
FITT-table: Automatic Standing Table for an Active Work Style

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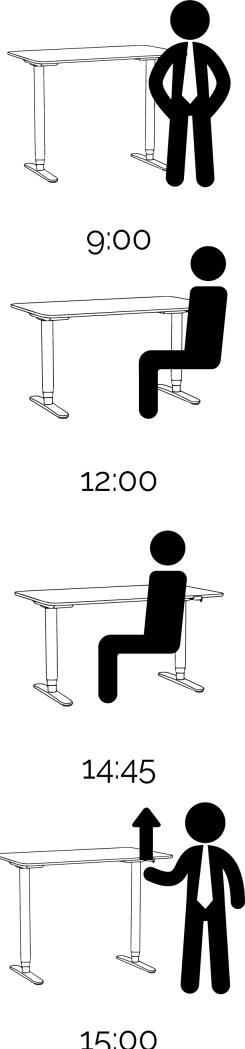
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Introduction

The work environment is changing with a growing number of flex working spaces. This results in individuals having to work behind different desks during the week. To improve the physical activity level of employees, sit-standing desks are provided to give individuals the possibility to have a more active work style. The use of sit-standing desks has been proven to enhance a more active and therefore healthy work routine (Chau et al., 2014. Garret et al., 2016). The availability and overall use of the desks is however not yet fully implemented in the work routine (Wallmann-Sperlich et al., 2017). The height adjustable desks give employees the option to switch from sit to stand position, but the height is set by the individual themselves. The height might therefore not be the correct height to work in an ergonomically good position, leading to discomfort (Lin et al., 2017). Guidelines should therefore be created so make sure employees can use these desks in an ergonomically responsible way (Lin et al., 2017).

DIS 2020 Workshop paper, July 6–20, 2020, Eindhoven, Netherlands.
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ACM ISBN 978-1-4503-6819-3/20/04.

Based on these insights, the initial version of the FITT-table was developed. The table is an automatic standing table which sets the table in the ergonomically approved sitting or standing hide depending on the preference of the user. By doing this, we want to create a personalized



desk which motivate employees to change position and have a more active work style.

Related work

When looking at active desks, cycle and treadmill desk are implemented in the office environment to enhance the activity pattern of individuals. These options give employees the option to be active, while conducting their work. These interventions improve the activity pattern of individuals, but do lower the overall work performance (Podrekar et al., 2020).

When looking at automatic sit-standing tables the work of Barbieri et al., (2017) shows a design which nudges individuals to switch to a standing position. In their design, they developed a semi-automatic table which schedules 10 minutes of standing after 50 min of sitting. User can agree, refuse or postpone (by 2 minutes). The results of implementing this table shows a reduce of sitting time contributed positively to their health and well-being, without interrupting their regular work (Barbieri et al 2017).

Based on the work findings of Barbieri et al., (2017) we want to further extent this by taking the daily activity pattern of individuals into account. The FITT-table will, next to being an automatic sit-standing table, collect the number of steps of users. The steps will use to identify active and non-active periods and adapt its sitting and standing position based on this.

FITT-table

The FITT-table is based on the existing IKEA automatic stand-sit BEKANT desk (IKEA n.d.). The controller of the table was disassembled and 3 wires are soldered on the UP, DOWN and ground in of the controller, based on the

example of Rantanen (2019). The three wires on the Ikea controller are connected to an Arduino mega. The Arduino mega is connected to a MFRC522 RFID sensor and an ultrasonic HC-SR04 distance sensor. The RFID reader is used to read the RFID cards which are used as tags to put the table in its standing or sitting position. The ultrasonic is used to measure the height of the table. A Particle photon is connected to the Arduino mega via the TX/RX connection. The Particle photon is used to obtain the step of the user. The Fitbit data is collected via the Fitbit API, which sends the steps of the user to the Particle cloud in a set time interval. The Photon is subscribed to the step data event and calculates if the user has more or less steps than a set threshold.

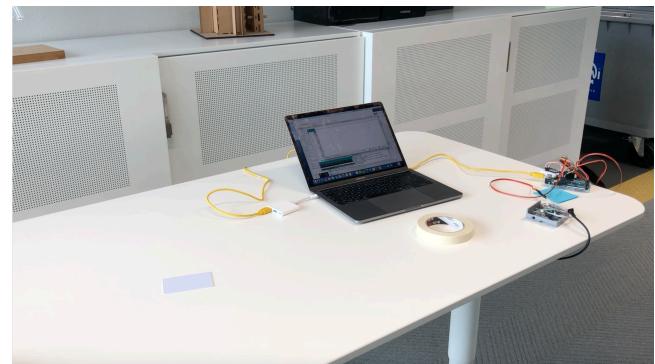


Figure 1. Development of the FITT table

Scenario

A person arrives at the office 9:00 and walk to one of the flex desks. She scans her employee card at the table and the table adjusts it height to a standing position, which she pre-determined as her preferable working position. The height of the desk is set together with a ergonomist to have a good working posture.

Figure 2: FITT-table scenario

After working standing for a couple of hours, she scans her employee card again and the table moves to its sitting position. She works in this position for several hours and her Fitbit measures that she had not been active. After several inactive periods, the table will move up, reminding the user to be active and change position during the work day.

Future development

The current version of the FITT table functions as a prove of concept and to explore the possibilities of automatic sit-stand tables to make people more active during their work routine. The current version of the table is however not ready to be set out in a field study. The table needs to be connected with the company data base to use the employee cards that are used within the company. A data logging system needs to be implemented to learn about the behavior of users. More research also needs to be conducted on the position changing of the table to find the opportune moments to go from sitting to standing, which fit in the working routine of individuals.

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