Week 3: Refining Research Questions

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# Refining Research Questions

Researchers are innovating across health care using Internet of Things (IoT) devices. Their efforts predominately focus on wearable technologies that attach wearable sensors to the patient (Tun et al., 2021). Wearable technologies face significant competition because these solutions have a low barrier to entry, economical pricing, and are mass-producible. However, these products lack elegance due to restricting movement and necessitating the patient always to carry these devices. Additionally, the saturated market causes each iteration to produce less incremental value-add.

In contrast, high-quality research must be challenging, elegant, and move the needle (Zeller, 2014). Meeting these requirements necessitates a different approach, such as utilizing cameras and real-time video processing to deliver a superior solution. However, video-centric systems encounter more complexity in several aspects. For instance, patients can freely move around their residence and change its configuration (e.g., move furniture or turn off a light). Addressing the noise within these dynamic environments is challenging and creates multiple research questions.

**R1** – How are researchers minimizing noise in their video streams? An efficient process must exist to analyze short videos and extract the subject’s *intent*. This mechanism must support reliably support noisy (e.g., out of focus) and variable (e.g., distance to the camera) input.

**R2** – How can the extracted intents best *interface* with Cyber-Physical Systems (CPS)? Nurses at assisted living centers provide a helping hand literally and figuratively. Smart devices must serve this same function across a range of tasks (e.g., medication management).

**R3** – How can those interfaces ensure patient *confidentiality*? Patients will only use a continuous video recording solution if they trust its security and privacy controls. There must be explicit and deliberate decisions regarding how information is stored and replicated.

**R4** – How can central administrative teams most efficiently *scale* across global and domestic terratories? Healthcare workers can remotely deliver world-class services because the homes contain CPS systems for routine tasks (e.g., monitoring for falls). Competitive businesses can leverage this capability to decrease costs, increase profit margins, and maintain quality standards.

# References

Tun, S., Madanian, S., & Mirza, F. (2021). Internet of things (IoT) applications for elderly care: a reflective review. *Aging Clinical & Experimental Research, 33*(4), 855-867. doi:10.1007/s40520-020-01545-9

Zeller, A. (2014). *What makes useful research in software engineering*. Retrieved from YouTube: https://youtu.be/4MbixFVWwck