1. Problems that led to the establishment of the project:

- **High cost of current robotic surgical systems:** Systems such as "Da Vinci" are very expensive, making them unavailable to many hospitals, especially in resource-limited areas.
- **Size and complexity of systems:** Current robotic surgical systems are large and complex, limiting their use in places with limited space.
- **Lack of access to low-cost medical training:** Current systems are not intended to train new surgeons at affordable prices or provide an effective simulation environment.
- **Risk of infection during surgeries:** The need to reduce direct contact between the surgeon and the patient to reduce the risk of infection, especially in sensitive operations.
- **Saving time, effort and cost:** The doctor is unable to perform more than two operations per day, as his energy will be drained and the quality of his work will decrease, as well as his concentration.

2. Simple explanation of the project:

The Medxact Robotic Arm project is a smart and innovative system based on a robotic arm that can be controlled remotely using a smart glove connected to Wi-Fi, Bluetooth, or the channels of the ESP-32 board.

Project components:

- **Robotic arm:** A 3D printed structure, equipped with servo motors to control movement accurately.
- **Smart glove:** A wearable device equipped with sensors of our own making, such as a flexibility sensor, but more accurate and less expensive, and a gyroscope sensor to capture hand movement from the X-axis and X-axis and send signals to the robotic arm.
- **ESP-32 control unit:** A central processor that manages the communication between the glove and the arm, analyzes data, and records operations to develop artificial intelligence, used in the glove and the robotic arm.
- **ESP-32-CAM Camera:** A processor mounted on a 360-degree swivel to detect all directions and through machine learning, the camera recognizes the images and videos it sees and stores them as well.

Distinctive features of the project:

- Low cost due to replacing expensive materials with our own materials of higher efficiency.
- Full control of finger and arm movement using a remote glove.
- Possibility of recording surgical operations using a moving camera and saving all movements performed by the doctor.
- Small and low-cost design compared to current systems.
- Ease of use and training for new users.

3. Results:

Improving access to robotic surgery: Thanks to the low cost, the system can be used in hospitals with limited resources and rural areas.

Reducing the risk of infection: Remote control reduces the need for direct contact during operations.

Providing effective medical training: The system provides a simulation environment for training new surgeons at a lower cost, improving their skills.

Enhancing the accuracy of surgical operations: Thanks to precise motor control, sensitive surgical operations such as eye surgery and other delicate operations can be performed.

Future development potential: Recording and analyzing data using artificial intelligence will enable the arm to perform surgeries autonomously and with extreme precision after training.

4. Conclusion:

The Medxact Robotic Arm project represents a qualitative leap in the field of robotic surgery, as it combines technological innovation and low cost, making it an ideal solution to current problems in robotic surgery systems. The project is characterized by its ability to expand to include many medical and educational applications, making it a step towards making robotic surgery accessible to everyone.

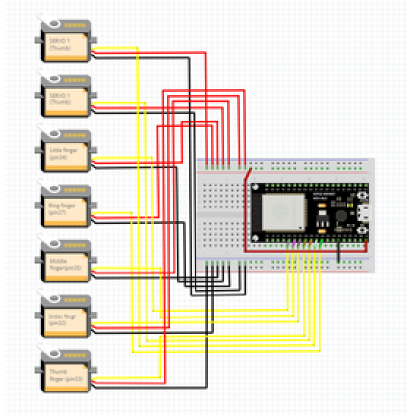

Image (1): connections for the medical arm

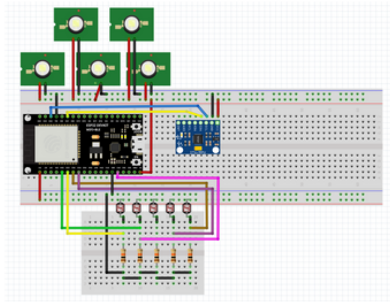

Image (2): Connections for the glove controlling the plant

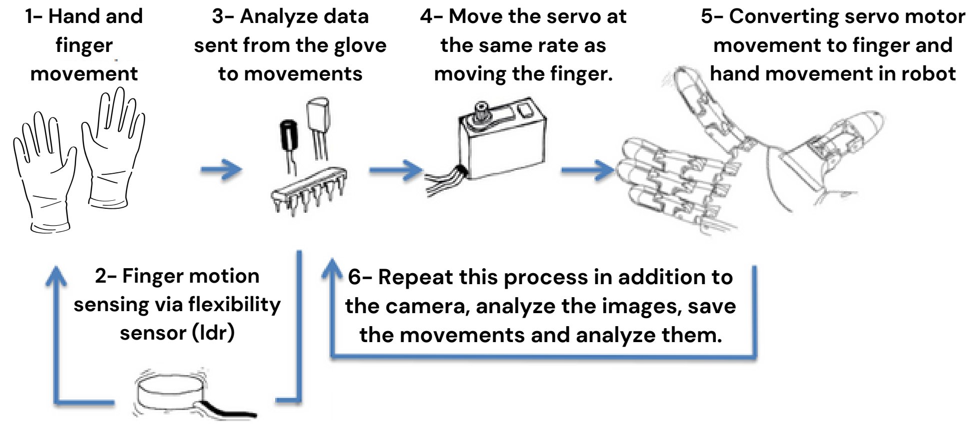

Image (3): The operations that the project performs and how it performs them

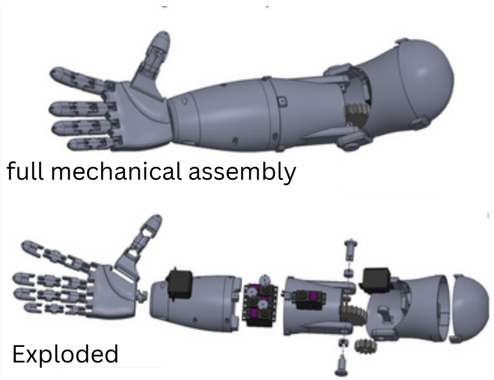

Image (4): 3D design of the medical arm

Image (5): An accuracy and endurance test for the arm in which he succeeded in all of them.