The Application of AMOLED Near-Eye Display Technology in Enhancing Humanistic Care in Hospitals

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Abstract
This study focuses on humanistic applications of AMOLED (Active-matrix organic light-emitting diode) near-eye display technology in medical settings. AMOLED technology offers new methods to medical humanistic applications with its flexibility, rich color gamut, high contrast, fast response, low power consumption and many more advantages. In pre-surgery stage, AMOLED near-eye display could push detail notifications about the upcoming surgery, promote patient-doctor communication and meet the patient's right of know. During the surgery, the excellent visual displays could distract the patient's attention, relief the pains, reduce the dose of analgesics as well as monitoring the procedure to ensure safety. Furthermore, AMOLED near eye display could reduce physician reassurance of patients, enhance surgical efficiency. In summary, AMOLED near eye display shows significant potential in medical humanistic care, promote patient recovery.

Author Keywords
AMOLED display, near eye display, patient care

1. Introduction
Surgery, as a traumatic treatment, tends to create a series of psychological barriers in patients. These psychological barriers not only affect the patient's psychological state but may also trigger a series of physiological changes, thereby affecting surgical outcomes and postoperative recovery. In the healthcare setting, the preoperative patient's psychological state is critical to the success of surgery and postoperative recovery. Many patients tend to experience significant worry during the waiting phase before entering the operating room due to fear of the unknown surgery, concern about the outcome of the surgery, and uneasiness about the changes in their postoperative life. This emotional state not only increases the patient's psychological stress but also affects his/her physiologic state adversely.

Patients' nervousness tends to increase further as they enter the preparation period for surgery. When facing the upcoming surgery, the patients may be overly nervous, resulting in physiologic responses such as high blood pressure and tachycardia, physiologic changes that not only increase the risk of surgery but may also affect the smooth progress of the surgery. Therefore, at this stage, the medical team needs to pay close attention to the patient's emotional changes and provide timely psychological counseling and comfort to ensure that the patient can meet the surgery with a smooth mind.

Figure 1. Preoperative Emotional Reassurance

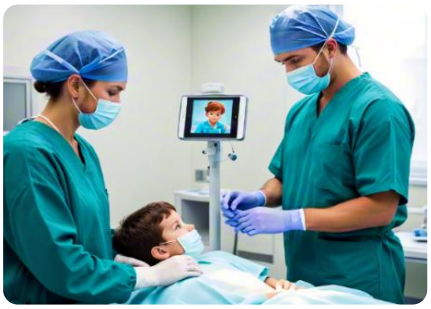

Figure 2. Intraoperative Emotional Alleviation

During surgery, although the patient is under anesthesia, the awakened or partially awake patient may still feel panic when facing an unfamiliar environment like shadowless light and ceiling in the operating room. This emotion will not only increase the pain of the patient but also may interfere with the operation. Therefore, the surgeon needs to constantly reassure the patient and give them confidence and support during the operation to ensure smooth operation and patient comfort.

In summary, the preoperative psychological state of patients has a critical impact on the success of surgery and postoperative recovery. Therefore, the medical team must take effective measures to pay attention to the patient's emotional changes and reduce their psychological burden to ensure smooth surgery and good patient recovery. AMOLED near-eye display technology brings a new solution to the medical field with its advantages of high contrast ratio, ultra-wide viewing angle, vivid colors, and low power consumption. AMOLED near-eye display technology, with its advantages of high contrast, ultra-wide viewing angle, vivid color, and low power consumption, has brought new solutions to the medical field, especially its flexible features, which provide more comfortable visual enjoyment for patients lying on their backs. AMOLED near-eye display technology in applying preoperative and intraoperative humanistic care not only enhances the patient's surgical experience but also provides medical workers with a more efficient and convenient means of communication, which is of far-reaching practical significance and has a broad application prospect.

2. Experiment Background
Concerning the experimental data, the first step is sample selection: 1000 patients who underwent surgery in a hospital between 20XX and 20XX were randomly selected for the study. Among them, 550 cases are male and 450 cases are female; the age range is between 18 and 75. Next is the grouping: the patients were randomly divided into the control group and the experimental group, with 500 cases in each group. The control group adopts conventional surgical care methods, and the experiment refers to the experimental data, starting with sample selection: 1000 patients who underwent surgery in a hospital between 20XX and 20XX were randomly selected as research

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subjects. Among them, 550 cases were male while 450 cases were female; the age range was between 18 and 75 years old. Secondly, grouping: the patients were randomly divided into the control group and the experimental group, with 500 cases in each group. The control group adopts conventional surgical nursing methods, and the experimental group implements humanistic care and psychological nursing interventions based on the control group. The third is data collection: through questionnaires, interviews, observation records, and other methods, the data on patients' mood changes during the operation were collected, including tension, anxiety, pain, depression, and other emotional reactions. At the same time, the emergencies during the operation were recorded, such as sudden rises in blood pressure, arrhythmia, and excessive bleeding. Final data analysis: we used statistical software such as SPSS to process and analyze the data, including descriptive statistics, correlation analysis, regression analysis, and more.

Table 1 Comprehensive postoperative evaluation data

Mood-change data	Experiment group	Control group
Nervousness and anxiety	60%	85%
Pain	50%	75%
Worries	30%	50%

Table 2 Comprehensive postoperative evaluation data

Emergencies data	Experiment group	Control group
Nervousness and anxiety	5%	15%

During emergencies, patients in the experimental group had significantly milder and faster recovery from physiological reactions such as blood pressure surge and cardiac arrhythmia.

Table 3 Comprehensive postoperative evaluation data

	Experiment group	Control group
Preoperative anxiety scores	3.2	6.8
Intraoperative anxiety score	8.5	5.3
Surgical success rate	96%	88%
Post-operative recovery days	7.5	10.2

The reference results show that intraoperative patients' mood changes have a significant impact on the occurrence of emergencies. Through the implementation of humanistic care and psychological nursing interventions, patients' emotional reactions like tension, anxiety, and pain can be effectively alleviated, thus reducing the incidence of emergencies. This may be related to the fact that humanistic care and psychological nursing interventions can enhance patients' psychological resilience and improve their tolerance and self-confidence in surgery. There are two design options for the care display solution, one of which uses a VR headset to immerse the patient in a virtual space to divert the patient's attention, and the other option is a patient near-eye display device that matches the operating room and matches the inpatient scenario to allow the patient to watch specific videos and other information, such as knowledge popularization content, entertainment content, and other information, to alleviate their emotions. The main idea of this paper is the AMOLED near-eye display scheme, i.e., the research on the application of AMOLED near-eye display technology in medical scenarios for the humanistic care of patients.

3. Experiment Process

The first step is to optimize the near-eye display parameters, concentrating on comfortable color and brightness adjustments, resolution and sharpness settings. In the room light illumination is maintained between 300lux-500lux, the brightness is set at 50%-70%, the color temperature is warm white 3000k~4000k, the font size is fine-tuned according to the patient's eyesight.

The analysis focuses on the design of the distance and angle of the display to the human eye, the comfortable viewing angle of the human eye ranges from 60-90 degrees horizontally and 30-40 degrees vertically, refer to Table 4. There is a difference in the head circumference between different people, but this difference is relatively small.

Table 4 Pupillary Distance Data

Subjects	Range of eye distance
Adult female	56~64mm
Adult male	60~70mm
children	~55mm

The straight-line distance from the human eye to the back of the head is a relatively complex measurement because it is affected by several factors such as head shape, forehead height, and eye position. This distance is not a fixed standard value but varies with individual differences. Rough range: Generally speaking, the straight-line distance from the eyes to the back of the head may be between 5~15cm, but this range is for reference only, and the specific value needs to be measured according to the individual situation.

4. Design Schemes

The pupil distance, in this case, is designed using the adult eye spacing of 60mm, this part of the AMOLED display is mounted flatly. The best near-eye display distance of human eyes from an AMOLED display is about 300~350mm, which is included in the design scope of this case. According to the comfortable viewing angle of the human eye is about 60° to 90° in the horizontal direction and 30° to 40° in the vertical direction, based on the design of 60° horizontally and or minus 30° horizontally, AMOLBD near-eye curvature is designed with a flat surface in the middle of 60mm, and left and right are 30° each.

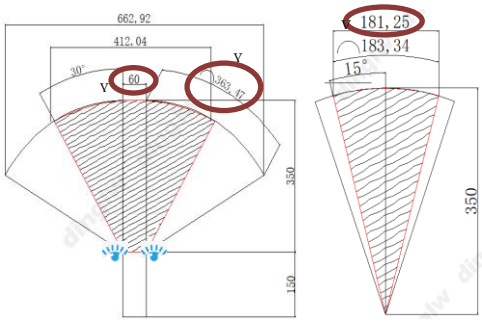


Figure 3. Human Eye Distance Display 350mm Horizontal and Vertical Optimal Display

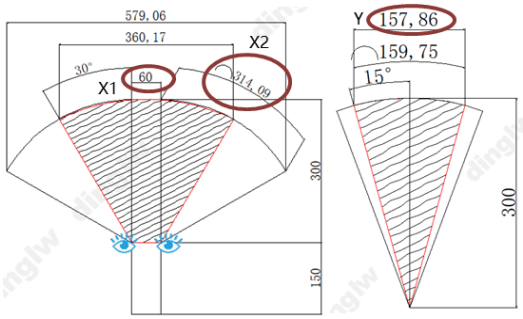


Figure 4. Human Eye Distance Display 300mm Horizontal and Vertical Optimal Display

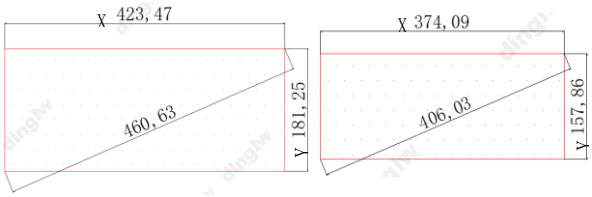
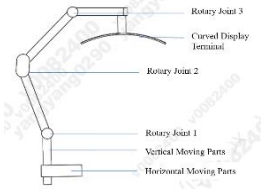


Figure 5. Best display size

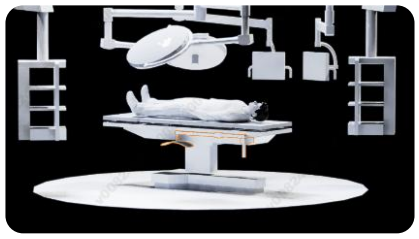
5. AMOLED near-eye display scheme

Near-eye display folding design scheme as illustrated in Figure 6, the advantages of adjustable amplitude are the largest, the eye/head without pressure, convenient content debugging; disadvantages of unilateral side fixation bracket or affect the operation, the patient's field of vision blocking is insufficient.

6-1



6-2



6-3

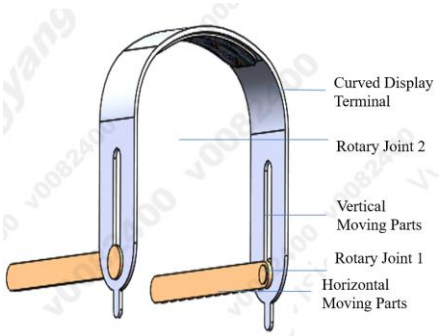
Figure 6-1: foldable stand; **6-2:** folding state; **6-3:** expanding state

Near eye display telescopic design shows as Figure 7, The advantage of this solution is that it is completely unobstructed to the bottom space, which facilitates head debugging, and the disadvantage is that it does not obscure the patient's field of view sufficiently.

Figure 7-1: telescopic arm; **7-2:** in working condition

Near-eye display U-shaped storage scheme as shown in Figure 8, the advantage lies in the rapid folding to the bottom of the bed, no pressure on the eyes/head, and convenient content debugging; the disadvantage of the patient's field of view is not enough obstruction.

8-1



8-2

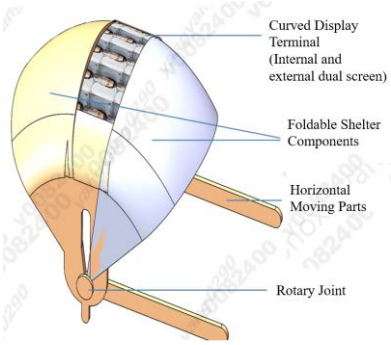
8-3

Figure 8-1: U-shape stand; **8-2:** folding state; **8-3: expanding state**

Based on the above design, comprehensive optimization still exists in the patient's field of vision blocking insufficient

problems, and increasing the patient's head-blocking area at the same time while setting up the external screen body can observe the patient's demeanor, the near-eye AMOLED display U-type scheme, for example, to increase the patient's head blocking, as shown in Figure 9 schematic. The near-eye AMOLED display distracts the patient's attention simultaneously, and the internal increase in the camera function increases the AMOLED display on the outside, which makes it easy for doctors to observe the patient's condition at any time. The scheme leaves most of the gap above and below, which is convenient for the patient to leave a larger space for the body to move and more convenient for the operation of medical equipment and devices such as oxygen masks and other spaces. Other schemes such as vertical retractable displays and near-eye display folding design schemes, can be added to the patient's head shielding design.

9-1



9-2

9-3

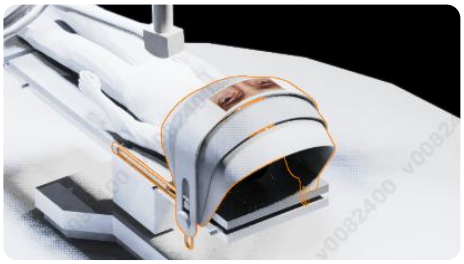


Figure 9-1: optimized U-shape stand;
9-2 & 9-3: expanding state

6. Conclusion

In this paper, patient humanistic care based on medical scenarios is dedicated to offering detailed surgical information for patients before surgery to promote communication between the doctor and the patient. During surgery, to distract patients' attention, slow down pain, and reduce medication use. Soothing the beneficiary's mind before and during surgery enhances surgical comfort, shortens patient recovery time, and promotes rehabilitation. This paper carries out detailed research and testing on AMOLED near-eye display comfort technology, creates related AMOLED near-eye display products, provides a reference for the application of AMOLED near-eye display in medical scenarios, and carries out a fundamental technical reserve for the development of AMOLED near-eye display technology, and promotes the development of technology to serve the human being. AMOLED near-eye display technology is one of the display technologies that has the advantages of flexibility, high color, and high performance. AMOLBD near-eye display technology, as one of the display technologies, has the advantages of flexibility, high color saturation and contrast, fast response time, and low power consumption, which show great potential in medical human care.

References

1. Li, T.. (2009). Research on human eye sight detection based on sight angle. Computer Technology and Development (08), 37-40.
2. Deng, Chunmei, Chen, S. F. & Chen, Chulan. (2009). Effects of preoperative psychological intervention on psychological status and blood pressure and heart rate of patients undergoing elective surgery. Journal of Guangdong Medical College (02), 156-157.
3. Tse, Pik Yung. (2010). Effects of preoperative visits on psychological stress response and complications in patients undergoing elective surgery. Jilin Medical (22), 3696-3697.
4. Zhang, Xueyan & Yi, Fengqiong. (2011). A study of preoperative negative emotions as well as heart rate and blood pressure in patients undergoing anesthesia in the operating room. Chinese and Foreign Medical Research (32), 3-4. doi:10.14033/j.cnki.cfmr.2011.32.062.
5. Fei, H. H. & Jiao, D. X... (2008). Clinical Observation of Humanistic Care on Psychological Stress Response of Surgical Patients. Contemporary Nurses (Academic Edition) (06), 35-36.
6. Paik, M.S. & Kang, Y.C.. (2006). Quality of operating room nurses. Journal of Changchun University of Traditional Chinese Medicine (03), 38. doi:10.13463/j.cnki.cczyy.2006.03.033.
7. Zhang Hulian, Han Airong, Liang Lingyu & Guo Jianxun. (2009). Preoperative psychological care of operating room patients. Nursing Research (29), 2686.