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# SENSOR SYSTEM FOR ROBOTIC MODULE AT REPOSITION OF FRACTURES

***Abstract.:****The paper deals with reposition of bones when lower and upper extremities are fractured.*
*Owing to the fact that during the repositioning the surgeon s arms are often iradeated,it is necessary to control the robotic module so that position of the structure can be done with the least possible space elimination and in the shortest possible time. These requirements can be secured by the systém,which from the viewpoint of the output functions wil have two hierarchic levels,i.e. sensor systém of phisiological characteristics of a human and sensor systém of a robotic module with the surrounding area.*

## 1.Introduction

At the reposition of the fractured bones both a surgeon and a patient are exposed to X-ray radiation.To eliminate this negative aspect it was necessary to secure a high quality of a reposition in the shortest possible time.For this purpose a robotic system was used which can provide the quality of a reposition and, to fulfil the second part of the requirement , the equivalent sensor system was designed to the robotic reposition.

It concerns a space setting of the required functions by sensors that in a real time monitor the state of robotic modules and a patient in their internal and external structures.

A qualitative and a fast processing of the values reduces the time of the X-ray examination as well as the number of X-ray photographs.The sensor system is based on the hierarchical structure with the prescribed laws on the individual levels. The target function is to carry out a reposition of bones of a high quality by using the mentioned system.

## 2.Robotic Reposition

The on-purpose function of the robotic reposition is to eliminate the reach of a surgeon at the reposition of the fractured bones from the so-called X-ray zone. The reposition unit of a performance comprises two robotic cybernetic modules , a part of which are four drive modules with the elements of artificial intelligence, i.e.

RCM = f/RCMl,RCMr/, then
RCMl=f / D1l,D2l,D3l,D4l,Ssy/, RCMr=fD1r,D2r,D3r,D4r,Ssy/

Fig. 1. Shows the block sheme of the robotic system.

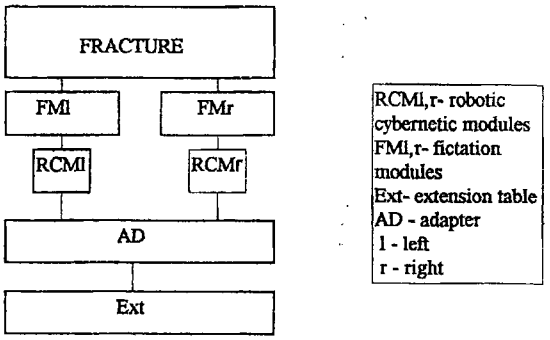


Fig .1.The block sheme of the robotic systém.

The robotic modules create a hardware interface between the fixation modules with the fracture of diaphasal bones and the adapter with the extension table.The function of the robotic module is to arrange the output of the drives D1l-D4l and D1r-D4r so that they satisty the requirements of the corrections, it means that the axes of the broken bones must be identical.
Fig.2. shows the block scheme of the robotic cybernetic module with the structure of a sensor system.

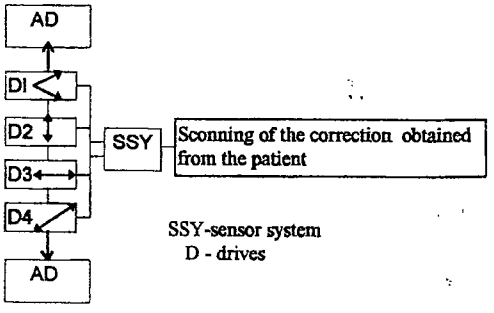


Fig.2.Block scheme of the robotic cybernetic module.

## 3.Sensor System

The aim of the sensor system at the reposition of bones by the help of the robotic modules is to scan a real state in a real time, to find out real corrections and to prepare the signals so that they can be actually processed and evaluated.
As this system is used at the manipulation with a human , it means with his extremity, it is necessary that the sensor system is based on the principles of a hierachical arangement.
Hierarchical level can secure interaction between the robotic system and the considered locality of the patient.
Fig.3. shows the block scheme of the sensor system.

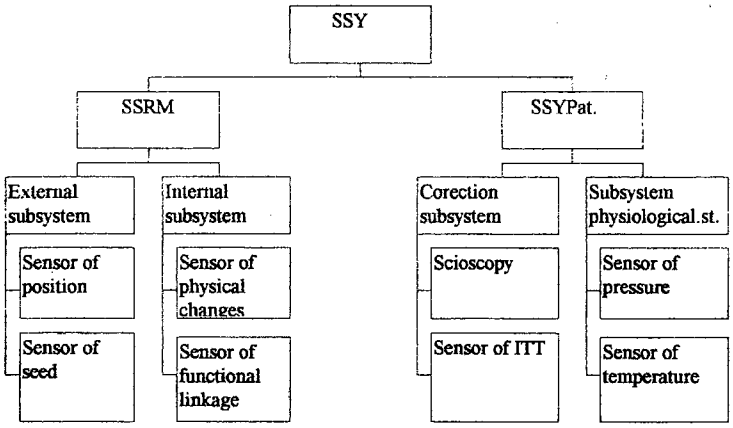


Fig.3. Block scheme of the sensor system.

Hierarchical arrangement of levels goes from the sensor system of a patient to the sensor robotic module. With the subsystems levels, it goes from the subsystem of physiological states, via correction subsystem to the both subsystems of the robotic module.
A strategic role in the above mentioned sensor system is played by the block of sciascopy which scans the created corrections at the fracture in a cooperation with the block for the scanning of the interscial tissue pressure /ITP/ and which, at the same time, signals the condition of the tissue pressure from the viewpoint of the compartment syndrome symptoms.
The other blocks in the given system have commercial functions which are known from other commercial fields.

## 4.Conclusion

The essence of the presented problem is a proper application of a partial by sensing activium from which the sensor system is created.
The role of this sensor system is to secure the correct processing of the infromation, the system is based on the robotic system and its part is a human - a patient that gives the system the interdisciplinary character.
Through the explained structural linkage, the target function was fulfilled - the reduction of the risks at the operations for both a patient and a surgeon in the way that a surgeon does not work in the X-ray zone and a patient undergoes the X-ray examination by means of the correction subsystem.

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## References

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