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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’s 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.

We propose to design a device that automate charging process by protecting the human from headache of monitoring 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 |
|  |  |
|  |  |

**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.

We designed a device that automates the charging process by protecting the human from the headache of monitoring the percentage of charging periodically.

The system is a user interface with a backend database and one tiny hardware component.

This system can monitor the batteries in any smart machine such as personal computers or laptops.

The system can monitor all critical resource usage and record transactions in real-time.

this record collects data about usage of (Central processing unit – random access memory - Hard Disk) and makes a type of live streaming for the user that can watch resources usage furthermore charger status (Online-Offline) and battery percentage.

User can also make some of the filtering operations and study their battery life cycle, so he/she can guess the time that battery will need to replace.

user can furthermore surveillance his/her average usage using the filtering operations over records and according to some criteria such date - time.

All of these at the same place, the same UI, and without tedious processes.

**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.

secondly: 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 decrease batterie’s lifespan by 25% which in turn lead to replace them frequently, as well as frequently and randomly power outage 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 chosen.