



Inexpensive automated medication dispenser for persons with neurodegenerative illnesses in low resource settings

Morufu Olusola Ibitoye, Aisha Olaitan Raji & Suleiman Olanrewaju Nafiu

To cite this article: Morufu Olusola Ibitoye, Aisha Olaitan Raji & Suleiman Olanrewaju Nafiu (2019): Inexpensive automated medication dispenser for persons with neurodegenerative illnesses in low resource settings, Journal of Medical Engineering & Technology, DOI: [10.1080/03091902.2019.1692935](https://doi.org/10.1080/03091902.2019.1692935)

To link to this article: <https://doi.org/10.1080/03091902.2019.1692935>



Published online: 29 Nov 2019.



Submit your article to this journal 



Article views: 7



View related articles 



View Crossmark data 

RESEARCH ARTICLE



Inexpensive automated medication dispenser for persons with neurodegenerative illnesses in low resource settings

Morufu Olusola Ibitoye^a , Aisha Olaitan Raji^a and Suleiman Olanrewaju Nafiu^b

^aDepartment of Biomedical Engineering, Faculty of Engineering and Technology, University of Ilorin, Ilorin, Nigeria; ^bDepartment of Electrical and Electronics Engineering, Faculty of Engineering and Technology, University of Ilorin, Ilorin, Nigeria

ABSTRACT

Neurodegenerative illnesses due to diseases or old age are typical examples of clinical conditions that may affect the proper observation of prescribed medication usage with negative consequence on dose potency. Commercially available medicine dispenser for these populations are expensive, complex to operate and/or beyond the reach of those living in low resource settings due to lack of social protection. This study presents the design and construction of an inexpensive (\$49.6) medication dispenser suitable for point of care applications in low resource settings. The dispenser was constructed using a simple control mechanism based on Arduino[®] IDE that controlled three different micro servo motors to accommodate different shapes of medication. Sequel to the laboratory trials by abled individuals, we were able to demonstrate between 58% and 100% accuracy of the device when the three servo motors were simultaneously used to dispense medication of three different sizes. Following rigorous clinical trials in the target population, we intend to deploy this device for wider and independent usage by users in order to prevent unnecessary hospital admission meant to enforce compliance with appropriate medication usage for the users.

ARTICLE HISTORY

Received 28 January 2019
Revised 7 November 2019
Accepted 8 November 2019

KEYWORDS

Neurodegenerative illnesses; medicine dispenser; older adults; low resource settings

1. Introduction

People living with neurodegenerative illnesses or cognitive impairment account for about 2.29–21.6% Africa's population [1]. Aged population are most vulnerable to this illnesses especially those with cardiovascular diseases and/or those that are illiterates [2], with “marginally” higher prevalence in women [2,3]. These clinical conditions may suscept victims to non-adherence to prescribed medication for their often chronic and life-threatening diseases. Prescription of medications to these patients especially those among them with long-term illnesses such as diabetes Melitus, high blood pressure and cancer, could be for a very long term. The available statistics indicated between 11% and 42% [4,5] adherence level to the prescribed medication while between 37% and 80% affected individuals usually discontinued medication unduly [4]. Adherence to the prescribed medication, which is often compromised in these populations [4,5], is directly related to effective and efficient management of these diseases [6–8]. For example, while the prescribed medications are often effectual in managing disease(s), their full potentials are mostly not

reached because approximately 50% of patients do not take their medication(s) as prescribed by their physicians [9]. In some instances, multiple medication error may be due to patients' medical conditions or negligence [6].

Interventions to improve this situation hold enormous potentials toward alleviating the clinical conditions of these patients. In the literature, there are various options to prevent non-adherence to adequate medication regimen. For example, medication/pill box can only handle simple regimen [10] and requires sufficient cognitive capability. Medication management procedures [11,12] are also gaining prominence but mainly in developed countries. Dependent lifestyle on family members or hospital admission is another viable option. However, apart from the high care or medical/admission costs associated with this option, most of those services are not available in low resource settings. An inexpensive, automation-based and easy-to-use medication dispenser is of high interest as commercially available options are far beyond the reach of the vulnerable population living in low resource settings. The present study reported the