the output has a pulse, it means that the signal is received at the input.

a) Broadcast (rays release)

Figure 2 - Functional block diagram



-Function selection block and encryption block: When the user presses the function keys to issue his request commands, press the softkey corresponding to a decimal number. The encoder circuit will convert to a corresponding binary code in the form of a digital signal code consisting of bits 0 and 1. The number of bits in the binary code can be 4 bits or 8 bits ... depending on the number of function keys more or less.

-Conditional oscillation block: When pressing a function key, simultaneously starting the oscillator circuit to create a clock pulse, the clock pulse frequency determines the standard time of each bit.

Data-pin block and serial out-to-serial converter block: The binary code at the encoder circuit will be latched to the serial out-to-serial data converter circuit. The serial parallel data converter circuit is controlled by clock pulse and timing circuit to ensure the correct completion of the conversion of sufficient bits of an instruction code.

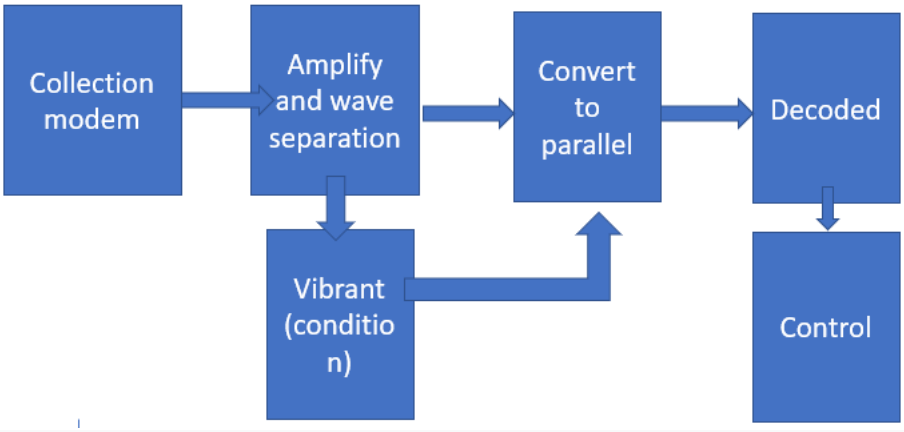
FM modulation and transmitter: the code in serial form will be sent through the FM transmitter and modulation circuit to pair the code into a carrier with frequencies 38Khz to 100Khz, thanks to the high frequency carrier the signal is transmitted further , that is, increase the range of the shot.

Transmitter block: is an infrared LED. When the code has a bit value

= '1', the LED emits infrared in T period of that bit. When the code has a bit value = '0', the LED will not light. Therefore the receiver does not receive the signal as bit = ‘0’.

b) Collection

Figure 3 - Functional block diagram



Receiver unit: Infrared rays from the transmitter are received by the infrared receiver or other optical components.

- Amplifier and Wave Separation Block: first amplifying the received signal

passing through the detector circuit to eliminate the carrier and decouple the necessary data is the code.

- Series to parallel converter block and Decoder unit: code

is fed into a series to parallel converter circuit and then passed through the decoder unit to the corresponding decimal in the form of a pulse at the corresponding output to trigger the control circuit.

The carrier frequency is also used for phase comparison with the lateral oscillation frequency

The receiver helps the transceiver circuit work synchronously, ensuring that the detector circuit and the serial to parallel converter circuit work correctly.

5. Discussion

We might consider to monitor any risk happening from the process of infrared rays release and collection.

A risk management process might be applied in order to reduce risk and harmful effects from infrared rays for users and for environment.

Risk process: identify risks -> risk evaluation -> risk monitor -> risk control and prevention

6. Conclusion

The process of releasing infrared drays and collection need to be managed well. In big factories and in industrial manufacturing, we need computer system to monitor their operation of infrared rays collection and release.

Also there might be risk control system during the infrared rays release and collection operation. Any bad effects from infrared rays might be reduced if we can design a proper control system.

Limitation of research

We need to research into details the control system to reduce any risks from infrared rays.

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