Need statement:

A way to address the positioning of limbs in surgical procedures involved with external limb fixations that can reduce manual adjustment by surgeons or nurses during operations.

Problem:

Some of the re-occurring problems seen during the surgeries were the positioning of the limbs of the patient during localized surgeries such as hip, elbow or knee. During these types of surgeries, it was often seen that nurses or residents had to consistently position and reposition the extremity of the patient. Especially when it came to surgeries involving joints, nurses or residents would often have to adjust the angle of the arms or legs to allow for better access to specific areas within the wound for X-ray imaging. Ligaments and muscles would act as obstacles to the operation procedure if limbs were positioned at a specific angle versus a different angle. During a longer surgical procedure, at times the nurses or residents were seen to have to maintain a certain position of the limb for the surgeon for several hours making it tiring and inconvenient for the staff holding the limb.

MARKET:

There are currently a number of systems out in the market that use hydraulic technology to allow for limb support and positioning during a wide range of surgical procedures. These types of medical devices come as equipments that allow for easy attachment and detachment from various surgical surfaces, while others come permanently attached to surgical tables or chairs. Some of these devices are produced using autoclavable material to maintain a sterile environment for the patients.

Limb positioners that can attach to various surgical tables are found to cost between $2000 - $10,000, while devices that come pre-attached to operating tables can cost anywhere between $5000 - $20,000.

An example of some of the various devices currently available in the market are:

Product	Description	Picture
Schure Loc XPS Surgical Shoulder Positioner – By David Scott	- Does not require any foot pedals, hydraulics or power cords to use and can easily attach to various tables or chairs within the operating room - Maintains steady positioning of limbs throughout the surgical process	

SPIDER2 Limb Positioner – By TENET Medical Engineering	- This particular device allows for repositioning of various hip, knee, shoulder, and elbow related surgeries, and runs on a pneumatic-hydraulic system	
SW-800-0004/0050 Linear Motion Shoulder Arthroscopy Chair/Multi-Axis Arm Positioner with pad – by SW Med-Source	- Motion control by hang push button controller with attachment to operating tables - Can accommodate patients up to 500lbs - Can also secure the patients head and limbs - Tilting and rotation system allowing for access to patients by surgeons from different angles	
TRIMANO support arm – AR-1640 Series – by Arthrex	- Lightweight, attachable device that can be used to hold a patients' arm during arthroscopic or open elbow surgeries - Mechanical adjustment by pressing the handle of the device, release of the handle will automatically lock the arm into the desired position	
Orthopaedic operating table/electro-hydraulic/on casters 601700 series – by Medifa Medical Factory	- Lateral guides that keep legs patients propped up and maintains it at a specific angle throughout the surgery - Permanently attached to surgical table	

At the moment, although there are various types of devices available in the market that allow for easy positioning of the limbs of patients, these systems were not seen at the Montreal General Hospital or Montreal Neurological Institute. This may be due to costs as well as the additional steps required during the preparation of a surgical procedure to attach these mechanisms onto the operating table and to the patient.

In the event that this need is chosen to be the final need that will be focused on in the following semester, there should be a focus on producing designs that will use materials that are sturdy and long-lasting, while being able to have a lowered cost compared to the devices already out in the market. A greater appeal will have to be generated for the new product in order to encourage the incorporation of the new device by surgeons in hospitals. In general terms, the SPIDER2 Limb positioner

Need Criteria:

- **Cheaper than that already exist**
- **Easy to use, requires no particular training to operate devices**
- **Lightweight, easy to manipulate**
- **Able to be sterilized and reused for many years**

References:

https://www.arthrex.com/products/AR-1640
https://www.davidscottco.com/product/schure-loc-xps-surgical-shoulder-positioner-800-0280.html
http://www.swmedsource.com/shoulder_beach%20chair.html
http://www.didage.com/index.php?route=product/product&product_id=3126
http://www.medicalexpo.com/prod/medifa-hesse-gmbh-co-kg/product-69294-472633.html