

# Chapter 80

## Electronic Sustainability in Libraries With Microcontrollers: Applications

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### ABSTRACT

*Electronic sustainability can be achieved using simple microcontrollers by saving energy, time, and manpower and safeguarding the resources from accidental or intentional loss. Implementation of such an electronic framework does not require huge investments or special skills but will save a lot on automating simple tasks basically micro-computers that can be programmed to control operations with endless day-to-day applications. Arduino microcontroller is used widely in making mini projects that can be effectively connected to systems for better electronic governance in libraries like avoiding theft, saving electricity, saving water, data streaming, live system allocation, automatic system shut down, scheduler, etc. Their applications can be broadened by our own creativity. Electronic components in the form of switches, buttons, sensors, etc. work as input devices. Motors, lights, buzzers, display boards, etc. can be used as visual and sound output devices. All the software is available from Arduino DLE free library, and the components are easily customizable and connectable.*

### 1. INTRODUCTION

Arduino Uno microcontrollers are compact and easily programmable, offering a wealth of freely available software codes within the Arduino Community. These codes are customizable to suit individual needs. The controllers are both cost-effective and reprogrammable, providing a replaceable solution with versatile functionalities that seamlessly integrate into various projects. One notable feature is their multiplatform compatibility, distinguishing them from other controllers.

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Given that most modern computers lack serial ports, Arduino Uno's adaptability stands out. Even beginners can program it through a USB cable, eliminating the need for a dedicated serial port. This adaptability extends to customization, as controllers can be tailored and operated using open-source software, complemented by downloadable circuit diagrams.

The use of basic and inexpensive components, coupled with essential tools and a touch of creativity, allows for the execution of simple projects. This not only fosters experimentation but also enhances library efficiency. The affordability and replaceability of components further contribute to the accessibility and popularity of Arduino Uno.

The Arduino project goes beyond traditional compiler tool chains, offering users an integrated development environment (IDE) for a user-friendly coding experience. Additionally, a command line tool developed in Go provides an alternative for those who prefer command-line interfaces or seek automation in their projects (Arduino Playground - DHTLib, n.d.; Team, n.d.).

## **2. BACKGROUND**

Libraries, being user and service centric, has lot of commitments at different levels of skills. Many slight skilled work like turning on and off lights, computers, printers, internet connectivity, sensors, cameras etc. Few regular jobs like watering plants, adjusting the moisture control, air conditioning, allotting systems to users etc. which are too labourious still very simple tasks. These labourious tasks do not need any skill set but claims time and labour. Therefore, automating these simple tasks with systems that are too easy to handle, especially without any help of a professional body will save time and energy which has direct impact on economic and efficient use of human and other resources.

## **3. WHAT CAN ARDUINO DO IN LIBRARIES?**

Arduino can be used in libraries in:

1. Theft detection and control
2. Live system access time management
3. Automatic on and off lights
4. Flood alarm
5. Fire alarm
6. Intruder alert and alarm (Kalpana et al., 2022)
7. Auto watering system for plants
8. Air conditioner - Automatic on and off with Moisture control
9. Automatic temperature monitor
10. Solar panel data streamer
11. Parking lot management

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