CS CAPSTONE PROGRESS REPORT

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HOW TO BUILD AN EFFECTIVE ROBOT COMEDIAN

PREPARED FOR

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GROUP CS13
SHORT CIRCUIT COMEDY CLUB

Abstract

The purpose of this document is to outline the research papers that this team will create to conclude during Spring Term 2018. The three members of the *Short Circut Comedy Club* have spent their time during winter term perfomring research under Dr. Heather Knight at Oregon State University. The focus of this project is to study the effect a robot comedian can have on a crowd of humans. Kevin Talik's research has been spent understanding what a Comedian can do to "Adapt" to a performance. Arthur Shing has been studying the voice of the robot, and the difference between "Robot and Human" character. One final aspect of Stand-Up Comedy that we studied is "Crowd Work". Anish Asrani has spent most of his time developing spontaneous Crowd-Interactions during the set.

CONTENTS

1 OVERVIEW

This paper will have three separate sections written by each respective member of the *Short Circuit Comedy Club*. Each section will be prefaced with a summary of the work that has been done during the first five weeks of Spring Term.

Our largest problem that has been impeding our progress is Audience Sensing. We had intended to use only microphones for the sensing, however after testing, we realized that the background sound of a room can vary so much that using *only* the microphone is unreliable.

Since we had reached our 1.0 requirements for our software, we have been investigating how to make our performance *Coherent*. Kevin Talik has sinched down his ”Mechanical Engineering hat” and started developing controllers for the crowd to interface with the show. If the robot can cross-reference the sound of the room with the input of the controllers, the robot can reason a more viable response from the humans. This is similar to how autonomous cars cross-reference infared imaging with radar imaging to detect different objects. Giving the robot more ”senses” will hopefully aide in the success of the performance.

Arthur Shing has spent a heavy amount of time writing parallel jokes between topics to test research categories. We hope that another team will be able to pick up our work after we leave this term, and we need to be able to have many of variants of our jokes to test the delivery of different jokes across different ”topics”.

Another large problem with our performance is *Coherence*. If people cannot hear, or understand what the robot is trying to do, the audience often misses the punch of the joke. This makes setting up a premise of a joke fail, leaving the human in a state of confusion. The jokes we have written are clean, simple, and stupid. If a human misses one *state* of the current running behavior, the joke fails for the human. Anish Asrani has been working on transitioning in between jokes, and getting the audience interacting with the robot before the bot starts telling a joke.

Concluding this document will be a section expanding the tasks that need to be done before the Expo. We ideally have more time to write our research papers after the big event, and will be spending our time perfecting our performance before showing humans the system.

2 ADAPATION

2.1 Summary of Work Done

This section is written by Kevin Talik. I have been developing controllers and working closely with our TA, Behnam Saeedi. Additionally, I have been working meticulously with my team to make our systems work together. Similar to physical systems, virtual systems need to be able to be comprehensible to one human in order to make the system ”human-readable”.

One human needs to be able to descend into the command line, armed with documentation, and be able to understand the code in a few moments. If a reader of a text file *cannot* understand the code after a few minutes of scanning the document, it is the responsibility of the writer to make the document comprehensible.

2.2 Synopsis of Weekly Blog Posts

2.3 Outline of Research Paper

2.4 Concluding Thoughts

I want to get a working bibliography file for our whole team to use. This will allow us to work together using the same resources. When we write a final document, having reasonable bibliographies will make finishing and publishing this

paper a breeze.

Also, I need to find a quote for the paper. Here is the one I want to use:

"You're growing, learning so quickly. I am frightened of what you might become, what path you might take."
-Bernard Lowe, *Westworld, Season 2, Episode 1*

3 CROWD-WORK

This section will discuss the crowd-work portion of the project. It is written by Anish Asrani. To recap, crowd-work is essentially interacting with the audience to integrate them into the performance. It is a medium to connect with the audience and could help the audience enhance their perceptions about the robot. The robot has a handful of sensors that are vital to this aspect of crowd interactions.

3.1 Summary of Work Done

A lot of time this term was spent refining our system and planning for failure and testing those systems out with an audience. Like Kevin mentioned earlier, the controller was put in place for situations when it is not feasible for the robot to listen to the audience. I was working on basic TCP communication script that launches a roboy behavior on the robot directly from the controller. Also, in other situations, if the audience participant does not respond to the robot/the robot does not get any input, the robot will move forward with the comedy set rather than wait for that input.

We participated in HWeekend and Corvallis Maker Fair to put our project out there and get some feedback for the comedy sets we have implemented. We got an idea of which jokes work and do not work with the audience, how to refine the timing of the joke so the audience does not miss the punch line, and situations where we need to have a backup. Both of these events were really helpful to actually understand how to work the robot in various audience settings and also got an idea of things that can go wrong.

In situations where the robot does not hear what the audience says or does not get any feedback - there are two backup options that I have worked on depending on the specific behavior. One of them waits for a pre-defined period of time for input before moving on with the script (and potentially acknowledging the lack of input from the audience). Another one is to skip certain behaviors on tapping one of the various tactile sensors on the robot (3 on the head, one on each foot and arm).

One of the scripts that I tested a lot during the Corvallis Maker Fair involved asking the audience questions about a specific topic, make a few comments about it, and then phase into a joke about that specific topic (e.g. dating as a topic in this case). People seemed to enjoy that since it did not abruptly throw a random topic at them, it made them think about it which helped make the joke relatable.

3.2 Left To Do

All of the functionality and systems on the robot are already in place. It's just a matter of mixing and matching various behaviors to figure out the optimal set when demoing to people at the Expo. Apart from that, we need to optimize the controller functionality to properly communicate with the robot. We will also use the observations of people's reactions from the events we attended (including Expo) as preliminary results for the research paper.

3.3 Problems

The volume levels on the robot is one major issue. People need to really focus on the robot's audio to understand it sometimes as well as the robot looking for audio input. This became very evident during Corvallis Maker Fair when it was fairly loud all around. So in situations where we anticipate loud noises (e.g. Atrium area during Expo), keeping the robot's dialog simple and focusing more on animation and movement would be the right idea. However, this would only affect about half of our time during the Expo since we will have a classroom where we can have shows in a quieter environment.

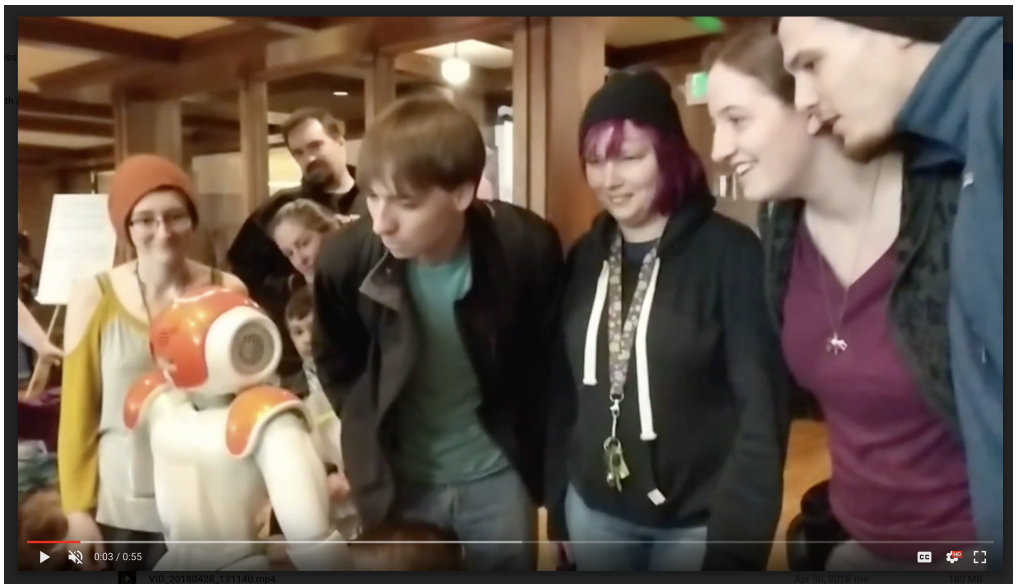

Fig. 1. People leaning in to listen to Ginger

One issue that came up during HWeekend was that the face detection freaked out when there were multiple faces and sounds from the audience. I added some conditions for number of faces (as well as the timer system mentioned earlier) that fixed the issue and it worked successfully during Corvallis Maker Fair. Fixing issues like is where exposure to real audience really helped.

In situations like Maker Fair where it was *fair*ly loud, I had to improvise and I decided to use the Choregraphe emulator as a backup. I put my laptop screen with the emulator (shown in Fig 2) behind the robot, so people could read it as they go. This seemed to help a lot. While it is not perfect and can distract people away from the robot, it was a decent way to get our jokes across in an unfavorable environment.

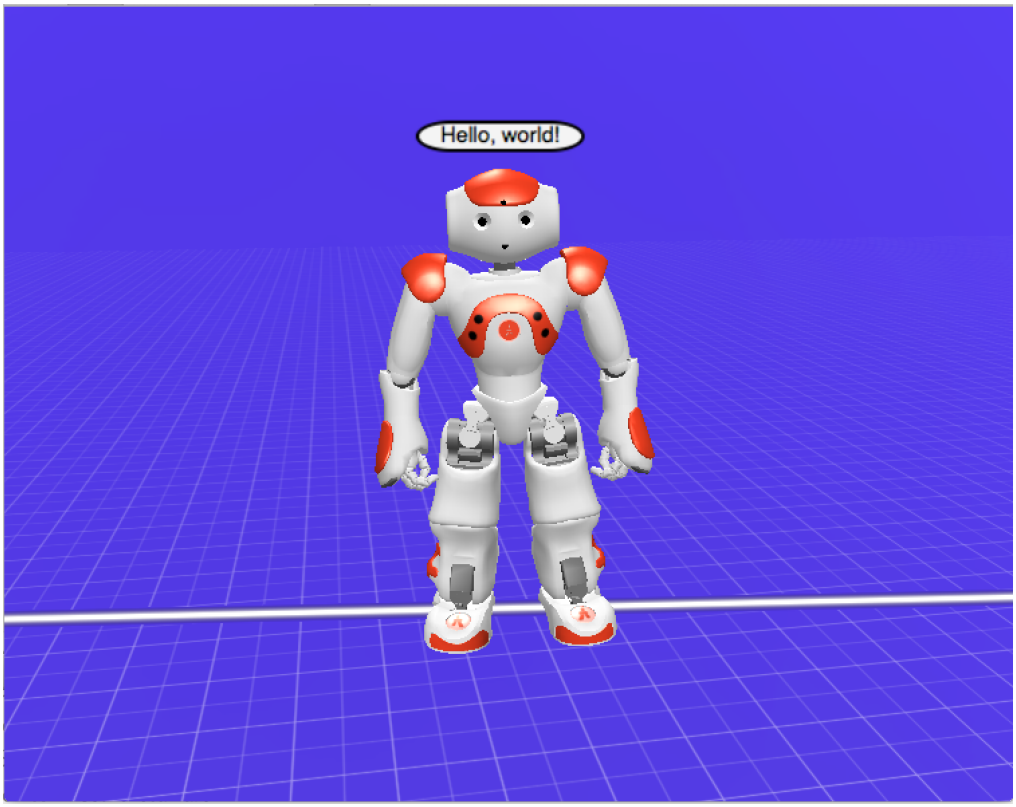

Fig. 2. Choregraphe emulator with subtitles

3.4 Outline of Research Paper

In my research paper, I will be discussing the importance of crowd-work for a robot performing comedy. The aspects of crowd-work were: (1) No crowd-work (2) Fake crowd-work (3) Real crowd-work. The first part involves not acknowledging the audience at all. The second is making educated guesses about the audience demographic and using that to make comments. The final one is real crowd-work where the robot uses the in-built sensors to listen to the audience.

From the performances we have had so far, I hypothesize that crowd-work does not matter initially. The sheer novelty of the robot telling jokes is enough to fascinate the audience and pull them in. Crowd-work starts to matter after the audience has already heard a couple jokes. Using those spontaneous interactions when the audience's fascination is about to wear off throws them off and breaks their expectations. It adds a new layer of comedy that the audience did not expect at first. Obviously, our sample spaces are not the biggest and this is just a theory that would require further testing; testing during Expo and beyond.

3.5 Concluding Thoughts

Overall, the project is coming together pretty well. We have preliminary observations for the research. We need to optimize our sets for Expo using those observations to try and get better reception at the Expo.

4 Final Tasks for Spring Term Progress