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Novel miniaturized, fully integrated, wireless, low-cost glucose sensing platform

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Diabetes is a significant health care issue which affects millions of people worldwide. Diabetes management at different stages requires glucose sensing followed by appropriate medical actions. Accurate and reliable sensing is an important component for finding the complete solution to the disease management as well as to scientific studies required for better understanding of the disease and effect of different therapeutic factors for its prevention or treatment. To achieve the goal of providing low-cost, long term solution for accurate glucose sensing, we have been working on developing a novel, fully-integrated sensing technology which holds the key to solve the significant challenges inherent in current glucose sensing technologies. This system is based upon CMOS integrated electrochemical sensors with integrated control and autonomous wireless operation. A combination of extremely efficient circuit design, wireless operation (using RFID-like technology) and Nanotechnology allows extreme miniaturization resulting in the smallest working platform to date. I will also present a smart external reader technology that can be used as a wearable device for continuous reading or used with smart phone for discrete readouts. In this presentation, I will go through the motivation behind our smart design and the advantages it has over current devices, both commercial and research devices. I will explain the key design challenges and their effect on the overall system design and will present the status of our work, including extensive *in-vitro* and preliminary *in-vivo* results. Finally, I will conclude with the plan to move forward with this technology and the clinical strategy to get this technology ready for human use.

Biography

Muhammad Mujeeb-U-Rahman did his MS and PhD in Electrical Engineering at Caltech. His thesis work was focussed on developing novel fully integrated systems which can operate as wireless sensors in complex biochemical environment like human body. This work has led to the inception of a funded startup company focused on developing next generation glucose sensor products. He received the Demetriades-Tsafka-Kokkalis Prize for the best work in Nanotechnology at Caltech in 2014. He was also a Fulbright Fellow for his MS. Prior to coming to Caltech, he was the Founding Member of the WiMAX research group at Caltech which was started based upon his senior thesis work.

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