ISP 2023 Case Study 2[⋆]

Health care robots

1   Description

We live in an aging society that faces a dire shortage of care staff. Robots, at the same time, are starting to reach levels of sophistication and robustness that render them potentially useful for nursing tasks. Highly specialized robots can already support individuals with different medical conditions. Smart prosthetic limbs that adapt to the gait of users, and even simple exoskeletons, for instance, can be adapted to individuals and their needs already. Moxi ($1500 for a lifetime subscription) can already interact with patients; Grace, of hanson robotics even comes with human features and behaviors to provide emotional support in isolation situations; Robear can already help patients with limited mobility.

Current nursing robots mainly lack versatility - they are developed and trained for specific tasks, to which they subsequently are limited. Given the complexity of their hard- and software, this represents a strong inhibitor for general adoption. It is also a waste of opportunities and their potential.

Recent developments in deep learning could change this situation, and a large amount of research is now invested to leverage this potential. Robots being equipped with extensive sensor technology, including lidar, depth-cameras, and sometimes even thermal imaging would clearly allow for more flexible and autonomous operation. Considering the number of potential patients, they could also be deployed in large quantities - where federated learning and exchange of sensory data with feedback could help speed-up development and improvement of models and systems.

With regards to privacy the general understanding is that only trained models will be exchanged between robots, that users will consent as they desire care and medical support, and that simple access control policies can limit the potential disclosure risks.

You are getting involved with one large research project that is pushing towards this goal, and your task is to perform a risk analysis, identify crucial

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social issues and ethical concerns. Considering the scenario and potential of surveillance: will this solve this problem? Against which adversary? How do you assess the legal situation?

2   Tasks

- Analyse the case study from the legal and the societal perspective. Is personal data being processed, and if so, is this lawful? How valid and meaningful is consent given in this context?
- What about people close to the patient that also 'engage' with the health care robot?
- Analyse how much information about and control over the functioning health care robot their owners have.
- What other risks (eg related to auonomy or even personal safety) can you identify?
- Could this be improved somehow? Give concrete suggestions.
- What other measures could be deployed to reduce the privacy risks associated with using their appliances?