

**SMART TOOLBOX SENSOR LIGHTING (STOSEL)**

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**CIVIL ENGINEERING DEPARTMENT**

**SESI II :2023/2024**

**POLITEKNIK MELAKA**

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This report was submitted to the Civil Engineering Department as partially fulfilling the conditions of the award

Diploma of civil engineering

**CIVIL ENGINEERING DEPARTMENT SESI II :2023/2024**

**STATEMENT OF AUTHENTICITY AND PROPRIETARY**

**RIGHTS**

**SMART TOOLBOX SENSOR LIGHTING**

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Civil Engineering Diploma to us.

Done and truly acknowledged by that one;

ROBIN A/L STEVEN

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as project supervisor on date 20/11/2024 MUNIRAH BINTI ABDUL RAHIM

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**ABSTRACT**

In today's dynamic work environments, effective tool management and workspace safety are paramount. Traditional toolboxes often fail to address common challenges such as tool misplacement and inadequate lighting, which can hinder productivity and increase the risk of accidents. This project introduces STOSEL which stands for Smart Toolbox Sensor Lighting , an innovative solution designed to enhance tool organization through integrated sensor technology and built-in lighting.

STOSEL features a sophisticated sensor system that detects when tools are removed, providing real-time alerts to prevent accidental loss. Additionally, a fixed-intensity LED spotlight illuminates work areas, ensuring optimal visibility in low-light conditions. By combining these functionalities, STOSEL aims to streamline workflows, improve efficiency, and promote safe work practices.

The significance of STOSEL extends to various professional fields, including plumbing, contracting, and DIY projects. By addressing the pressing issues faced by these professionals, STOSEL demonstrates the potential of smart technology in everyday tools. This project not only highlights the innovative design of STOSEL but also paves the way for future advancements in tool functionality and safety standards.

In conclusion, STOSEL represents a crucial step towards improving workspace safety and efficiency. As industries continue to evolve, the incorporation of technology into everyday tools will be vital for fostering safer and more productive work environments.

**CHAPTER 1 INTRODUCTION**

# INTRODUCTION

In today's fast-paced world, tools are indispensable for various tasks. However, they often come with challenges such as misplacement or inadequate lighting conditions, hindering efficiency and safety. To address these issues, our project introduces a novel solution—a Smart Toolbox equipped with sensor and spotlight technology.

The primary goal of our Smart Toolbox is to prevent tools from being left behind unintentionally and to illuminate dark workspaces, thereby improving safety and productivity. The integrated sensor detects when tools are removed from the toolbox, triggering alerts to remind users to retrieve them before leaving the area. This feature not only prevents loss but also promotes responsible tool management.

Additionally, the built-in spotlight illuminates work areas, eliminating the need for external lighting sources and enabling users to work comfortably and accurately in low- light conditions. This ensures optimal visibility and reduces the risk of errors or accidents caused by poor lighting.

By combining sensor and spotlight technology, our Smart Toolbox offers a practical and innovative solution to common tool-related challenges. In this proposal, we outline our objectives, methods, and the potential impact of our project, highlighting its significance in enhancing tool safety and efficiency.

# BACKGROUND PROJECT

In everyday tasks and professional settings, traditional toolboxes have long been relied upon for storing and transporting essential tools. However, despite their ubiquitous presence, these toolboxes often pose challenges that can impede productivity and safety. One common issue is the accidental misplacement of tools, which can lead to wasted time and frustration as individuals search for missing items. Additionally, working in poorly lit environments presents another obstacle, as inadequate visibility can compromise the quality of work and increase the risk of accidents.

To address these challenges, our project introduces the Handy Toolbox—a versatile solution designed to enhance tool management and workspace illumination. By incorporating sensor technology, the Handy Toolbox detects when tools are removed from its compartments, providing users with real-time alerts to ensure no tools are inadvertently left behind. This proactive approach not only minimizes the risk of lost tools but also promotes responsible tool management practices.

Furthermore, the Handy Toolbox features a built-in spotlight that illuminates work areas with optimal brightness, eliminating the need for external lighting sources. This innovative feature enhances visibility, enabling users to work with greater precision and efficiency even in dimly lit environments. By providing adequate illumination, the Handy Toolbox creates a safer and more conducive working environment, reducing the likelihood of errors and accidents.

In summary, the Handy Toolbox represents a significant advancement in tool storage and usability. By addressing common challenges such as tool misplacement and inadequate lighting, this innovative solution aims to streamline workflows, improve productivity, and enhance safety in various work settings.

# PROBLEM STATEMENT

In many work environments, especially those involving laborers, technicians, and workers who rely on hand tools, tool management is a persistent issue. Tools are frequently misplaced or left unattended after use, leading to significant time wastage and operational inefficiencies. This not only disrupts workflow but also increases the likelihood of lost or damaged tools, resulting in higher replacement costs. Many existing storage solutions lack mechanisms to address such problems, leaving users dependent on manual efforts to keep track of their tools.

Additionally, inadequate lighting in poorly lit areas or emergency scenarios poses safety hazards and further reduces productivity. Workers often struggle to identify the right tools or complete their tasks efficiently in these conditions, especially when traditional toolboxes do not include integrated lighting solutions. The absence of multifunctional and user-friendly tool storage options leaves workers with limited choices, forcing them to compromise on convenience, safety, and functionality.

To address these challenges, there is a pressing need for a comprehensive solution that combines efficient tool organization, proactive loss prevention mechanisms, and built-in lighting features. Such a solution must be compact, cost-effective, and tailored to meet the practical demands of laborers and field workers, ensuring improved efficiency and enhanced safety in their daily tasks.

# PROJECT OBJECTIVE

## To ensure user satisfaction

By providing an organized and efficient toolbox system that addresses the common challenges of tool misplacement and disorganization, the product aims to enhance the overall user experience and productivity.

## To enhance product functionality

Integrating advanced features such as a built-in buzzer to detect tools not returned, a lighting system for use in poorly lit or emergency conditions, and a mobile app with GPS functionality to locate the toolbox ensures that the product is practical, modern, and user-centric.

## To achieve ergonomic design

By prioritizing ergonomics, the toolbox is designed to be lightweight, compact, and easy to handle, ensuring user comfort and convenience during transport and usage.

## To promote safety and efficiency

Through its innovative features and ergonomic design, the toolbox aims to create a safer and more efficient working environment for laborers and workers.

## To cater to user-specific needs

The product is tailored to meet the demands of various industries, ensuring adaptability and relevance across diverse work environments.

# SCOPE OF THIS PROJECT

## Portability and Weight Management

The toolbox is designed with a maximum weight limit of 12 kg, ensuring it remains lightweight and easy for users to carry, even during prolonged usage or transport.

## Tool Storage Capacity

The system can store up to 15 hand tools, offering users a practical and organized solution for efficient tool management in various work environments.

## Integrated Lighting System

Equipped with a bright spotlight, the toolbox enhances visibility in poorly lit or dark environments, ensuring user safety and convenience during operations.

## Energy-Efficient Power Source

The toolbox utilizes solar energy to power its lighting system, making it an environmentally friendly and energy-efficient solution suitable for outdoor and remote work areas.

## Durable and Lightweight Materials

Constructed from wood with an aluminum frame, the toolbox achieves a balance between durability and portability, ensuring it withstands regular use without compromising on weight or structure.

## Customizable Tool Layout

The toolbox features customized compartments, designed to meet the specific needs of users by accommodating different types and sizes of tools, enhancing accessibility and organization.

## Targeted Functionality for Users

The toolbox combines practical features such as a limited weight, sufficient storage capacity, durable materials, and energy-efficient lighting, making it ideal for laborers and field workers who require a portable and reliable tool management solution.

# IMPORTANCE OF THIS PROJECT

The STOSEL project is vital in revolutionizing tool management by offering an organized, portable, and user-friendly solution tailored to laborers and field workers. With a lightweight, ergonomic design and a maximum weight of 12 kg, it ensures easy handling while accommodating up to 15 hand tools in customized compartments. The integration of a solar-powered lighting system enhances safety and functionality in poorly lit environments, promoting sustainability and reducing energy costs. Additionally, the built-in buzzer prevents tool misplacement, saving time and improving workflow efficiency. By combining practicality, durability, and innovation, STOSEL not only addresses common workplace challenges but also inspires advancements in everyday tools, making it an indispensable asset for workers in various industries.

# SUMMARY

Chapter One presents the STOSEL project, which aims to address key issues faced by laborers and workers, including tool misplacement, safety hazards, and lack of efficient organization. The project focuses on providing a portable, user-friendly toolbox that includes a built-in buzzer to detect misplaced tools, a solar-powered spotlight for enhanced visibility in dark environments, and an ergonomic design with a maximum weight of 12 kg for easy transport. The toolbox can store up to 15 hand tools in customized compartments, ensuring organized tool management. Constructed with durable wood and an aluminum frame, STOSEL is designed to be both lightweight and sturdy, making it suitable for various work settings. The project also emphasizes sustainability through the use of solar energy, making it an eco-friendly and cost- effective solution. STOSEL ultimately aims to improve efficiency, safety, and organization in the workplace, while inspiring innovation in everyday tools for the modern worker.