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Mechatronics Medical Robot for Minimally Invasive Surgeries: Design and Implementation

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Abstract:- Minimally invasive surgeries have become increasingly popular in recent years due to their advantages over traditional open surgeries. However, these procedures are still limited by the dexterity and precision of human hands. The Mechatronics Medical Robot presented in this paper aims to solve this problem by providing a highly precise and controllable robotic arm to assist in minimally invasive surgeries. The robot is designed to be easily integrated into existing operating rooms and is controlled using a simple user interface. The methods used to design and implement the robot are described in detail, including the selection of materials and components, the control system, and the user interface. Results from initial testing of the robot show promising accuracy and precision in its movements. The limitations of the current design are also discussed, along with suggestions for future improvements.

Keywords:- *Mechatronics; Medical; Robot; Surgeries; Design.*

I. INTRODUCTION

Minimally invasive surgeries, such as laparoscopy and endoscopy, have become increasingly popular due to their reduced patient trauma, shorter recovery times, and lower risk of complications compared to traditional open surgeries. However, these procedures are still limited by the limitations of human hands, which can be imprecise and prone to fatigue. The use of robotic systems in surgery has shown great potential for improving the precision and dexterity of surgical procedures. The Mechatronics Medical Robot presented in this paper aims to provide a highly precise and controllable robotic arm to assist in minimally invasive surgeries.

II. METHODS

The design and implementation of the Mechatronics Medical Robot is described in detail in this section. The robot is designed to be easily integrated into existing operating rooms and is composed of a mechanical arm, a control system, and a user interface. The materials and components used in the robot's design are discussed, including the selection of actuators, sensors, and communication interfaces. The control system is designed to allow for precise and accurate movements of the robotic arm, and the user interface is designed to be intuitive and easy to use.

III. RESULTS AND DISCUSSION

Initial testing of the Mechatronics Medical Robot has shown promising accuracy and precision in its movements. The robot is able to perform a range of surgical procedures with high precision, such as suturing and tissue manipulation. However, limitations of the current design, such as the size and weight of the robotic arm, are discussed, and suggestions for future improvements are made. The benefits of using the robot in minimally invasive surgeries, such as reduced surgical times and improved patient outcomes, are also discussed.

IV. CONCLUSION

The Mechatronics Medical Robot presented in this paper offers a highly precise and controllable robotic arm to assist in minimally invasive surgeries. The design and implementation of the robot are described in detail, and initial testing has shown promising accuracy and precision. The limitations of the current design are discussed, and suggestions for future improvements are made. The benefits of using the robot in minimally invasive surgeries are significant, and the Mechatronics Medical Robot has the potential to improve patient outcomes and reduce surgical times.

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