


# Potential of the ARToolKit for Use in Industrial AR Applications



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# What's ARToolKit?



⌘ Library for AR applications based on square marker tracking

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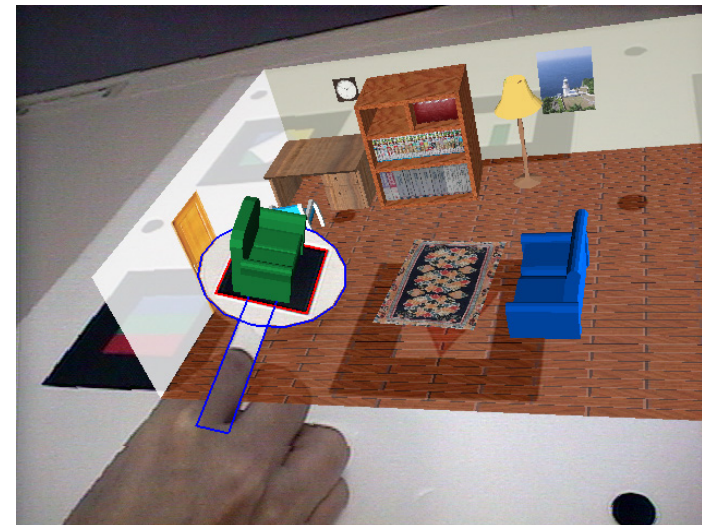
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- ⌘ What can we make with ARToolkit?

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  - ☑ Indoor AR System



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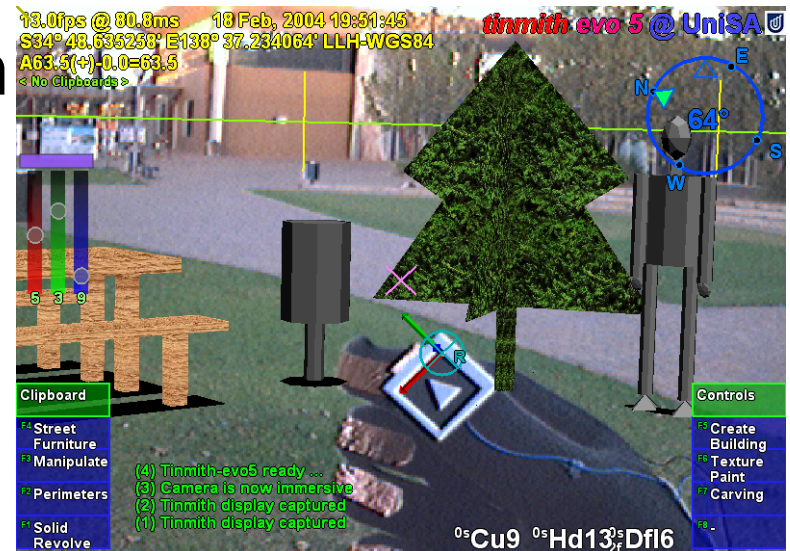
⌘ Library for AR applications based on square marker tracking

⌘ What can we make with ARToolKit?

☑ Table-top AR System

☑ Indoor AR System

☑ Mobile AR Interface



With permission from Wayne Piekarski,  
University of South Australia

# History



1998: Optical See-Through HMD Calibration Method using vision based marker tracking in Univ. of Washington

1999: First version of ARToolKit for ShardSpace Demo @ Siggraph in Hiroshima City University

2000: Linux and Windows version

2004: ARToolKit website on sourceforge.net

Currently

- ☒ Open source: Ver.2.71.1

- ☒ Commercial version by ARToolWorks: Ver.4.

# Why did I develop ARToolKit?



- ⌘ AR Research Purpose
- ⌘ Help to make a prototype of AR system
- ⌘ Target user: AR (CG, 3D-UI) Researchers

Currently, ARToolKit is used by many kinds of users.

But small number of developers for industrial applications



# Problems of ARToolKit



## ⌘ Documentations

- ☒ Please look at the source code.
- ☒ But source does not have any comments.

## ⌘ API design of libraries

- ☒ Use of many critical global variables

## ⌘ Usability of utility software

- ☒ Camera calibration is not easy.

## ⌘ Version management

- ☒ No change logs

# Advantages of ARToolKit



(1) Simple prototypes can be made without big efforts.

☑ ARToolKit provides video input and Graphics library as well as tracking library.

☒ Video handling is not so easy.

☑ ARToolKit can work without camera calibration.

☒ It is not pose/position measurement, but registration.

(2) Light-weight processing

☑ Tracking works 30fps@640x480 by Pentium III 600MHz.

☑ Applications want to use CPU resource for the main purpose.

# Advantages of ARToolKit



## (3) Cheap system

- ☒ Applications can be made by only a camera without any other sensors.
- ☒ Making markers is very easy.

## (4) Many platforms

- ☒ Irix, Linux, Windows, MacOS
- ☒ PDA, MobilePhone

# Industrial applications with ARToolkit

⌘ Nothing in Japan

⌘ Many companies have tried to use ARToolkit, but have not made decision to use ARToolkit/AR.

☑ Does not like black squares

☑ No space to put the enough size/number of markers

☑ Negative effects by wearing HMDs

☑ Cheap for single user, but expensive for 100 users

# Practical applications with ARToolkit

## ⌘ Display systems for museum exhibition

- ☑ Ars Electronica Center: Gulliver's Box/World
- ☑ Singapore Science Center
- ☑ NHK Studio Park
- ☑ Seattle Art Museum



Gulliver's World, Ars Electronica Center

# Practical applications with ARToolKit



## ⌘ Entertainment

☑ NTT - Mobilephone

## ⌘ Education

☑ 3DCG learning by using ARToolKit libraries

# For practical industrial applications

- ⌘ Interactive system by monitor-based AR
  - ☑ Integration with HD visual system
- ⌘ New types of display technology
  - ☑ Mobilephone, PDA, Film display,
  - ☑ Super light-weight HMD with super wide FOV
- ⌘ Collaborative Design System
  - ☑ Integration to existing CAD system

ARToolKit itself is an old technology. So it should be replaced by other new technologies developed by myself or other people.

**Thank you**