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**Faculty of Graduate Studies for Statistical Research**

**Department of Computer Science**

**The Smart Battery Charger**

**A Project Presented for Fulfillment**

**For Diploma Project in Computer Science**

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* **Abstract:**

In recent decades, smart devices have played the most significant role in human life, and power consumption has been one of the most trending issues. As a result, batteries and their lifespan have been one of the most sophisticated topics.

All people nowadays want to use smart devices for the longest time possible without recharge their batteries, that's because smart devices became one of the most important tools for all people regardless of their work positions or their business.

One of the solutions for dealing with this problem is trying to maintain battery lifespan as much as possible, so in this report, we introduce a smart solution to charge the battery with the standards that the major global companies advise, we support this hypothesis with many articles that specialist companies have been published.

This report discusses the design, implementation, and testing of a device that automates the charging process by protecting the human from the headache of monitoring the percentage of charging periodically.

* **Declaration:**

We here declare that the project entitled “The Smart Battery Charger” submitted for all training centers, and educational institutional, which serve the student affairs in smart and automated way.

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| --- | --- | --- | --- |
| No. | Name | Task | Signature |
| 1 | Mohamed Sayed Hemed | Hardware Implementation (Design Board & write low level codes) |  |
| 2 | Sherif Mostafa Samy | Software Implementation (Design interfaces & writing code) |  |

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* **Definitions, Acronyms, and abbreviations (Glossary)**

|  |  |
| --- | --- |
| UML | Unified Modeling Language |
| UAT | User Application Test |
| MCU | Microcontroller |
| IDE | Integrated Development Environment |
| PC | Personal Computer |
| UI | User Interface |
| CPU | Central Processing Unit |
| RAM | Random Access Memory |
| HD | Hard Disk |
| Li-ion | Lithium-Ion |
|  |  |

**Chapter 1: Introduction**

**1.1 INTRODUCTION**

In recent decades, smart devices have played the most significant role in human life,

and power consumption has been one of the most trending issues. As a result,

batteries and their lifespan have been one of the most sophisticated topics.

All people suffer from smart devices batteries that must be replaced periodically, and these battery's performance decreases almost daily.

This report discusses one of the smart solutions that depend on using the global standards of charging batteries taking into consideration the advice of specialist companies in this field like Apple and Samsung.

The overall goal of the project is to design, implement and produce (as a sale product) a tiny hardware device (tiny to be portable for any user) that can enable or disable charger functionality in real life.

We start to design a software that co-operate with this hardware in windows platform, designing of software is built to be able to develop to be multiplatform in future and able to contact with smartphones or tablets regardless their brands.

We design the software (that connects with the hardware device) to be compatible with Windows platforms.

Designing the software takes the concept of functional programming, parallel programming, and object-oriented programming in (C#9.0 & dotnet 5.0) to be much more flexible to has the ability to develop to be multiplatform in the future and able to contact with smartphones or tablets regardless of their brands.

**1.2 Motivation**

The motivation for designing this application came from some reasons:

Firstly: As students in the computer science department, the laptop is one of the most important tools for us, so we want to save its battery’s life as much as we can.

This is the first serious contribution to overcome this issue by building an intelligent device from scratch that saves batterie’s life, which based on Embedded Systems by combining software with hardware.

On other hand: for each student in any faculty or institution, a laptop can be one of the most precious especially for those who suffer from poverty.

Replace the battery with a little bit of money for these students can literally kill their studies progress, so we are seeking for saving money for these students to save their brains.

**1.3 Problem Definition**

Batteries do not have an infinite lifespan. Most battery manufacturers claim that their products have a 300-500 cycle rating [ ].

After this, batteries would be unable to carry as much energy and will only be able to fuel the computer for limited periods of time [qur21]

The wrong way of charging Lithium-Ion batteries which included in laptops leads to a decrease in batterie’s lifespan by 25% which in turn lead to replacing them frequently,

as well as frequently and randomly power outages which lost user’s work.

Leaving the battery connected to the charger when the battery is completely charged while you are using it may lower battery lifespan if you do it repeatedly [sam21]

“So, a good range to aim for when charging a Li-ion battery is from about 40% to 80%

in one go. Try not to let the battery drop below 20%” [qur21]

As battery’s cost has risen, it is necessary to save money and enhancing batteries’ performance, so solving this problem now not later is the correct choice.

**1.4 Background**

**1.5 Related works**

**1.6 Scope**