

Abstract

The purpose of this thesis is to develop an application that offers people that have Parkinson's disease the means to utilize the computer, more specifically the means for a pleasant user experience when using the mouse, considering that a mouse or mouse touchpad cannot be used if the hand is shaking or trembling continuously.

The normal mouse will be replaced by the Leap Motion Controller, a 7 centimeters USB peripheral device with three infrared LEDs that read the position of the user's hands and fingers, when they are inside its sight range, returning precise and exact coordinates of the hands and fingers. The decision on whether the person needs stabilization for the cursor will be given by the Fuzzy Logic Control System.

The first aim of this thesis is to develop an algorithm that replaces the cursor in the Linux Operating System, using the Leap Motion device.

The second aim of this thesis is to implement a Fuzzy Logic Controlling System that decides whether a user's hands are trembling like in the Parkinson disease or not.

The third aim is to combine the algorithm used for the Leap Motion device with the output values from the Fuzzy Logic Controlling System, so that it can determine if a user will use a cursor that is stabilized or not.

The beginning of the thesis builds a knowledge basis about Fuzzy Logic and Leap Motion Controller, that will be used to describe and understand the logic behind the algorithms implemented. The first three chapters present the theoretical basis that the application was built on.

The following and most important part of this paper presents, in detail, how the algorithms work, the decisions that had to be made and the steps in order to achieve the stabilization of the cursor. The first chapter describes the engine behind the decision of whether a user is sick of Parkinson's disease or not. The following chapter illustrates how the application makes use of the Leap Motion Controller Python API and how the cursor is replaced and stabilized. This section is entirely original and describes our approach on this matter.

The final part of this thesis presents how a person can use the application, which gestures were chosen to replace the normal mouse, and results, experiments and analysis based on them.

This thesis ends with a few conclusions, that present how and if the application can be useful and a summarization of the main ideas of the thesis.

This work is the result of my own activity. I have neither given nor received unauthorized assistance on this work.

Author

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