Autonomous OT Light

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Abstract/Introduction

- During surgery, doctors face many obstructions on wound areas due to shadows of equipment and their hands. They have to manually change the position of light which distracts them while performing surgery. This issue is being faced by doctors all around the world

- An autonomous OT light that enables adjustment by looking at the shadow and hand of the doctors. It will detect the wound area and doctor's hand over it and adjust itself accordingly which minimizes human intervention in adjustment

Economic Value

Component	Cost per piece (Rs.)
Stainless steel hollow pipe	1566
Thrust bearing (X 6)	900
Radial ball bearing (X 3)	500
Nut + Bolt (X 3)	200
Helical Gears (X 6)	1920
Crown and Pinions	620
Screw (X 2)	120
3D printed motor holder(X 4)	1600
High torque DC Servo motor (X 4)	15600
Depth Camera (Intel realsense)	26030
Surgical LED lights	38000
Total	87056

Methodology

- **Mechanical aspect**
  1. OT light arm
  2. OT light gimbal
  3. Gears
     i. Helical gears
     ii. Crown & Pinion
- **Working methodology**
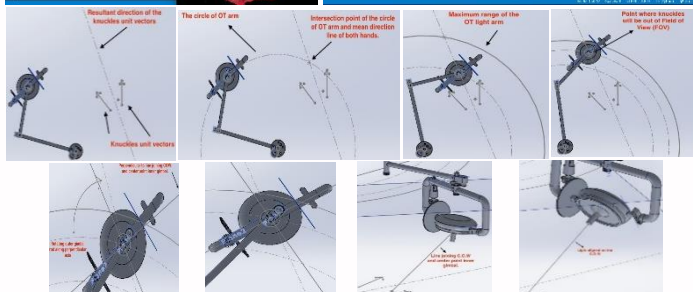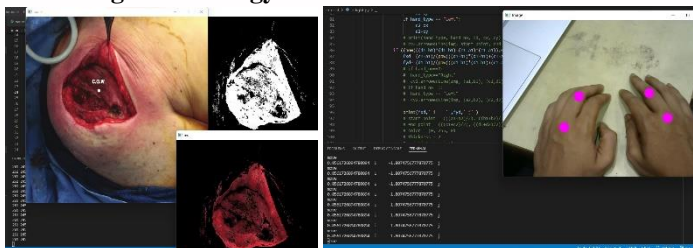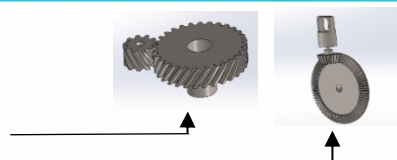
- **Electronics aspect**
  1. High Torque DC Servo Motors
  2. RGBD camera
  3. Arduino
  4. OT light

Conclusion

- **Current scenario**
  Doctors have to manually operate the OT light during surgery, creating interference or distraction.
- **Outcome**
  - We have created an autonomous OT light that will adjust itself according to the surgeon's hand, taking into consideration that light will be on the wound and shadow of the hand have minimal interference.
  - OT light simulation
- **Future prospects**
  - Accommodate ML model to decrease the percentage of human intervention in the process.
  - The model can be further improved for the inclusion of more than two hands by the doctors during surgery.

References

- Inverse Kinematics
- openCV
- Robotic motion
- Autonomous Surgical Lamps(universität Bremen)
- Optimized Positioning of Autonomous Surgical Lamps