

Development of user interface system using magnetic force by digital fabrication technology

デジタルファブリケーション技術による磁気を用いたユーザーインターフェースシステムの開発

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In this thesis, we describe the user interface with magnetic force. We propose an actuator that driven by magnetic force and a method to optimize the center of gravity's position of the levitated object in the magnetic levitation device. We developed and evaluated that actuator with magnetic force as shape changing interface driven by repulsive force of magnet. The shape changing interface that made by this method is driven by the repulsive force of the electromagnet and the permanent magnet. It is thinner than the conventional ones and can be manufactured in a small size. It consists of 3×3 or 4×4 cells. It is also be able to use for larger applications by combining a plurality of these cells. In this thesis, we evaluate of the hardware performance of the novel shape changing interface and the feedback when the user actually touched it were obtained by experiments. I also developed the center of gravity optimization system to the levitated object for the magnetic levitation device. In the magnetic levitation interface which has been used as a display etc. in the past, it has been used only for those riding on the attached magnets. For this reason, it is difficult to levitate itself the object that the center of gravity position is misaligned or complicated in shape. In this thesis, we made a system to create a model that can be magnetically levitated by center of gravity optimization. We believe that this method can widen the range of utilization of the magnetic levitation interface which has been limited in the usage scene so far. We believe that by utilizing these interfaces based on magnetism, it is possible to expand various interactions and user experiences which could not be realized as it stand.

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