

Making HRI Accessible to Everyone Through Online Videos. A proposal for a μ MOOC in Human Robot Interaction

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ABSTRACT

We observe that in comparison to other media; online videos are a powerful outreach instrument for Computing technologies in general and specifically for Human Robot Interaction (HRI). Our experience in creating demos, scenarios and educational videos leads us to believe that such modalities can have large pedagogical value. We also found that the rapid hand drawing (exemplified through fast frames in video) is an interesting technique to propagate science facts around social media. We propose an introductory video explaining HRI that can be used for creating awareness about robotics and the area of HRI across all educational levels and MOOC systems. The main challenge is to promote retention via HRI pedagogical material as there may be a tendency of withdrawal to deeply technical content. In conclusion, we present guidelines to promote the uptake of HRI across not only educational institutes but also the general public.

Categories and Subject Descriptors

H.4 [Information Systems]: Miscellaneous; I.7 [H.5.2 User Interfaces]: D.2.2, H.1.2, I.3.6; J.4 [Social and Behavioural Sciences]

General Terms

Theory, Education, Human Robot Interaction, Children

Keywords

Outreach, Education, Human Robot Interaction

1. INTRODUCTION

We find that the correlation between education and HRI is fascinating. A lot of steps need to be taken to develop this discipline for the future with several open questions and challenges. How shall we as HRI researchers attract students to this research area? How do we explain our research focus to managers and supervisors; especially when budget and

funds are to be allocated? In addition, explaining HRI research as what we do for a living to a non-technical audience (such as our grandparents) poses a dilemma too.

These questions are not trivial as explaining what we are doing to people who are not familiar with the field has an important impact on our work. The most obvious example is when researchers apply for funding. The committees usually are interdisciplinary teams who decide according to the information that they have about the proposal but also according to their academic backgrounds. Human Robot Interaction is very recent as a research area, so it is likely that some of the panel members or other faculty members in our institutes or universities do not have enough information to understand the importance of our discipline.

2. HRI FROM THE BOTTOM UP

One of the other compounding issues for most technological institutions and educators is that there are not enough students (and females in particular) interested in scientific careers - a fact that is well established in [9, 3, 13]. Most students decide to pursue traditional disciplines. As a countering strategy a bottom up approach is now being advocated for with high school students and teenagers being exposed to science and technology both as intra-curricular and extra-curricular activities. Recently, we have witnessed a widespread trend of robotic courses for children. Certainly this is a concentrated effort to encourage children to aspire for scientific careers [10]. However this is not enough. Our experience about such courses is that they are strongly biased towards technical skills, they are dominated by male children and in general are isolated from the usual school curriculum. More often than not kids build a robot, they learn fancy technical terms and impress the parents who pay large sums of money for those courses. However, not much attention is paid to teach children about the social applications of robots.

Therefore, children are unable to visualise the robots participating in their daily lives as agents in the future. Furthermore, the enrolment ratio of boys to girls is not very encouraging. There is a need to adapt and revamp the curriculum and content of such courses; by not contemplating regarding the social impact of robots but also dealing with issues related to aesthetics, social skills, artistic impressions, etc. Hopefully via inculcating more multi-disciplinary topics within robotic courses for children would eventually enable

the organisers to attract more girls.

3. ROBOTS AND EDUCATION THROUGH MEDIA

As HRI researchers; on several occasions we have given demos to a wide variety of audiences and platforms, namely: managers, other students, children, co-researchers, etc. Most often than not, the audience is excited to see a robot. It is at times rare to see a humanoid robot in a public space in certain countries and most people are deeply interested in knowing more about the future applications of these robots around the house, work and school.

We have explored other forms of media to convey our research and the area of Robotics in general. In November 2012 we created a video called "Robot Gangnam Style"¹ in which five NAO robots and a Papero robot dance to the popular pop song Gangnam Style. The video has been watched by more than 600,000 people on YouTube until today with very positive comments. The response was overwhelming with the video even appearing in various news outlets.

More recently we created a YouTube video based in the work of [8, 6, 12] to explain to the general public in the most simplest manner about Human Robot Interaction². YouTube offers a dynamic and interactive platform to promote science. With millions of users per day likely a high percent is interested in learning about science and particularly something closely related with science such as technology, design and other disciplines. In the current video we were inspired by videos on the AsapScience Channel³ The rapid frame rate of hand drawings is a technique that is low cost and requires only a few resources; such as a good script, reasonable drawing skills and some vibrant drawing tools. Instead of using Powerpoint slides and static images simple animations can be sketched that can be engaging for the audience. The content of the video was based on introductory concepts in HRI, such as their presence in fiction, media, and religion; the impact of robots in our daily lives, the disciplines involved in HRI and the uncanny valley. We conclude the video with a few sample research projects that we are involved in. We believe that the rapid frame rate of such videos will attract the attention of the viewer; as the quick drawing resembles a real animation. In the Robot Gangnam style video we noticed that people only spend less than 2 minutes watching the video. For a video that is meant to entertain this is probably acceptable however for an educational video it is desirable that viewers watch the video till the end.

One of the problems that we find with our videos is their distribution and publicity. The video of the robot dancing Gangnam style was a success as it was released some weeks after the original video appears. Online users were very engaged with the original video clip and it was easy for us to replicate this success on a minor scale with our own video using robots. Moreover the video had coverage from the local media and international media ultimately attracting more viewers to our video piece.

¹<http://goo.gl/j8hJmH>

²<http://goo.gl/ICUadg>

³<https://www.youtube.com/user/AsapSCIENCE>

On the other hand, although the video "Introduction to Human Robot Interaction" was evaluated positively for other members of HRI community via LinkedIn; it has been hard to spread the word about this video. The support of the media has been not present and the video has not had a similar success compared with the Robot Gangnam style video. Apparently the support of traditional media as TV, newspapers and news websites is fundamental for the success of videos about robots.

4. FLAWS OF VIDEOS USED IN ONLINE EDUCATION

Our experience with the robot parody of Gangnam style gave us a clue about how robots can be popular in the media. Likewise our experience producing the movie "Eugene in Aotearoa"⁴ and our video of "Introduction to HRI" provided us with an artistic and educative perspective of the use of videos in the outreach of HRI. Although people were interested in our videos, we didn't have any chance to measure the real impact on the public. How do we measure the perception of the videos by YouTube users? A large number of views does not mean that the viewers will research more about the topic.

Based on our experiences we propose the following guidelines in order to promote the uptake of robotics with the general public:

1. Reach out to children as they are the future researchers. In addition, parents will automatically get involved. Promote and encourage sharing of content and material amongst parents and children.
2. Use popular marketing techniques for the outreach of HRI (such as AsapScience, etc). We should not hesitate to use the same techniques that successful products and companies employ for their promotion.
3. Investigate the possibility of teaching HRI through a MOOC. Their motto is "Education for everyone, everywhere" is specially useful for a discipline such as HRI.
4. Explore the artistic, aesthetic, design, social, humanistic, philosophical possibilities of Human Robot Interaction. Such topics can attract the attention of people and students who are traditionally not interested in technical subjects.
5. Make it easy. Most of the scientific disciplines are perceived as difficult and people are intimidated to study about them. Instead we should focus on the fascinating facts about HRI, the moral dilemmas, the philosophical discussions and the creative technical solutions of these problems.

5. A PROPOSAL FOR BROAD OUTREACH OF HRI

We think that a more structured way of promoting HRI can be more effective in keeping track of the interest being generated in prospective HRI researchers. We now propose

⁴<http://goo.gl/NIKO4T>

a new use of the videos close to the already existing Massive Open Online Courses (MOOC) with significant changes in the format.

MOOCs have been very popular around the world since 2012. Coursera.com, edX.com, Futurelearning.com and others offer high level education for free (or a very low fee) from prestigious universities to a large number of people interested in virtually any topic. A lot of talented people can now access distance or remote education that previously was limited for economical, social and geographical reasons[2]. The hype around MOOCs is very attractive. However after a couple of years there is perception that MOOCs have become an ineffective educative tool. MOOCs have a very low rate of completion. For instance, Duke University reports that just 313 participants of 12,725 finished the Bio-electricity MOOC in 2012. In other words, 2.45% of the students completed the course [1]. Initially students are very enthusiastic to start a MOOC [5] in order to avail the opportunities that online courses offer. However, many issues inhibit to the participants to finish the MOOC. Participants argue commonly that MOOCs have certain flaws: take too much time, assumes too much knowledge, cause lecture fatigue and a poor course design among others [4].

We consider that the MOOC's problem lies mainly in the design of the course rather than limitations in the pedagogy. Apparently lecturers giving a MOOC behave similarly as in regular courses in a physical classroom. They talk long periods of time in front of the camera, they use slides and a monotone voice. Moreover, just few changes in the camera shots are made. Most of lecturers and course managers do not consider that Human-Human interaction differs significantly to Human-Computer interaction; as both lecturers and students face an unreal experience interacting with a computer screen.

On the other hand, it is understandable that it is very difficult for lecturers using videos in a MOOC to compete against other media which attract the attention of young people with extravagant clips of information, dynamic shots, beautiful hosts and other similar marketing techniques. For the "MTV generation" and beyond it must be difficult to follow a long lesson of 10-15 minutes with very neutral backgrounds and monotone voices in the screen. Certainly in most of the MOOCs presenters use slides with graphs, charts and other graphic information. However they are static images with a voice in monotonous tone; not offering any engagement and enjoyment to the user on the other side of the screen.

The design of content plus the synchronization with voice and changes in the intonation of the voice are important factors in the design of videos used in MOOCs. Krum suggests that "cool" material for visual information should be engaging, distinctive, simple and easy to read [11]. Also the level of the challenge in the course is very important. Thrun suggest that MOOCs should be designed as challenges/short problems rather than lectures[14].

Considering this factors, we propose that a micro massive open online course (μ MOOC) for HRI could be very beneficial allowing people know what exactly HRI researchers do.

6. THE CREATION OF A μ MOOC IN HRI

As we mentioned earlier, one of the main failures of MOOCs lies in the design of the material. However also the duration of the course and the assessment are factors that can be either motivating or depressing for the students. We propose alternative strategies to employ while conducting a MOOC for the field of HRI.

We define our proposal as μ MOOC as we consider an online course in HRI with outreach purposes should be short. Duration of the lessons and each video snippet should be not longer than 2-3 minutes. Our experience with our videos is that most of the viewers do not finish the video. Most lectures in MOOCs are just too long. Guo found that certificate-earning student in the edX system spend just 4.4 minutes watching a video of 12 to 15 minutes [7]. Also the duration of the course along the time should not be beyond a few weeks. If we compare with most of the MOOCs available, these figures are significantly lower than an average MOOC. Therefore we believe users would be less intimidated while enrolled and studying in this condensed version of the MOOC.

Secondly the format of the videos should be fun, engaging and simple. Animations, movies, documentaries are educative resources widely used since several decades ago. We understand that even the most important universities and lectures will have difficulties to produce their own professional animation movies. However, the technique utilised in our video "Introduction to Human Robot Interaction" is easy to perform, does not require special skills, requires few editions and is incredibly cheap. This format has been used effectively for many channels in Youtube such as AsapScience and the comments of the people on those videos reveals that they are being engaged and stimulated by the videos. Furthermore such videos lead to higher numbers of retention as people keep watching the video until the end. Even more all this techniques should be supported by genuine passion coming from the instructor. That passion must be reflected in the subtle clues given by the voice over during the video. Definitely instructors are the responsible to produce more attractive content to potential students and improve the rate of success.

Other important factor is the use of an exclusive channel for the educational content in an open system without sign-up and login as Youtube or Vimeo. Youtube is effective because casual users can look around anonymously. People interested in the topic can see as much as they want and learn in their free time.

Optional assessments are another feature which is integral to the success of such a pedagogical setup. One of the main obstacles for most of the students in MOOCs is to find motivation to complete the assignments. A link with optional evaluation for the users at the end of the video can be useful for interested users learning in deep HRI. Consequently videos can be simultaneously used to focus both casual users and more advanced users who can receive more personalised treatment by the μ MOOC's manager.

Keeping the people motivated for longer periods of time throughout the course is also imperative. As social animals,

individual learning is difficult for most people. A future channel for outreach of HRI should consider guidelines to keep students motivated such as regional study groups.

7. RESULTS AND DISCUSSIONS

We are ambitious and we consider that the design of a comprehensive and global curriculum for Human Robot interaction is possible to create a strong generation of new researchers interested in the area. Curriculum can not be just built inside universities and just for undergraduates and graduates. Even the general public has the right to know about Human Robot Interaction, like any other discipline. That is in benefit of the researchers. The more people know about what we are doing and the impact and value that HRI could provide to their daily life; the more support we will have for our future research.

Furthermore online tools together with well-designed videos offer options to people interested in exploring HRI in depth with optional assessments and exercises, discussion groups and personalised responses coming from specialist. The creation of a μ MOOC can offer the advantages of a outreach channel and a μ MOOC that can be useful to both kind of users. Several advantages can be observed into the μ MOOC model. Mainly casual users could learn something about HRI and more interested users can gain experience using the optional assessments and other on line tools.

8. FUTURE WORK

Certainly the creation of MOOCs involves many man hours and enormous resources. However the most important part is still the structure of course and the storyline followed to offer meaningful information to the students.

In the close future we will create our own HRI channel on Youtube. We will use the same drawing in high rate frame technique to create a corpus of 10-12 videos of two or three minutes. Then we can design evaluation instruments so that interested students can complete their self-assessment and validate their knowledge in the area. Certainly the experts in this field are more than welcome to collaborate with us. We wish to create a strong bond between top researchers in our field and the provide an opportunity to the general public to learn about our work in social robotics and human robot interaction. We expect that the interest in such projects increases along the time and other experts will contribute with ideas and cutting edge research in order to share with the students.

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