

出國報告（出國類別：會議論文發表）

第四屆遊戲與軟工研討會暨第三十七屆
ACM/IEEE 軟體工程大會出國報告書

The Fourth International Workshop on Games and Software
Engineering and The ACM/IEEE 37th International Conference on
Software Engineering

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出國期間：May 12- 23
報告日期：August 12

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第四屆遊戲與軟工研討會暨第三十七屆 ACM/IEEE 軟體工程大會出國報告書

摘要

This report summarizes my feedbacks on attending the 37th International Conference on Software Engineering, 2015, hosted by ACM Sigsoft and IEEE computer society. ICSE is well recognized as the premier conference in software engineering. This year, the conference has more than one thousand attendees, many top scholars from all over the world, featured with excellent keynote speaks and various workshops that are related with state-of-the-art issues in software engineering. Our paper was presented in the conjunctive workshop on games and software engineering that is hosted by Prof. Judith Bishop who is the leader of the software engineering group in Microsoft research.

這份報告總結了本人參加第 37 屆國際軟體工程大會的目的，過程與心得建議。本會議由 ACM Sigsoft 和 IEEE 計算機學會主辦。ICSE 被公認為軟體工程中最重要會議。今年，大會有一千多個與會者涵蓋來自世界各地的眾多頂尖學者。我們的論文發表於主會之前的遊戲和軟體工程研討會。該研討會今年是由微軟研究院的軟體工程團隊的研究員主辦，由 Prof. Judith Bishop 主持。

本次發表的研究名為「空間連結」，是實現線上即時跨平台的 3D 體感技術。

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第四屆遊戲與軟工研討會暨第三十七屆 ACM/IEEE 軟體工程大會出國報告書

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1. 目的

The objective of this trip is to give the oral presentation of our recent work on web-based 3D gaming and service development. This is a joint work with two of my under graduate students JunHan Lin and PeiYu Sun. The paper presents an interoperability infrastructure for creating 3D applications using 3D motion sensor data within Web browsers. The approach uses a network protocol called SOX to connect web applications with a 3D motion sensor via an OpenNI 2 style interface. The use of SOX is justified by the need to send data in binary format to prevent large amounts of data expansion that occurs when using JSON. A table tennis game and a rehabilitation game are created as proofs of concept of the technique. Reviewers comment that overall the technique appears novel and technically sound. It is impressive that motion sensors from different vendors are seamlessly connected via this technology.

本行的目的主要是發表本實驗室最近在遊戲軟體工程的研究成果「空間連結」。Space Connection 是一個線上即時跨平台的 3D 體感技術，用戶只需透過動作偵測相機搭配不同作業系統終端機(EX: Mac, Windows or Linux)，並開啓瀏覽器即可進行 3D 線上體感互動，如此一來，開發者和使用者不僅無需另外添購體感主機(Ex: Xbox)，更無需擔心作業系統或體感照相機廠牌異同即可進行線上體感互動。Space Connection 的應用範圍廣泛，在醫療上，輕度中風病患可以透過此技術設計之醫療遊戲進行在家復健，療程中，病患可與復健師進行瀏覽器中體感互動，且病患復健骨架等資料可通過此技術即時呈現在醫師端以作為醫生診斷之參考，另外在娛樂方面，可開發例如體感桌球，排球，棒球等多人及時體感遊戲，讓多方玩家在瀏覽器上也能享受彼此即時互動體感的快感。

2. 過程

Due to the limitation of available flights, we have to arrive Venice first and then take train to Florence. Before the main conference of ICSE, we attend and give our talk in the pre conference workshop GAS that has special focus on games and software engineering. Dr. Judith Bishop and Dr. Nikolai Tillmann introduce the history of GAS, which is dedicated to the gaming field in software engineering. Dr. Tom Zimmermann, who won the best paper award in FSE, gave the keynote speak on empirical software engineering. He showed several BING data collected by Microsoft research and how social network trends change from empirical statistics. He also talked about diversity: prediction, surveys, clustering and how to build tools for frequent questions and use data scientists for long questions. In the social network, this is more related to people including decider, brain, innovator, researcher and sharing such as insights, models, and methods. Several statistics methods have been investigated including liker distributions, effect size, p-values. Several issues on games are also discussed with respect to Xbox Live, Gameplay, Engineering, Exploratory. The new game Halo Reach with telegraphs achieves players of 300 millions within 7 months. The key to success is the first hour experience: how the initial play can engage players. It's a pretty catastrophic play for the first hour drop. Prof. Zimmermann emphasized the issue with Grounded Theory, Expectations, Experiences, Exceptions, Outcome and Anticipated elements. All of them are needed to be taken care as a good game mechanic to keep players playing.

Prof. Xie Tao from UIUC gave the first talk on software analytics. More details could be found in his recent publication “software analytics in practice,” in IEEE software 30(5), 2013. Another talk is about game development in Tom’s Cowboys paper, where they use what they perceive in games as an Agile process to develop the game environment. This is unlike to non-game developers. Prof. Jim Whitead from UC Irvine has collaborated with Prof. Judith Bishop in developing formal methods in games where they found ways that non-computer experts can play games well. Joanthan and McGill present their work in a game genera agnostic framework for game design. The key idea is on visualization multiple paths with AI that is tailored for game genres. Another talk is on software architecture for games. It uses architecture analysis with MVC, applied to several diverse games for further process including realistic refactoring, quality ranking and they also look at the code to top level responsibilities. The following talk is about game builders for non programmers with their new construction tool: PhyDSL. It provides code generation environments to ease the process of developers’ guide, design, and mentor of the development. The drawback is about domain specific languages. Executable artifacts need to be compiled but there exists semantic gap between artifacts and the design. They develop a texture model for gameplay definition and an engine that takes gameplay specifications to transfer to android applications. One key idea is using event-condition-action rules on layout, dynamics, scoring, and controls, where most tablet based games can support the assessment.

Another paper in the session is about visualizing loops and data structures using crowd sourced formal verification: Xylem for finding loop invariants. The key is automated invariant finding for a game to find loop invariants and to provide values of variables inside a loop. The work involves static value analysis, symbolic executions, constraint solving, and patterns learning. The work can be further extended to design inspiration with multiple iterations of loops and loop induction. Through peer observations while navigating the constraints, it provides a visual metaphor that helps players see patterns. Integer problems. Plants for the set of values. The tool has also put online www.verigames.com. It has been said “vision is hard.” I believe that this would continue a hot research trend in game development.

ICSE has many interesting sessions and keynote speaks. In mobile applications, there is a paper on constant propagation for COAL, where the authors specify composite component communications with IC3 that facilitates an inter communication analysis in android mobile applications with COAL. It would be interesting to extend the work to integrate string analysis to generate a flow graph of constraints and then to derive regular expressions on string operations. The IC3 together with Epicc can be used for computing intents with message passing matching. Another tool IccTA can be used for detecting privacy leaks of inter components. Finally, it is possible the tool be extended to use android intents: using the solvers to get the actual values. Another paper is from Ohio State University talking about static control flow analysis of user-driven callbacks in android applications. User-driven control flow analysis is using call backs to find such all possible sequences of such call backs. According to GUI changes such as onCreate, EventHandler, AlertDialog to find ordering constraints, the authors build callback control flow graphs with static analysis using context-sensitive inter procedure analysis of callbacks. They have developed a set of tools as the Gator analysis toolkit. The toolset is available at <http://web.cse.ohio-state.edu/presto/software/gator>. They showed precision with context sensitive analysis (out-degree edges decreases) and a GUI Model where nodes are windows and edges are transitions. Finally, there are several interesting POSTERs. One interesting work is to include meta data for JavaScript instrumentations.

由於飛機航班的限制，我們先抵達威尼斯然後再轉火車到佛羅倫薩出席會議。GAS 研討會是由 Judith 博士主持。Tillmann 博士首先開場，介紹遊戲領域的軟體工程的歷史。Tom Zimmermann 博士（曾在 FSE 獲得了最佳論文獎）介紹了軟體工程在微軟最近的應用。他展示微軟的研究和網絡發展趨勢的實證統計數據，並透過 BING 數據顯示社會如何改變搜尋習慣。他還談到多樣性在決策科學的重要，並透過預測，調查，集群來構建數據科學的工具。另外也針對涉及到 Xbox Live 遊戲的幾個問題進行遊戲工程的探索性討論：如全新的遊戲「光暈河段」是如何在 7 個月達到 300 百萬的會員。其成功的關鍵是第一個小時的經歷：最初的體驗顯著的影響參與的玩家。

謝韜教授介紹他最近出版在 IEEE 軟體雜誌的研究成果「在實踐中的軟體工程分析」。另一個演講是關於敏捷式開發。來自加州大學歐文分校的 Jim Whitehead 教授開發形式化方法在遊戲中的應用，他們探討如何讓電腦非專業人士也可以參與遊戲。Jonathan 提出專為遊戲類型的 AI 可視化的多條路徑研究。另一篇是對遊戲軟體結構的研究。它採用結構分析與 MVC 模型，適用於現實的重構與品質排名。接下來的演講是提供遊戲製造商的構造工具：PhyDSL。它提供了代碼生成環境，能加速軟體開發的過程。

在會議上另一篇文章是關於使用可視化人群來源的形式驗證循環和數據結構：它提供了一個視覺隱喻，可以幫助玩家看到模式。該工具還放到網上 www.verigames.com。

ICSE 另有許多有趣的會議分軌與主要演講。在行動應用的分軌會議中，作者把過去定數擴散的方式與 IC3 結合，分析行動應用程式。一個可能的擴充是字串分析，透過產生制約的工作流程圖，得出的字串操作後的正則表達式來分析所有可能在動態行為中所產生的字串。IC3 與 Epicc 結合也可用於計算可傳遞訊息。另一個工具 IccTA 可用於檢測物件可能的隱私洩漏。另一篇是來自俄亥俄州立大學的研究，在談論 Android 應用程序用戶驅動的回調靜態控制流分析。用戶驅動的控制流分析是利用反轉工程發現這種回調所有可能的序列。根據 GUI 介面的變化找到順序約束，作者建立回撥控制流圖。技術上使用回調的上下文敏感的跨程序分析與靜態分析。他們已經開發出 Gator 分析工具包：web.cse.ohio-state.edu/presto/software/gator。初期實驗表現出精確的對上下文敏感的分析 and 圖形的界面模型。最後，也有一些有趣的海報論文。其中一個有趣的研究是實現涵蓋進階資訊的 Javascript 的程式碼。

會議的宴會是在義大利的舊時皇宮，非常氣派。另大會也安排夜間烏菲茲美術館的參觀。

3. 心得與建議

ICSE is one of the best conferences in Computer science. It is unfortunate that this time I did not meet any participants from Taiwan. I think in computer science, it is rather important to attend top conferences continuously as main research contributions. People do recognize your work with citations. As for the experience this time, though we only have our paper published in the pre conference workshop, all the attendees are experienced and excellent scholars in the field. Their feedbacks would help us improve the work both in practice and in theory.

軟體工程大會（ICSE）是計算機科學中公認最好的會議之一。很可惜的是這一次我沒有見到任何來自台灣的參與者。我認為在計算機科學的領域透過不斷參加頂級會議發表研究成果是非常重要的。透過論文的發表與面對面的交流，人們確實認識到與引用你的研究結果。這一次經歷，雖然我們只有在主會議前的研討會發表我們的論文，與會者人提出許多有助的建議與提醒。尤其是微軟研究院的研究員的鼓勵，相信能幫助我們持續推動本研究在實際生活的應用。

4. 附錄：照片

At the end of this report, we list some event pictures:





