The Smart Object
User Manual

Anna Maria Janaszkiewicz, 1111368@isep.ipp.pt
Hannes Harms, 1111817@isep.ipp.pt
Jana Valauskaité, 1111819@isep.ipp.pt
Toomas Juht, 1111825@isep.ipp.pt

Contents

Glossary

Arduino is a microprocessor that is commonly used for prototyping or for educational purposes.

CAD-Programm computer-aided design -program , is a computer program that is used for 3D modelling.

IMU Inertial measurement unit, the sensor that measures movement using accelerometer and gyroscope.

Java object-oriented programming language, that we used on the PC for 3D modelling and a Bluetooth connection to the SO.

Logical Level Converter steps up the 3.3 V level of the I^2C interface from the IMU to a 5V level.

1 The Device

The Smart Object is a device that can be used for manipulating objects on a computer screen. There are three degrees of movement freedom (x, y, z) and three degrees of freedom to rotate around all of these axes. The Smart Object is an ideal device for moving and rotating objects in CAD programs.

The Smart Object (SO) is a device developed for professional level CAD (Computer Aided Design) program users. The task the Smart Object fills is rotating, zooming and . . . . When the user wants to rotate the object on the computer screen you simply have to rotate the object in his/her hand in the desired direction. The device is designed to be used by left and right handed people.

1.1 Usage

When turning ON the SO the user should wait 5 seconds before picking up the device from a table surface. In this time the software compensates the offset of the IMU measurements. To get a good result the IMU has to be in place.

There are two command modes: "Camera mode" and "Object mode" Default mode is the "Object mode". When the program starts the user can turn the object in all degrees.

To enter to the "Camera mode" the user has to shake the object once and then only the camera is turned around the object. The camera moves only on the horizontal axis. To return to the "Object mode" the user has to shake it one more time.
(picture where SO is hold in users hand)
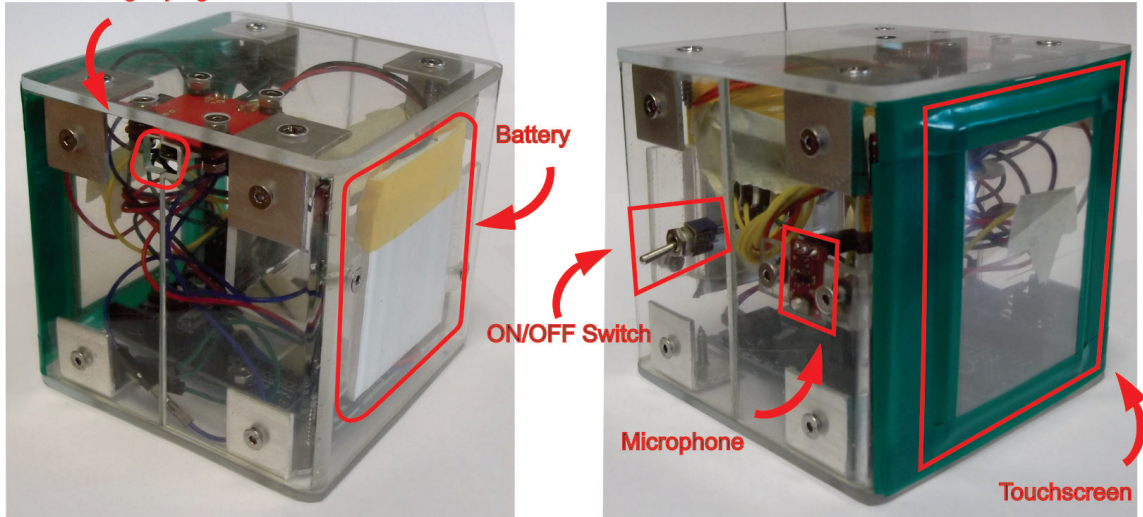
1.2 Control/Sensor elements

The movement is controlled by the movement of the users hand that is holding the device. The control elements are shown on the next picture.

1.2.1 IMU

The IMU is the most important sensor element. It registers all the movements and sends them to the program that translates the IMU data to the movement you can see on the computer screen.

1.2.2 Touchscreen

The touchscreen works only when the surface of the sensor is touched. It allows the user to zoom in and out just by a movement of a finger.

1.2.3 Microphone

The microphone is used to register voice commands.

1.2.4 ON/OFF switch

This switch enables to turn the Smart Object on and off. It has two positions ON position and OFF position.

1.2.5 Battery and charging

The SO has a built in rechargeable LiPo battery. The battery is charged by using a USB-cable and your computer.

Over time the battery loses its properties and the user has to recharge it more often.

1.3 Software

The software consists of a executable .jar file. If your computer can run Java applications, you can start the software by double clicking on the .jar.

The software is downloadable from a web-link: `http://dl.dropbox.com/u/47213371/SmartObject.jar`

1.3.1 Installation

The Installation is very easy and consist of only two steps: 1. create a Bluetooth connection from your computer to the Smart Object. The security code has to be

12345

. 2. make sure your system can run Java applications. If not please install Java.

2 Troubleshooting

If you have problems with the device, please, read these hints.

Problem	Solution
No movement of objects in applications.	Make sure the device is turned ON (the ON/OFF switch is in ON position). Make sure that the Bluetooth connection is turned ON in your computer.
How i know if the battery is empty.	When you turn ON the device the light on Arduino board lights up. If it lights up then the battery has power.
Software is running, still no movement of objects.	Turn OFF the Smart Object and turn it ON again. Wait a few seconds and restart the software again.
The application freezes and I can not see movement	Switch Off/On the Smart Object and restart the software

3 Technical data

Dimensions (width, depth, height):	198 mm, 198 mm, 198 mm
Weight:	845 g
Power source:	Battery, charged by PC via USB cable
Connection interface:	Bluetooth
Battery:	3.7V
Sensors:	IMU, Touch screen, Microphone
Ambient temperature range:	15 °C - 40 °C

3.1 System requirements

Hardware:

- PC with x86 CPU
- 1 GHz clock rate
- 512 MB RAM
- 100 MB free hard disk memory
- Screen resolution >= 1024 x 768 Pixel (for the SpaceController Panel)
- Bluetooth

Operating system:

- Windows XP 32 Bit
- Windows XP 64 Bit
- Windows Vista 32 Bit
- Windows Vista 64 Bit
- Windows 7 32 Bit
- Windows 7 64 Bit
- Linux

Software:

- Java

3.2 Known Bugs

Object moves on the computer screen when the SO is idle.

3.3 Trademarks

Arduino, JAVA,