# HUMAN INTERFACE DEVICE
# 3D POINTER

Arzu KARATAŞ
Göktürk BİLGETÜRK
Metehan Göksel KURTULAN
Instructor Dr. Faris Serdar TAŞEL

**Çankaya University, Department of Computer Engineering**

## Abstract

The human interaction with the computer created by Human Interface Device (HID): 3D Pointer has become more important with the increasing use of virtual reality. This technology is actively used in the fields of education, industry, health and entertainment and we aim to use it in our project. The aim of this study is to transfer the spatial data in real life to the computer in 3D and visualize it in various fields. As a result, this system should be able to calculate the data quickly and accurately in accordance. Human Interface Device is a system that calculates the position data obtained with ultrasonic sensors using Arduino and visualizes them in 3D as a result of C#. The purpose of this project is to transfer the spatial data without using any receiver in general and to perform various studies on the transmitted data.

**Key words:** Arduino, C#, Trilateration, 3D Posiotining, Visualization

## Introduction

The human interface device provides users with a virtual motion experience without the need for any tools. This system allows any object to move simultaneously with the virtual object on the screen. The main objective is to create a system that can be developed, adapted, dimensioned and portable and at the same time affordable.

## Solution

The system consists of two main components and each component has its own subsystem. It consists of two main parts: real object and virtual view. The basic system is formed by positioning 3 ultrasonic sound sensors in different planes. The position data obtained by 3 sensors are calculated in Arduino using Trilateration method. In simple terms, trilateration is a mathematical technique in which a point in space is calculated using the distances from such a point. The only point calculated by this method is transferred to Visual Studio and visualized with C #. It allows users to move any object in the field and move the object on the screen in a virtual environment. The object played in the cube-shaped area is also visualized in the dimensioned cube on the screen.

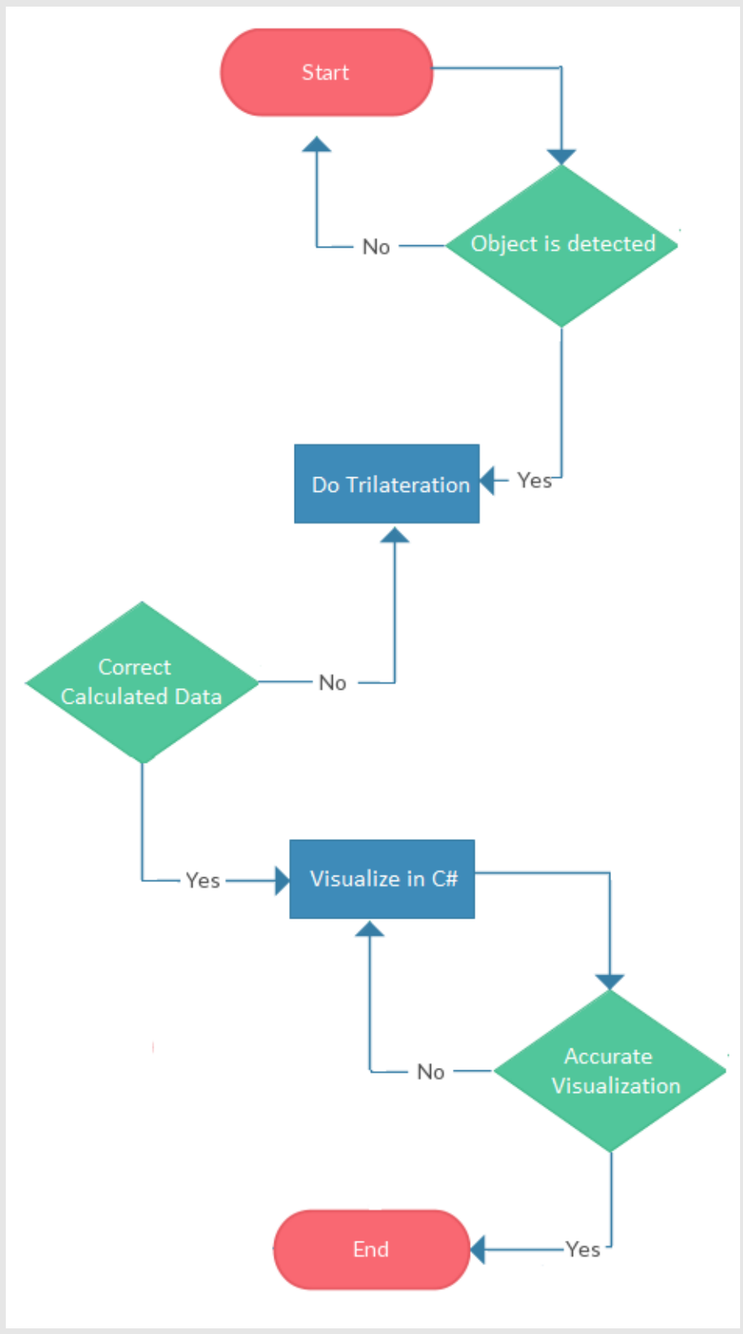


**Figure 1 - Flowchart**

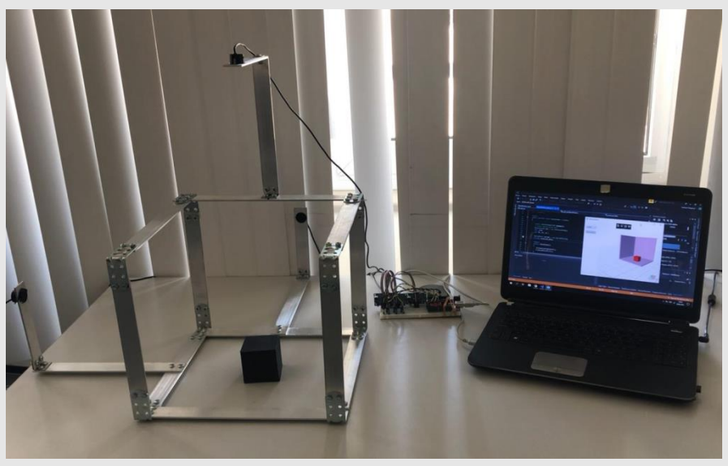

**Figure 2 – Finished Product**

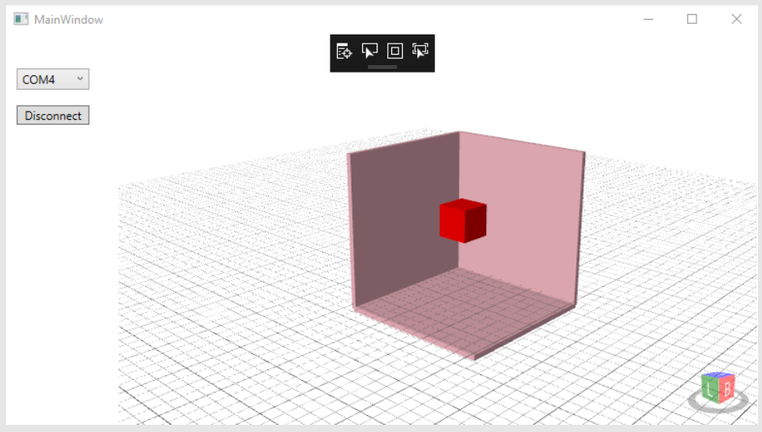


**Figure 3 – Finished Product**

## Results & Conclusion

In this project, we have aimed to teach a variety of research techniques and conducted 3D research and tried to show their implementation. We thought it was convenient to use ultrasonic sound sensors to calculate the location. As a result of this, we created “Human Interface Device: 3D Pointer”. We planned to use the minimum number of sensors with the correct sensor positioning. Trilateration Methodology is the most suitable algorithm for calculating the intersection of positioning from different dimensions. In simple terms, trilateration is a mathematical technique in which a point is calculated.

As a result of our research, it is our goal to create a system that aims to inform about positioning techniques and working principles. This system will be developed in the future. Precise and most sensitive measurements can be achieved.

## Acknowledgement

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**Figure 4 – Team Members**