# Manga Generator: Immersive Posing Role Playing Game in Manga World

Yuto NARA
yuto@shirai.la

Genki KUNITOMI
genki@shirai.la

Yukua KOIDE
koide@shirai.la

Wataru FUJIMURA
fujimura@shirai.la

Akihiko SHIRAI
manga@shirai.la
Kanagawa Institute of Technology, JAPAN

## ABSTRACT

This paper reports a methodology of automatically generating an immersive posing role playing game that reflects the personality of the player who acts out the part of the hero, using pre-installed speech bubbles, backgrounds, effects, and all the other elements that comprise *manga*.

## Categories and Subject Descriptors

H.5.m [**Information interfaces and presentation**]: Miscellaneous.

## General Terms

Laval Virtual ReVolution 2013, cartoon generation , case study

## Keywords

Kinect, emotion, etertainment system, user content generation

## 1. MOTIVATION

Nowadays, a tremendous amount of *manga* is published in newspapers, weekly magazines, and electronic publications. In particular, as part of the media mix, new contents such as television *anime* and movies have spawned off the original *manga*. As a child, many people probably experienced role playing characters from *shonen manga* (comics for boys) and hero action *manga*. *Manga* stirs people's imaginations and sometimes makes people want to act out the stories in real life. However, this can raise a problem with respect to the adaptation of *manga* into animation as the adapted work may be very different from the images that readers had in their minds. In addition, *manga*, when adapted into *anime*, is non-interactive and has passive content, and does not require the reader's imagination. Creating games based on the original world view of the *manga*, without going through the process of adaptation into anime, is a very challenging task. If were is possible to create a game system that seamlessly immerses players in the story without encroaching on the original world view of the *manga*, it would be possible to achieve new potential in the media mix.

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, to republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.
*Laval Virtual VRIC'13, March 20-22, 2013* Laval, France
Copyright 2013 ACM 978-1-4503-1243-1 ...$10.00.

## 2. RELATED RESEARCH

The following are some examples of other studies on the generation of *manga*.

In "Research on automatic *manga* generation based on TVML script," Hasegawa, Hayashi, and others[7] explain how to automatically generate *manga* by adding speech bubbles to script captured to be used as a frame from TV program making language (TVML)[3]. The addition of speech bubbles is divided into three fields based on the capture fields of a camera, and is based on an algorithm that adds the speech bubble based on the position of the character within the capture field. However, effects are not implemented.

"Comi Po!" is a software application designed to help people draw *manga* easily, even if they are not very good at drawing. Users can create *manga* by generating poses and expressions for pre-installed 3D characters and arranging backgrounds, dialogue, and other elements[2].

"Comic Chat" automatically creates manga-like images by using chat software released by Microsoft Research in 1996. When dialogue is input, facial expressions and the background change in line with the emotions of pre-installed characters. Users are able to create characters and there are many available expressions. Subjective as it may be, in order for users to easily carry out dialogues, it is difficult to maintain the world view.

"Manga Camera" is a smartphone camera application designed by Super Software Co. that gives a *manga*-like feel to photos taken by a smartphone. When photos are taken using pre-installed effects and imitative sounds, the software processes them using a color-reduction filter, allowing users to create *manga*-like pictures.

According to Umeda, "Real-time *manga*-like depictions based on the interpretation of bodily movements using KINECT" create *manga*-like images by applying effects based on body-motion analysis as well as *manga* color-reduction processing in real time to photos taken by KINECT[9]. The purpose of the system is to produce visual output, rather than an interactive system that immerses players in interaction while letting them enjoy a *manga* story the way games do.

## 3. DESIGN

Our premise was that *manga*-like visual output alone-such as the application of a simple color-reduction filter is insufficient for a games system. By focusing on users' enjoyment, we designed and

developed a system that lets users immerse in the world view of *manga* and act out the fun of the story. The way the system works is as follows: a player selects a prepared story, takes the role of a character in the story, acts out his part within the designated time, and the finished work is then printed on paper. This way, we were able to create a system that stays true to the world view of the original *manga* while retaining a high level of immersion and freedom.

## 4. SYSTEM OVERVIEW

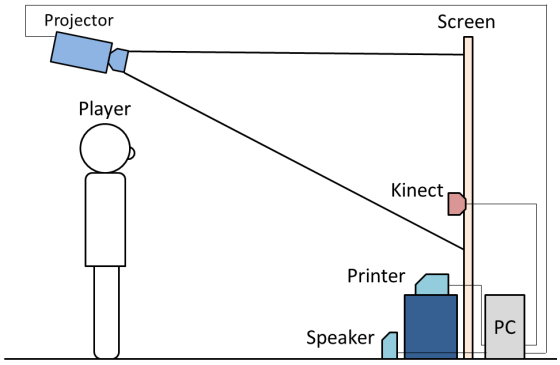


**Figure 1: System configration**

The prototype of this system projects a *manga* frame, background, and images with added *manga* effects taken from KINECT onto an 80-inch screen. Background music and sound effects will recreate the world view of the original work. The player acts out the story with the whole body poses that he imaged from the work. After a countdown, photography starts, and mood selection takes place based on posture assessment. The selected *manga* effects are then added to create a frame. Repeating these steps to create one page of the *manga* story, users are given a printout of the *manga* they played a part in creating.

The *manga* project's layer structure consists of frames, speech bubbles, imitative sounds, users' toned images from Kinect RGB camera, effects, and backgrounds. As the effects change every time in accordance with a player's movements, each and every generated *manga* is unique.

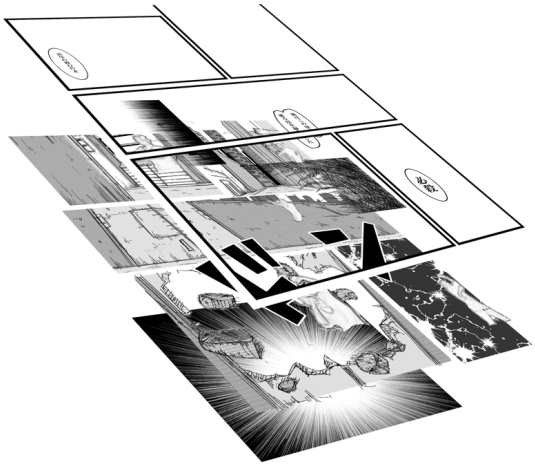

**Figure 2: Manga layer structure**


**Figure 3: Example of improperly placed speech bubble**

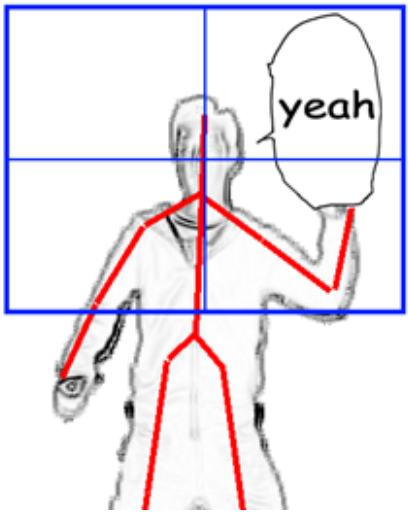


**Figure 4: Placement of speech bubble using Kinect kinematics**

## 5. AUTO CONFIGURATION FOR SPEECH BUBBLE

The key components that make up *manga* include speech bubbles, imitative sounds, and props. When placement of these objects is performed automatically without consideration of the location, there may be an incompatibility problem of objects and the user colliding, or objects may be far from users. To solve this problem, KINECT is used as a photography unit to capture a player's skeleton structure and place *manga* objects at appropriate locations in relation to the player's position. In the same way, the system automatically places objects such as speech bubble and props at places compatible with the player.

The speech bubble is a PNG file for which the value of the alpha channel becomes 0 for blank area. The placement of speech bubbles considers the head coordinate of the user from the skeleton (Fig.4).

## 6. AUTO SUPPLEMENT OF MANGA EFFECTS BASED ON MOOD SELECTION

This system evaluates a player's posture, selects an appropriate mood, and adds a *manga* effect automatically. Evaluation of posture is made based on the degree of bending of five joints (both shoulders, both elbows, and the hips). Based on the degree of bending of the joints, skeleton information, and kinematics obtained from KINECT, the system calculates the inner products of the joints. By adding the inner products, the system recognizes

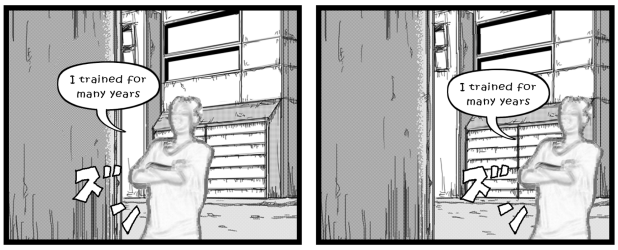


**Figure 5: Using skeleton information to properly place objects**

$$f_{elv}(t) = \frac{V_1 \cdot V_2}{|V_1| \times |V_2|}$$
$$-1.0 \leqq f_{elv}(t) \leqq 1.0$$

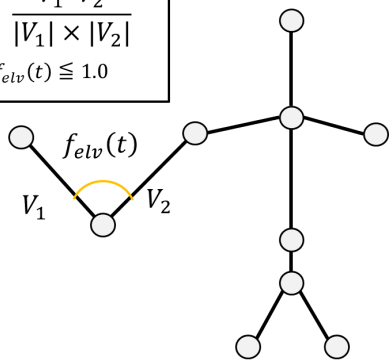


**Figure 6: calculating the inner product of elbow based on skeleton information**

three statuses based on threshold values and a contributing ratio is assigned to each part[8]. Assigning higher contribution ratios to the shoulders and hips give the character a livelier feel. The formula for computation (Eq. 1) and the contributing ratios of various body parts are given below (Table 1):

$$F = 1.5f_{elbL} + 1.5f_{elbR} + 2.5f_{axiL} + 2.5f_{axiR} + 2.0f_{pel} \quad (1)$$

$$(-10.0 \leq F \leq 10.0)$$

After being multiplied by the contribution ratios, the sum of the inner products ranges from -10.0 to 10.0 and is used as the mood parameter. When the joints bend significantly, the pose is considered active, and vice versa.

As an example, the natural standing pose in he left panel of Fig.8 left has a sum inner product of -7.41. This is recognized as an inactive pose, and a dark impression *manga* effect is added. With a sum inner product of 2.00, the posture in the right panel of Fig.8 is more dynamic than that in left panel. As this is recognized as an active pose, an even flashier *manga* effect than that in the above example.

**Table 1: Contribution ratio of body parts**

| Parts of the body | Contribution ratio |
|---|---|
| Elbow（left, right） | 1.5 |
| Shoulder（left, right） | 2.5 |
| Hips | 2.0 |

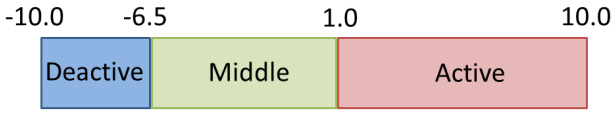


**Figure 7: Mood parameter thresholds**

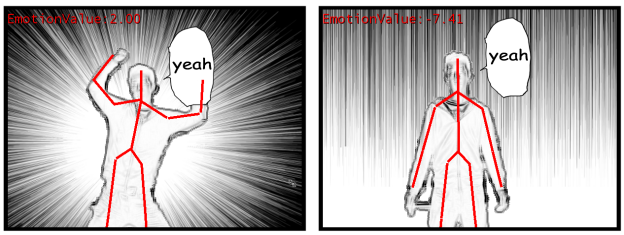


**Figure 8: Result of Deactive(left) and Active(right)**

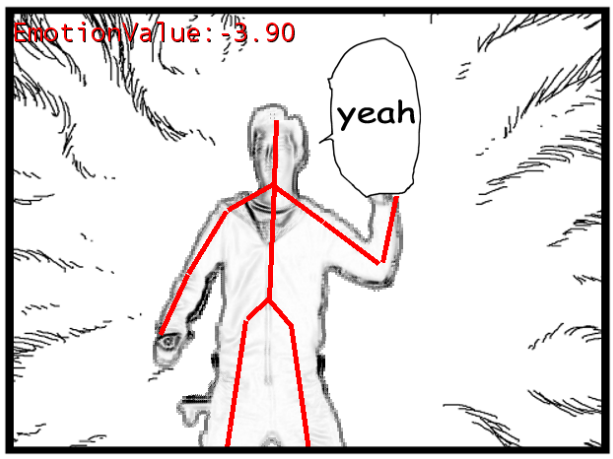


**Figure 9: an intermediate pose**

**Figure 10: In an exhibition Player makes rolls with their pose freely in a story.**

With a sum inner product of -3.90, the posture in Fig.9 is slightly more animated. This is recognized as having the middle status, and a flashier *manga* effect is added as a result.

## 7. EXPERIMENTS THROUGH EXPOSITIONS

This research has shown that by having a player subjectively acting out characters, we could place an immersive posing role playing game into the *manga* world and automatically create *manga* reflecting the personality of the player. Different from simple shader and comic chat that output manga-like visuals, our system achieved a game play that gives the player freedom to use their imagination without interfering with the world view of the original work as entertainment content with a controllable context. Fig.10 shows players' reaction to the demonstration of the prototype. Using an original story, the prototype presented players with characters that were not fixed. Players could enjoy freely acting out their own poses. In addition, we tried a system with comedians and other original *manga* introduced in a television entertainment program. In future application, we plan to add a dynamic script function and enrich the expressions.

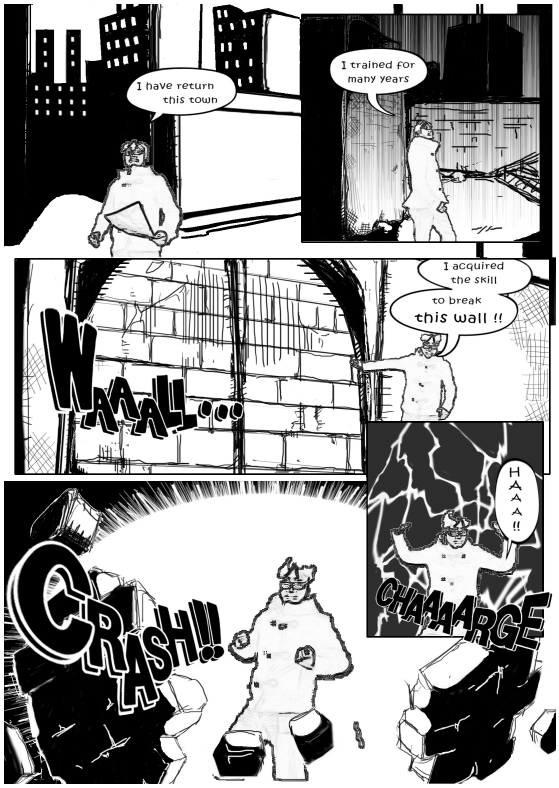


**Figure 11: Generated image: "American Comic style"**

## 8. CONCLUSION: SIGNIFICANCE, VALUE, FUTURE

This paper reported a methodology of automatically generating an immersive posing role playing game that reflects the personality of the player who acts out the part of the hero, using pre-installed speech bubbles, backgrounds, effects, and all the other elements that comprise *manga*.

The players' emotion can be obtain from the posture of the users[4, 5, 6]. The non-verbal interaction has an opportunity in the international experience[1]. In addition to family game consoles and next-generation sticker-machine photo booths, the system could also be used in motion e-books, digital signage, and other eye-catching new content. For example, the printed *manga* with user's image is suitable for a souvenir as a promotion material and it is difficult to thrown away. In addition, it is easy to give a link of social network to communicate after the experience (Fig.12).

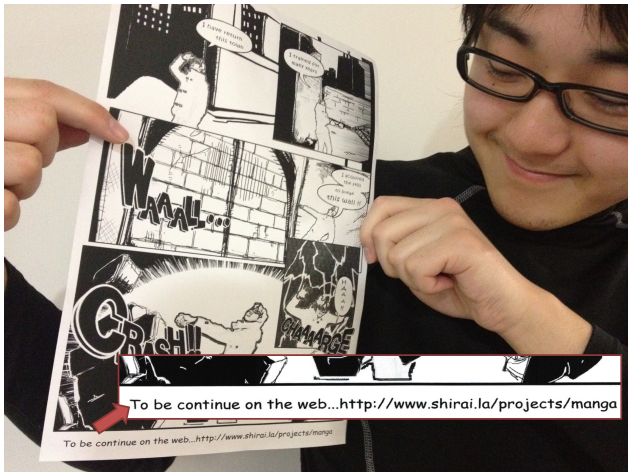


**Figure 12: Printed copy and URL for further communication with users.**

## Acknowledgments

We are deeply grateful to the International Collegiate Virtual Reality Contest (IVRC2012) and its community whose comments and suggestions were innumerably valuable. Special thanks go to Jonas

Schild, Khamla Vonsensey, and Enago (www.enago.jp) for the English language review.

## 9. REFERENCES

[1] M. H. Bond and D. Shiraishi. The effect of body lean and status of an interviewer on the non-verbal behavior of japanese interviewees. *International Journal of Psychology*, 9(2):117–128, 1974.

[2] ComiPo! LLP. Comipo, 2010. http://www.comipo.com/en/.

[3] M. Hayashi. Automatic generation of comic strip from tvml script. *NHK Giken R&D*, 75:34–41, 2002.

[4] A. MEHRABIAN. Inference of attitude from the posture, orientation and distance of a communicator. *Journal of Consulting and Clinical Psychology*, Vol 32(3), 1968.

[5] A. Mehrabian. Relationship of attitude to seated posture, orientation, and distance. *Journal of Personality and Social Psychology*, 10(1):26, 1968.

[6] A. Mehrabian and J. T. Friar. Encoding of attitude by a seated communicator via posture and position cues. *Journal of Consulting and Clinical Psychology*, 33(3):330, 1969.

[7] T. Sawada, M. Toyoura, and X. Mao. Film comic generation with eye tracking. In *International Conference on MultiMedia Modeling (MMM)*, January 2013.

[8] S. R. T. K. A. S. Takuya SAKAI, Wataru FUJIMURA. Accumotion: intuitive recognition algorithm for new interactions and experiences for the post-pc era. In *VRIC 2012 proceedings*. Laval Virtual 2012 France, 2012.

[9] D. Umeda, T. Moriya, and T. Takahashi. Real-time manga-like depiction based on interpretation of bodily movements by using kinect. In *SIGGRAPH Asia 2012 Technical Briefs*, SA '12, pages 28:1–28:4, New York, NY, USA, 2012. ACM.