Creating Meaningful Interaction with Dogs and Computer Machinery

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This short paper presents current work done in the Animal Computer Interaction (ACI) field on dog computer interaction within the group Animal Computer Interaction Design (ACID, 2015). Work here aims at enabling a dog to use computer machinery in an ordinary way to have meaningfully interactions enhancing their current lives. A brief portrait of the ACI field is sketched and then a short elucidation is given of the studies up to this point followed by their findings and conclusions. The current studies that have been undertaken are a dog head tracker and a methodology to figure out where the center of design lies in Dog-Computer-Interaction. These studies are hoped to filter in a waterfall type manner to help build guidelines for dog-computer-interaction technology.

Animal Computer Interaction (ACI), Dogs, Head Tracking, Requirements, ACID, Dog-Interaction

1. INTRODUCTION INTO DOG-COMPUTER-INTERACTION

With the growing amorphisation of animals, especially our domesticated pets, it is only progressive to presume that the technology revolution humans' face will be soon facing our pet companions' as-well. Although technology has been used by dogs in laboratories and working environments (either military or as human-aids) this research has been primarily focused on the human requirement aspect rather than an animal-centric approach. This creates a gap of missing animals' requirements in Animal Computer Interaction (ACI) and Human Computer Interaction (HCI) as the previous computer interaction is human-focused and not animal based. Animal Computer Interactive Design (ACID) group aims to explore this gap through the well explored HCI lens to create a user-centric approach to interactive technology by excluding the human prospective to elicit the root requirements of dogs.

2. LITURATURE SUMMARY

Literature reviewed so far shows that the ACI field is growing with a spike in mostly dog and cat machinery. In the past it was thought that dogs do not hold complex emotions and as thus cannot help to design technology as they do not hold an opinion. This has changed with current views where dogs are shown to hold opinions and can read emotions in humans and other animals. With the technology encompassing more and more of a dog's ordinary habitat, evidence and technology has started to arise to allow dogs to complex machinery.

3. PHD RESEARCH QUESTIONS

This research aims to progress dog computer interaction to empower dogs to not only use technology without training but also input their opinions upon the technology and help within its design. This will make improved dog computer interaction through safe, usable and efficient technology. The findings from ACID studies will then be encompassed through a concluding study to build guidelines taken from previous findings for building dog-computer-interaction technology.

4. METHODOLOGY

4.1 Dog head tracker
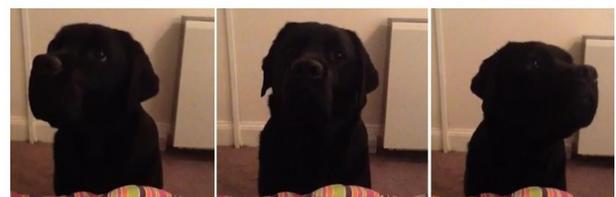
Figure 1: Images show example of the three classification criteria's with the dog for Matlab (Left, Center & Right).

So far within my work I had made a non-contact dog head tracker through picture analysis to allow a computer to recognise a dog head position. This gives indication of the dogs viewing perspective through three sections (left, middle & right) (Fig.1). This study was based upon hundreds of pictures of an individual dog to train using MattLab, computer algorithm software. This method proved to work at a higher consistency than ordinary human head trackers proving that it is possible to contact-free track a dogs viewing habits.

4.2 Who is in the center of Animal Computer Interaction?

The second study taken was a theoretical study to look into who is in the center of ACI design. This study looked at the motivation behind the technology to scale its effective use upon the animal. The stimulus behind this work was to get ACI practitioners to think of the end-use of this study in order to design improved ACI through their motivations. If technology is designed for humans benefit but to be used by the animal then the technology will not be solely designed for the animals benefit thus may hold some contingencies in order to get the human goal. A method was made to judge the motivation behind the work (humanisation, domestication and playful) to see where the requirements need to be gathered from (Fig.2).

Figure 2: *Diagram of dog Computer Interaction categorizations within Interaction Design: Humanize Domestication and Playful.*

Playful ACI was deemed closest to a dogs' true requirement as inherently all animals play this it is a natural interaction. Domestication was between human and animal requirements as this genre of ACI benefited both the human and animal. Humanisation ACI was seen as only eliciting the human requirements under the guise of using animals as this technology only benefited the human.

5. PRELIMINARY RESULTS

The preliminary results indicate that through body language a dog is able to input its design decisions (such as left/center/right) into technology through its viewing habits. It also has been suggested that by designing playful interactions this will be closer to the dogs ordinary behaviour thus get true requirements. This would give dog video and

interaction designers preliminary guidelines in how to design dog computer interaction through playful interactions and enable designers to get feedback from their dogs viewing habits through non-contact head tracking. There are a few issues being raised with these results though. Firstly as the head tracker was only designed on one dog, it would be beneficial to program MattLab to recognise multiple dogs to see if the program has the same efficiency with different skeletal forms/ colour patterning. With regards to the method for gathering requirements for dog computer interaction, a question was raised with what is natural? Domesticated dogs are not strictly natural but human evolved thus where does their nature lye? It could be argued ordinarily a domesticated dog's nature is within the human habitat but as this habitat changes vastly across different societies and countries as well as its use (e.g. working dogs), so this can be hard to define.

5.1 Contributions to Dog-Computer-Interaction

- Contract free head-tracker for dogs within three categorisations (left/center/right)
- Methodology on how to gather dogs' accurate requirements by looking at the center of the design.

6. PRELIMINARY CONCLUSIONS

It had previously been assumed that dogs can be face, head and eye tracked but not with contact-free or without training and this is the novel bit of this study. Through this contact free head tracking you can get unbiased results as it does not depend on training forcing the dog to watch the screen. The methodology of gathering requirements dependable on the end-user is something that has not been done within this field before. It does however match up to current HCI theories of identifying the user and gathering their requirements in order to build efficient systems.

7. PUBLICATIONS

Hirskyj-Douglas, I. & Read, J. C. (2014, Nov.) Who is in the center of dog-computer design? ACI. ACE'14. Funchal, Madera.

Hirskyj-Douglas, I., Huilan, L. & Read, J.C. (2014, Oct.) Is my dog watching TV? NordiCHI'14. Helsinki, Finland.

Hirskyj-Douglas, I. & Read, J. C. (2014, Jan.) Animal Computer Interaction Design (ACID). ACM-W'14. Manchester, UK.

Hirskyj-Douglas, I. (2015) Animal Computer Interaction Design. http://acid.uclan.ac.uk.