

User's manual

# Field Of Judgement

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## About Field of Judgement application

*Or why did I write this game? ☺*

**Field of Judgement is an open source two-player 3D shooter game that uses Kinect-based interface.**

**This application demonstrates how to use Gesture Description Language (GDL) library in the role of natural user interface for computer games. The demonstration of GDL application was my initial and basic goal I wanted to obtain.**

Field of Judgement (FoJ) is not intended to be a commercial product but a “working tutorial” for game developers. I know that computer graphic of FoJ is far from being perfect but in my opinion it is good enough to not spoil the game.

I have written over 340k of code for free to demonstrate to you how to build Kinect-based games so do not forget that origin of this software must not be misrepresented; you must not claim that you wrote the original software. If you use this software in a product, an acknowledgment in the product documentation would be appreciated. Also remember **that only the source code is under MIT license. All dlls are under licenses provided by theirs copyright holders.** Long story short: GDL library license in this software is for scientific/educational purpose only. It cannot be used commercially. If the GDL is used in other software (non-commercial) products, installations or for research, it must always be cited as "GDL" and a following statement has to be given:

**This product includes software developed by the Tomasz Hachaj and Marek R. Ogiela for use in the Gesture Description Language (GDL) classifier (<http://www.cci.up.krakow.pl/gdl/>). The software is based of scientific paper:**

**Tomasz Hachaj, Marek R. Ogiela, Rule-based approach to recognizing human body poses and gestures in real time, Multimedia Systems, February 2014, Volume 20, Issue 1, pp 81-99, (DOI) 10.1007/s00530-013-0332-2**

This form of citation does not require any permission.

This software has been tested by many our students but IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES etc.

If you have some questions about Field of Judgement, GDL methodology, licensing, scientific and commercial cooperation etc. feel free to contact my e-mail address [tomekhachaj@o2.pl](mailto:tomekhachaj@o2.pl).

Good luck and have fun! ☺

Tomasz Hachaj

e-mail: [tomekhachaj@o2.pl](mailto:tomekhachaj@o2.pl)

www: <http://www.cci.up.krakow.pl/>

GDL www: <http://www.cci.up.krakow.pl/gdl/>

# Field Of Judgement

## Requirements

*Or what do you need to start playing / developing?*

### Hardware:

- Kinect for Xbox 360 and Kinect for Windows (runs also without Kinect for developing reasons, however it makes no sense while playing ;-)).
- Windows 7 or 8 (Tested on Windows 7 Home Premium and Windows 8)
- Tested on:
  - o PC computer Intel i7-4470 CPU 3.40 GHz, 8 GB Ram, NVIDIA GeForce GTX 770 running Windows 7 Home Premium 64 Bit (game settings: 120 blocks)
  - o PC computer Intel Core i5-2320 CPU 3.00GHz, 8 GB RAM, AMD Radeon HD 6570 graphic card, running Windows 7 Home Premium 64 Bit (game settings: 20 blocks)
  - o Laptop Windows 7 Professional, AMD A6-3400 CPU, 4 GB RAM, Radeon HD Graphics 1.40 GHz (game settings: 10 blocks)

### Software:

- Kinect SDK 1.8 (for developers) or Kinect for Windows Runtime v1.8
- .Net Framework 4.0
- Visual Studio 2010 (for developers)

## Features of this game

*Or why this game is so splendid? ;-)*

- Fully functional two – players' 3D shooter game.
- Full body gesture based interface with GDL library and MS Kinect controller.
- GDL recognize walking and running (forward and backward), rotation, jumping, casting fireball, magic missile and force field. Of course GDL might be configure to recognize many more gestures ☺
- Graphic done with OpenTK (managed C# wrapper for OpenGL).
- Basic skeleton animation, mapping of Kinect SDK joints to CG model's joints.
- Rigid body collisions with Jitter Physics engine.
- OpenAL sound effects.
- Beautiful and epic music composed and performed entirely by me ☺
- Gore death effects ;- ) (can be switched off while plying with children).

## Gameplay

Or how to play?

I strongly recommend to watch the video that demonstrates the gameplay and controlling gestures [https://www.youtube.com/watch?v=RBA\\_BbcYQz8](https://www.youtube.com/watch?v=RBA_BbcYQz8)

...and the gameplay video <https://www.youtube.com/watch?v=pv0rjh9SnHg>

## Goal of the game

Frag your enemy as many times as you can 😊

## MS Kinect connectivity

Before you start the game you have to install either Kinect SDK 1.8 (for developers) or Kinect for Windows Runtime v1.8. Without these drivers the game will not start or crash after first screen. If you do not know how to connect Kinect to PC, ask your parents ;-).

After installing Kinect's drivers you can run game either with Kinect or without it. In first situation you can just keyboard and movements commands. In second you can only use keyboard. The second option is rather for developing purposes.

## Starting and calibrating

To start a game you have to run **Field of Judgement.exe**. In the start screen click space to start a game or escape to exit. During game you can click escape to return to start screen.

Before game calibration the FoJ might run slowly. That is because there are too many boxes (rigid bodies) inside the game. The physics engine runs on CPU and is hardly scalable. To calibrate your game (automatically change estimates number of boxes) you might run **Run calibration.bat** script either / or change number of boxes manually in configuration file.

## Configuration file (conf.xml)

Configuration file has following structure:

```
<?xml version="1.0" encoding="utf-8"?>

<GameConf xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <IsGoreEffects>true</IsGoreEffects>

  <MaxBoxCount>120</MaxBoxCount>

  <IsFullScreen>true</IsFullScreen>

  <IsVerticalSplit>true</IsVerticalSplit>

  <IsAudioEnabled>true</IsAudioEnabled>

</GameConf>
```

`IsGoreEffects` turns on / off death animation.

`MaxBoxCount` changes maximal number of boxes that are rendered in game. Each time you start the game the terrain is randomly generated.

`IsFullScreen` enables or disables full screen mode.

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IsVerticalSplit changes screen split mode from vertical to horizontal.

IsAudioEnabled turns effects and music on or off.

## Interface

In the picture below there is a screen capture during gameplay.



The screen is split vertically. Left part of the screen is a field of view of player 1. Right part is a field of view of player 2. In top left corner of each screen there are player's statistics. In bottom right part is a depth view of Kinect sensor with a segmented player. In this case there is only one player. From obvious reasons same player is not used to steer both entities in the same time. If there is only one player he or she always steer left player. If there are two players (maximal number of players) the player who is on the left steer left player and player who is on the right steer right player. After being hit the screen of the player becomes temporarily red.

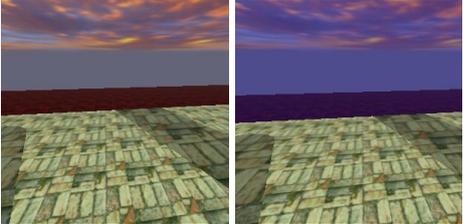
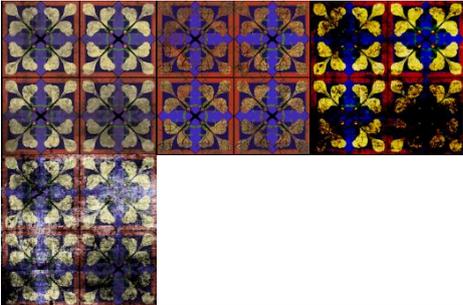
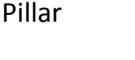
In FoJ there is keyboard and Kinect based interface. Not all commands are available from keyboard.

Command	Player 1 keyboard	Player 2 keyboard	Gestures
Forward, backward, left, right	arrows	W, S, A, D	Walk in place, walk in place with left hand over head, turn shoulders left, turn shoulders right
Run forward, run backward	-	-	Run in place, run in place with left hand over head

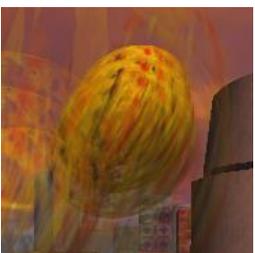
Cast fireball	Ctrl	Space	Straighten the right arm at the elbow in front of the body
Cast magic missile	-	-	Straighten the right and left arm at the elbow in front of the body
Force field	-	-	Clap hands over head
Jump	X	Z	Jump

## Objects in game

There are several objects in game that important to gameplay. Static objects do not bounce after hitting by another rigid body. The heavier the object is the more impact it has while colliding. All objects are permanent beside those that last X seconds. Restitution parameter measure how much additional force is donated to the bodies after collision.

Object name and picture	Description
Brick wall 	Mass coefficient 25, no restitution.
Death body fragment 	Mass coefficient 25, no restitution, last for 10 seconds.
Field border 	Permanent part of the map which surrounds FoJ from four sides. When an object touches field border it glows in blue. Static object, restitution coefficient 3.
Ground (Field of Judgement ) 	Permanent part of the map on which lie other rigid bodies. Static object, no restitution.
Wall with medieval pattern 	Mass coefficient 10, no restitution.
Pillar 	Mass coefficient 40, no restitution, has cylindrical shape.

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<p>Reflecting orb</p> 	<p>Static object, restitution coefficient 5.</p>
<p>Stone wall</p> 	<p>Mass coefficient 100, no restitution.</p>
<p>Wooden crate</p> 	<p>Mass coefficient 1, no restitution.</p>
<p>Player</p> 	<p>Each second a player regenerates 1 mana point.          Each three seconds a player regenerates 1 health point.          A player cannot have more than 100 points of mana and health. If health of player falls below 1 he / she dies and is respawned in random position of FoJ. If player was killed by an opponent an opponent gains 1 frag. If a player was killed by his / her own spell he / she loose one frag.</p>
<p>Fireball</p> 	<p>Mass coefficient 50, no restitution, lasts 5 seconds, mana cost 4, bounces off the walls and ground, disappear after hitting field border, after hitting player and after linear velocity drops below threshold. Deals 50 damage, it can also damage its caster.</p>
<p>Force field</p> 	<p>Static object that is generated around player who cast it. Player cannot move while the field is active. Non-static objects bounces off the force field (the player is invulnerable). Last 5 seconds, mana cost 10, disappear after hitting field border. Deals 99 damage, it cannot damage its caster. It is possible to cast force field in the air (why jumping). In that situation player fall on the ground after spell ended.</p>
<p>Magic Missile</p>	<p>Mass coefficient 0.1, no restitution, last 5 seconds,</p>



mana cost 5, bounces off the walls, disappear after hitting field border, ground, after hitting player and after linear velocity drops below threshold. Each missile deals 15 damages. After casting spell 10 magic missile are generated that travels in randomized directions, it cannot damage its caster.

## Troubleshooting and good advices

*Or what to do if something is going wrong with a game...*

1. If a game runs to slow see sections *Starting and calibrating* and *Configuration file (conf.xml)*.
2. It is possible that you become blocked when you stand on the top of the block. You will not be able to move or you will be moving very slowly. If this situation happen use force field to push back bricks around you.
3. If you cannot pass near a box use a spell to push it back. Force field ALWAYS pushes back other boxes besides reflecting orb, field border and JoS itself.
4. If you cannot find your opponent look for his / her aura in the sky.
5. Do not cast force field near the field border. If you do so and its radius collides with field border the spell end immediately.
6. It is possible that after several successful games your Kinect controller stops connecting to the game. This situation happens on some PCs and this is a driver error (as a matter of fact I do not know why it happens ;-). If this situation happened to you plug off Kinect from USB and after several seconds plug it in again. It works for me ;-)
7. It is possible that a player jumps over a body with nonzero restitution (for example reflecting orb) continuously gaining kinematic energy and he or she do not know how to stop (yes, it is frustrating). To stop it a player should start walking while he or she is in the air.

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## Game credits

Copyright (C) 2014 Tomasz Hachaj

Game design: Tomasz Hachaj

Programming: Tomasz Hachaj

Textures:

Tomasz Hachaj

Christopher S. Redmond, [redwolf518stock.deviantart.com](http://redwolf518stock.deviantart.com), [csredmond518@gmail.com](mailto:csredmond518@gmail.com)

<http://mertol.deviantart.com/gallery/>

<http://dactilardesign.deviantart.com/>

Music: Tomasz Hachaj

Sound effects:

<http://free-loops.com/>

<http://www.flashkit.com/>

<http://rpg2000.4players.de>

Fonts: FontMesa

Contact: [tomekhachaj@o2.pl](mailto:tomekhachaj@o2.pl)

Game uses: Gesture Description Language, Jitter Physics, SimplexNoise for C# and Open Toolkit library under licenses provided by theirs copyright holders.

## References

1. Codeplex site of JoS <https://foj.codeplex.com/>
2. Official website of The Laboratory of Cryptography and Cognitive Informatics where I works <http://www.cci.up.krakow.pl/>
3. Official website of Gesture Description Language technology (GDL) – there are always freshest news about yours favorite classifier! <http://www.cci.up.krakow.pl/gdl/>

## License for the source code

Field Of Judgement, Copyright (C) 2014 Tomasz Hachaj, Ph.D

The source code is under MIT license.

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## Other licenses

For other licenses see *Licenses* folder in game catalog.

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