Review Article

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Use of Camera in Medical Diagnosis

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Abstract

We must acknowledge the inventor of the camera - Louis Le Prince. Cameras have long secured their place in our daily lives. It doesn't just apply to the cameras in our smartphones or the digital cameras we use for vacation pictures. ATMs, toll booths, security firms guarding buildings and eye doctors using slit lamps all rely on cameras to do their jobs. Yet even the most observant among us can easily miss most of the devices—because they involve tiny cameras used in embedded systems. Medicine and research require cameras that perform well daily for the vital work that scientists, doctors, nurses and patients do, all without focusing on each other. Let's imagine how this technology benefits various medical diagnostics branches. The field of ophthalmology relies on high-resolution machine vision cameras to aid in diagnosing and imaging the retina. For these applications, it is often recommended to use machine vision cameras up to 31 megapixels to detect even the most minor details in the retinas (the retina - the area at the back of our eye that is sensitive to light and transmits the image of what we see to our brain) This the field has gained importance in recent years because early detection of diseases such as diabetic retinopathy or macular degeneration can significantly increase the chances of successful treatment. A modern ophthalmologist has many diagnostic devices and methods at his disposal. One widely used examination device is the slit lamp microscope (or slit lamp for short).

Keyword: Diabetes Mellitus; Endothelial Cell Density; Co-efficient of Variation; Hexgonality.

INTRODUCTION

The name refers to the slit-like beam of light used to illuminate the eye, allowing further examination by the microscope in reflected light. Most modern slit lamps include integrated digital cameras to document the diagnosis in photos or videos. Doctors use a fundus camera to create high-resolution photographs of the back of the eye. Newer portable models are designed to be very light and ultra-compact, meaning an integrated camera is a must. The increasing mobility of mobile devices is a significant help to doctors and patients as diagnostics can now be performed.

Dermatology: Dermatology is focused on skin diseases. Early skin cancer diagnosis (melanoma) can make a huge difference in successful treatment. One of the standard diagnostic procedures is dermatoscopy. An integrated camera is used to examine and document suspicious skin changes. It is done at different time points to digitally record the development of the pigment. Special software is used not only to archive images but also to analyze them. The built-in cameras play a vital role in compensating for different shooting conditions,

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including light and angle, in ensuring images are comparable over extended periods. The colour fidelity of the camera is also an essential factor in keeping the diagnosis as specific as possible.

Lab devices: In the present age of advanced technology, machine vision cameras have become essential for many applications. The cameras have applications in the medical sector example includes diagnostic devices, laboratory automation.

Medical Imaging: In the medical imaging high-quality and sensitive cameras are often used. The vision mechanisms are also useful with artificial intelligence to execute complete blood counts. Process Automation & Quality Control: At present, we are using a fully developed quality control system in medical laboratory diagnosis centres; all fully auto analyzer gives the best quality assurance in patients' sample so that it will be helpful for further treatment for the patients, we can't imagine this whole process without a camera! Lab automation is relevant in chemistry, biology, pharmaceutical and food technology, and medicine. The objective is to improve processes, generate more results in less time, avoid errors, document analyses and experiments in a traceable manner and reduce costs simultaneously. Basler cameras support tasks such as sample identification and sorting (e.g. barcode recognition, colour and pattern recognition) or process and quality control (e.g. sample management, control of analytical reactions).

Bioimaging: Bioimaging creates images of human structures and functions: from anatomical regions and tissues to cells and molecules. In biomedical research (e.g. cancer research) and routine diagnostics (e.g. histopathology), many samples are examined and evaluated quickly. Digital slide scanning enables full automation of the workflow, increasing quality and efficiency. Sensitive Basler cameras allow fast acquisition of high-resolution images with perfect colour fidelity with short exposure times for maximum sample protection. In industrial applications, machine vision cameras are used in quality control. Believe it or not, many basic applications are the same in the life sciences. Some critical uses of vision systems include: -Inspection to ensure that adequate biological samples have been collected; -Inspection of disposable materials such as needles to check for defects; -Monitoring laboratory sample changes when researchers are away; -Verification of test results by ensuring appropriate sample handling. To meet these obligations, life science camera systems should be small, compact, and self-contained—the more sophisticated the integrated image sensor, the better the image quality and the clearer the results. Systems must increasingly be truly multifunctional to meet laboratory needs. Lighting and communication capabilities should be built into the camera as a cohesive unit. This facilitates the continuous capture of information using the network. Another advantage of machine vision cameras in medical imaging is parameter transparency.

In addition, machine vision cameras offer complete control over camera setup and acquisition and are designed for 24/7 operation, which can be advantageous for high-volume laboratories and medical centres. Based on these above points, all the quality control of a medical diagnostic laboratory indirectly depends on the camera. Surgery There is nothing wrong with using a camera in surgery as a doctor's assistant; without a camera, the surgery is almost incomplete, as we all know. Machine vision cameras are increasingly being used to optimize surgical microscopes in minimally invasive surgery and micro surgeries, such as plastic surgery, reconstructive surgery, neurosurgery, and spine surgery. Cataract surgeons, for example, benefit from machine vision cameras, as these tools can often offer greater precision and accuracy and ensure optimal visual outcomes for patients. Cancer High-speed, high-resolution machine vision imaging systems have been developed to perform a non-invasive optical biopsy to assess cancer. Pathologists and surgeons use these cameras to provide real-time imaging at the cellular level, which can help diagnose various types of cancer. A gamma camera (γ-camera), also called a scintillation camera or Anger camera is a device used to image gamma rays emitting radioisotopes, a technique known as scintigraphy. Applications of scintigraphy include early drug development and nuclear medicine imaging for viewing and analyzing images of the human body or the distribution of medically injected, inhaled, or ingested gamma-emitting radionuclides. Drug Discovery Camera is also used by drug companies which is practical and gives the best results. Some companies are also using machine vision technologies combined with machine learning to "reposition" drugs and shelved pharmaceutical components to identify potential new targeted treatments for rare genetic diseases. These companies use raw images obtained by machine vision cameras and machine learning techniques to analyze therapeutic compounds in various conditions. In addition, pharmaceutical companies and drug processing centres can use machine vision technologies to capture multiple

images of pills during production to ensure the quality of medical prescriptions. In this context, machine vision cameras can identify minor cosmetic defects often considered unacceptable by consumers and regulators. Automated vision systems allow detailed examination of pills from different angles to identify these flaws and reduce the risk of defective products entering the market. The cameras can also adapt to the high speed at which pills are delivered to and through the production line, facilitating accelerated image acquisition and analysis for drug manufacturers. They usually enhance the knowledge and skills of the doctor to make the diagnostic process faster, easier, and more accurate. So, next time wherever you click your picture, remember that this camera is also helpful in the internal parts of our body for medical diagnosis.

CONCLUSION

The use of camera in medical field and health sector revolutionized mode of healthcare delivery system. There is need to explore more and more possibilities for the use of high quality and highly sensitive camera in the diagnosis and reaching to remote locations. The health sector is working on noble cause of eradication of deadly diseases and hence such technology is currently needed which will be easily accessible by the users. The death rates need to be lowered by use more and more technologies in health care. Block chain, internet of things is the new area to explore for advancement in healthcare.

REFERENCES

1. Lahiri, B.B., Bagavathiappan, S., Jayakumar, T. and Philip, J. (2012), Medical application of infrared thermography: A review. Infrared Physics and Technology, Volume 55 doi:10.1016/j.infrared.2012.03.007
2. Thermal imaging. (2014) Thermal Imaging of the Southwest. http://www.tiofsw.com/Breast Screening. (2014) Thermography Arizona.
3. http://www.thermographyarizona.com/Clinical cases. TermografiaJozéValdez.http://www.thermography.pt/en/cases PDeS 2015 May 13-15, 2015. Cracow, Poland 496
4. T. Starner, J. Auxier, D. Ashbrook and M. Gandy, "The gesture pendant: a self-illuminating, wearable, infrared computer vision system for home automation control and medical monitoring," Digest of Papers. Fourth International Symposium on Wearable Computers, 2000, pp. 87-94, doi: 10.1109/ISWC.2000.888469.