

## Squid Chair ~I Support Your Arms~

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**Abstract:** Desk workers suffer from a stiff neck. Since the weight of the arm is surprisingly heavy, it is a considerable burden to support with only the shoulder. So we will make armrests that are easy to use even during desk work and can know the current burden of user's shoulder. From the results of the questionnaire it turned out that the easy-to-use armrest means the necessity to be able to match with the height and position of his own arm. Therefore, we devise an armrest with two joints and monitor the state of the user by attaching the sensor to the moving part and the contact part with the arm. This gives the armrest flexibility and allows the user to know the unconscious change of the user while notifying the user of unconscious change. However, there are problems of the present situation that limitation of flexibility of armrest to make durability, and wrong notice contents by individual differences.

### 1. Background and Purpose

Many desk workers are suffering from a stiff neck and shoulder. The cause of stiff neck and shoulder in desk work is that the weight of the arm is supported only by the shoulder and our pose around the neck and shoulder do not change while using the mouse and keyboard. We focused on that the weight of the arm is about 5 kg even for one arm alone. So we reduce the burden on our neck and shoulders by creating what supports weight of arms. There are armrests in products that supports the weight of the arm. But armrests on the chair are fixed. So depending on the height of the desk and the position of the arms, we cannot use it during desk work. Therefore, we create a chair with armrests that can move according to arms during desk work.

### 2. Concept and Idea

The armrests reduce the burden on neck and shoulders greatly. However, there are few people using armrests during desk work. This reason is that there are differences in height

between the desk and armrests. And when we changed the position of the arm, we cannot use it because the mainstream armrest is fixed type. Therefore, we create function that allows you to freely move armrests as the arm moves. In addition, we attached various sensors on the movable parts. Thus, we can check the position of the arm of the user and the load on the armrest, and can grasp the state around the arm of the user. From this information, we create a function to inform the user when taking a different posture for a long time.

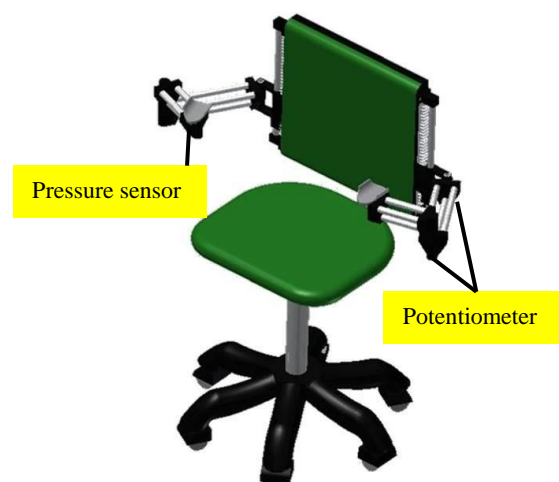


Fig.1 First design.

### 3. Design and Functions



Fig.2 Final design.

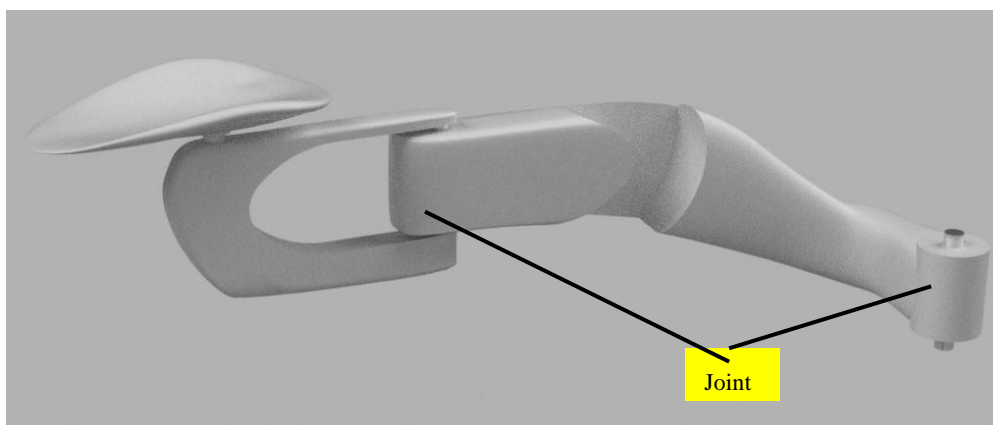


Fig.3 Armrest design.

Squid Chair has the design like a squid in Fig. 2 to express the flexibility of the armrest. There are two important functions of Squid Chair. The first function is the ability to move armrests according to the position of the user's arm. By allowing two joints shown in Fig. 3 to move in a circular shape, it is possible to cover all the range of motion of the user's arm. And, it can move smoothly even at a position close to the body of the user, so that it does not become an obstacle. The

second function is the notification function. This function is only to notify us of keeping posture for a long time and posture different from usual. Maintaining the same posture for a long time will continue to apply the load to the same muscle, so that fatigue is reduced by unfastening or resting the muscle. Also we find a condition that fatigue is hard to accumulate for the user by analyzing data whether the user feels tired or not after desk-work, and notify user when the state becomes unusual condition.

### 4. Problems and Future Work

Squid Chair is still having two problems. The first problem is the shape of armrests due to material hardness. This product should rotate 360 ° on the second joint part because of its characteristics. However, the load of 5 kg of arm weight concentrates on the joint. For this reason, it is now a design that focuses on durability. The second problem is that

the index of data analysis is the subjectivity of the user. Therefore, if you do not continue to use it to a certain extent from the first use, a false notification will occur. It is possible to suppress erroneous notification by inputting the average value at development as the initial value. But it cannot respond to individual differences. Therefore, we need to take measures.