A Culturally Sensitive Trust Model and Designer Guidelines for Product Development

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While economic and environmental issues are often major concerns in engineering design, a less common issue is the social impact of products on communities and individuals. A product's social impact can be defined as its influence "on the day-to-day quality of life of persons" [1]. While automation has been shown to yield gains economically (e.g. manufacturing) and environmentally (e.g. electric vehicles), there remains room to explore the social impact of automation in a person's daily life, especially in developing countries which have little to no access to modern automation. To achieve the UN Sustainable Development Goals by 2030, automation is uniquely positioned to help low- and middle-income countries attain a higher level of development in a short period of time [2]. Additionally, there has been little research on how cultural identity and heritage influences trust in automation [3]. I believe there is (i) a sense of urgency to understand how culture influences Africans' trust in automation and (ii) a need to develop a framework that designers can use to create socially relevant, automated systems that respond to the diverse, cultural predispositions of those on the African continent and in the diaspora.

Prior work from the REID and JRL labs at Purdue University showed that trust levels varied significantly between participants of two different cultural backgrounds [4]. However, this research was conducted in a limited online context, compared trust between only two cultures, and did not address how the findings might translate to the actual design process. The **objective** of my research is to understand how engineers can design socially relevant, automated products that will be trusted by people of varying African cultures. First, I will explore how dispositional trust, or the tendency to place one's trust, in automation differs in African cultures from other cultures within and without Africa. I will begin with the identification of culture-based variables and then correlate them to human participants' trust in automation. Participants' trust will be monitored by several methods (eye tracking, galvanic skin response, and trust questionnaires) as they use and experience automated products. The resulting data will contribute to a culturally sensitive, dispositional trust model that can be used in the product development process. In the second phase of this research, the dispositional trust model will be introduced to product development teams working on automated products for communities in Africa. Product development teams will be identified through African and non-African universities working on sustainable development projects. As teams implement the model in their design process, observational research techniques will be used to develop standardized design guidelines for subsequent teams.

This research will enable designers across multiple continents to develop products that the growing African workforce can trust to use in creating their own sustainable future.

[1] Burdge, R. J, 2004. A Community Guide to Social Impact Assessment., *Social Ecology Press.*
[2] ILO, 2020. Global Employment Trends for Youth: Technology & the future of jobs. [3] Hoff, K.A. et al, 2015. Trust in automation: Integrating empirical evidence on factors that influence trust, *Human Factors.* [4] Akash, K. et al, 2017. Dynamic modelling of trust in HMI, *IEEE.*