Chapter 1

Transforming Communication Protocols:

Secure Data With IoT-Enabled Devices Controlled by Brain-Computer Interfaces

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ABSTRACT

The discourse concerning communication protocols is being transformed by the convergence of the Internet of Things (IoT) and Brain-Computer Interfaces (BCIs). This relationship has the potential to significantly enhance control, efficiency, and customisation in a variety of applications, including healthcare and smart homes. Brain-computer interfaces (BCIs) facilitate direct communication between humans and technology by converting brain signals into commands. In the interim, internet-of-things (IoT) devices, which are equipped with sensors and actuators, have the capacity to collect and transmit data in an instant. By investigating the synergies between brain-computer interfaces (BCIs) and the Internet of Things (IoT), this study investigates the potential for transforming communication protocols. Future research and development initiatives, data protection, precise signal processing, and user flexibility comprise the primary subjects of the conversation.

INTRODUCTION

The neuromuscular circuits that the brain employs to interact with and regulate its environment are susceptible to damage from a variety of disorders. Muscular dystrophies, cerebral palsy, multiple sclerosis, amyotrophic lateral sclerosis (ALS), brainstem stroke, brain or spinal cord injury, and other similar conditions either injure muscles or disrupt the neurological circuits responsible for their regulation. These factors have a considerable impact on a substantial number of individuals worldwide, as evidenced by the research conducted by (López-González, A. et al., 2021). These factors have an impact on nearly two million individuals in the United States alone. Individuals who are severely affected may experience complete immobility (Pandey, D. et al., 2020), which may include the inability to control eye movement or breathe voluntarily. Furthermore, they may develop a complete inability to communicate (Devasenapathy, D. et al., 2023). The lifespans of the majority of individuals, including those who are incarcerated, can be substantially extended as a result of advancements in life-support technology (Pandey, D. et al., 2020). This, in turn, results in an increase in the personal, societal, and pecuniary burdens of their illnesses over an extended period.

Despite the scarcity of treatments for these illnesses, there are three viable options for resuming normal activities. The primary objective is to enhance the capacity of current channels. It is possible to substitute paralysed muscles with those that can be consciously controlled.Using hand movements, individuals with severe dysarthria can generate artificial intelligence generated speech (Gupta, R. et al., 2023). In the same vein, individuals who are paralysed as a result of substantial brainstem lesions

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