DESIGN AND CONSTRUCTION OF AUTOMATIC DOOR OPENER WITH LIGHTING CONTROL USING ARDUINO

By

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Introduction

► An Automatic Door Opener with lighting control using arduino is a simple project which automatically opens and closes the door by detecting a person or object.

► You might have seen Automatic Door Opener Systems at shopping malls, cinemas, hospitals etc. where, as soon as a person approaches the door (at about 2 or 3 feet), the door automatically slides open. And after some time (about 5 to 10 seconds), the door closes by sliding in the reverse direction.

► Such Automatic Door Opener Systems are very useful as you do not need a person to standby the door and open it whenever a guest comes. Also, since the doors are opened and closed only when a person approaches the door, there is significantly less loss of air conditioning.

MOTIVATION

My motivation extends to the core principle of inclusivity, ensuring that technology serves all individuals, regardless of physical disabilities. By creating a hands-free and customizable entry system, i aspire to break down barriers and foster a sense of independence for those who may face challenges in navigating traditional doors.

Furthermore, the project aligns with current global concerns, providing a hygienic solution by minimizing physical contact with door handles. This feature is not only timely in addressing health considerations but also positions the Automatic Door Opener as a practical and forward-thinking addition to public spaces, reflecting a commitment to the well-being of the community.

PROBLEM STATEMENT

Opening and closing of doors have been always a boring job, especially in places where a person is always required to open the door for visitors such as hotels, shopping malls, and theaters.

This manual process becomes a significant hindrance for individuals with disabilities, limiting their independent access to public spaces. Additionally, the conventional door operation lacks energy efficiency and often leads to unnecessary resource consumption, contributing to environmental concerns.

My project addresses these challenges by developing an Automatic Door Opener with Lighting Control using Arduino, streamlining entry processes, enhancing accessibility, and promoting sustainable practices.

AIMS AND OBJECTIVES

AIM

► The aim of this project is to design and construct an automatic door opener with light control using Arduino.

OBJECTIVES

► To building a system that will independently open the Door without human effort.

► To develop a low cost system in other to maximize profit and make it marketable.

► To established a mathematical analysis and over all design of automatic door opener with lighting control using Arduino.

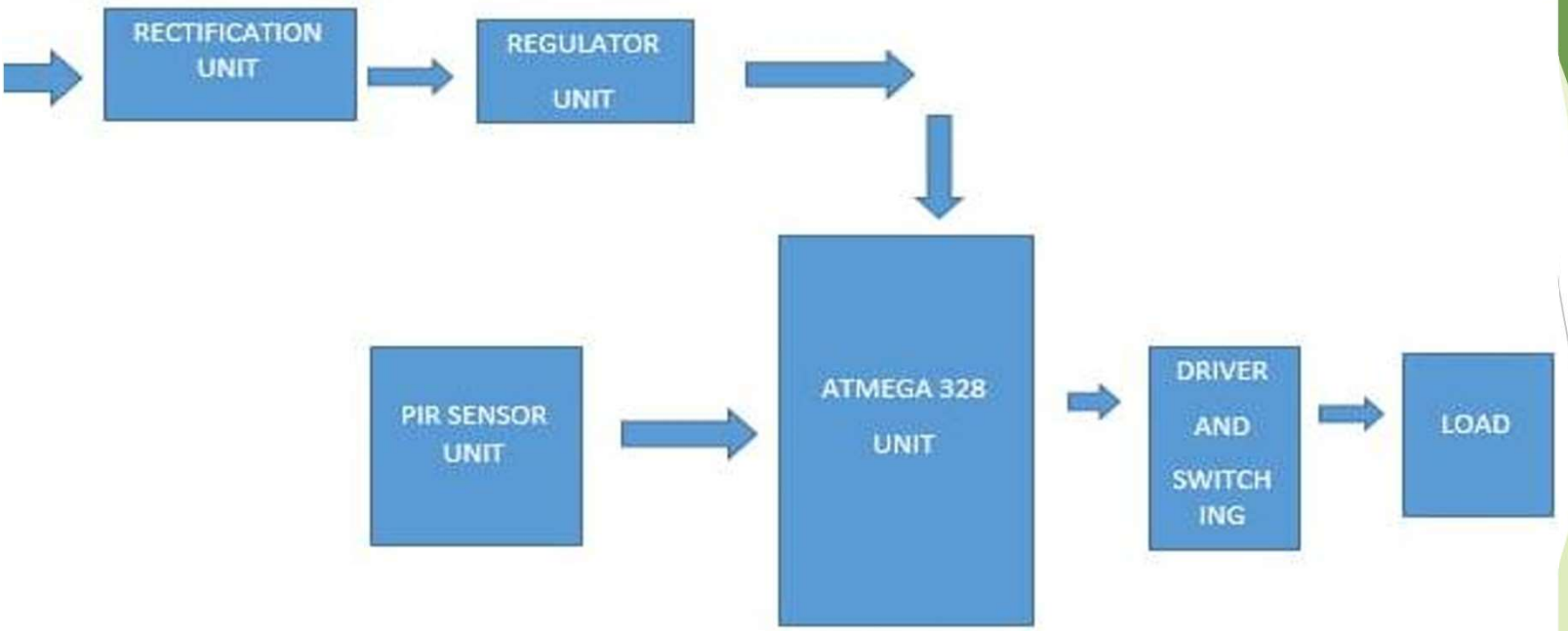
SCOPE

ATmega 328 is used to achieve the Opening and closing the door with the help of PIR sensor for proper.

LITERATURE REVIEW

S/No	Author	Focus	Contributions	Research Gap
0	Adeyemo and Kity (2021)	Humidity Measurement with IoT	Proposed the use of Mk723 sensor with PIC18F826 and Wi-Fi for humidity measurement	Characterised with low sensitivity and could not be view on android.
1	Lane and Joshi (2016)	Raspberry pi Firewall and Intrusion Detection System	The Raspberry Pi is connected to a network switch which has two configured virtual area networks (VLAN) to make a wider network.	IDS systems have the ability to monitor the network frequently, identify potential threats and log related events and stop attack.
2	Ahmed and Sadiq(2016)	Raspberry Pi-Based Investigating Model for Identifying Intrusion Evidence	The algorithm is envisioned to aid the research in the sense of identifying any anomaly activities from captured traffic for investigation purpose	It is essential for detecting and analyzing possible threats against monitored system
3	Taihr and Asmaa A. (2022)	Raspberry Pi home automation	A Node-Red program was installed in the Raspberry Pi for vehicle owners who want to control their vehicles in emergency cases	A technology in which engine is started via wireless
4	Gurmeet and Mikail (2019)	IoT LPG leakage detector project using Arduino	The relative simplicity of ARM processors made them suitable for low power application	ARM11 processor gets sensor data per minute

BLOCK DIAGRAM



- FIGURE 1:BLOCK DIAGRAM OF AUTOMATIC DOOR OPENER WITH LIGHTING CONTROL SYSTEM.

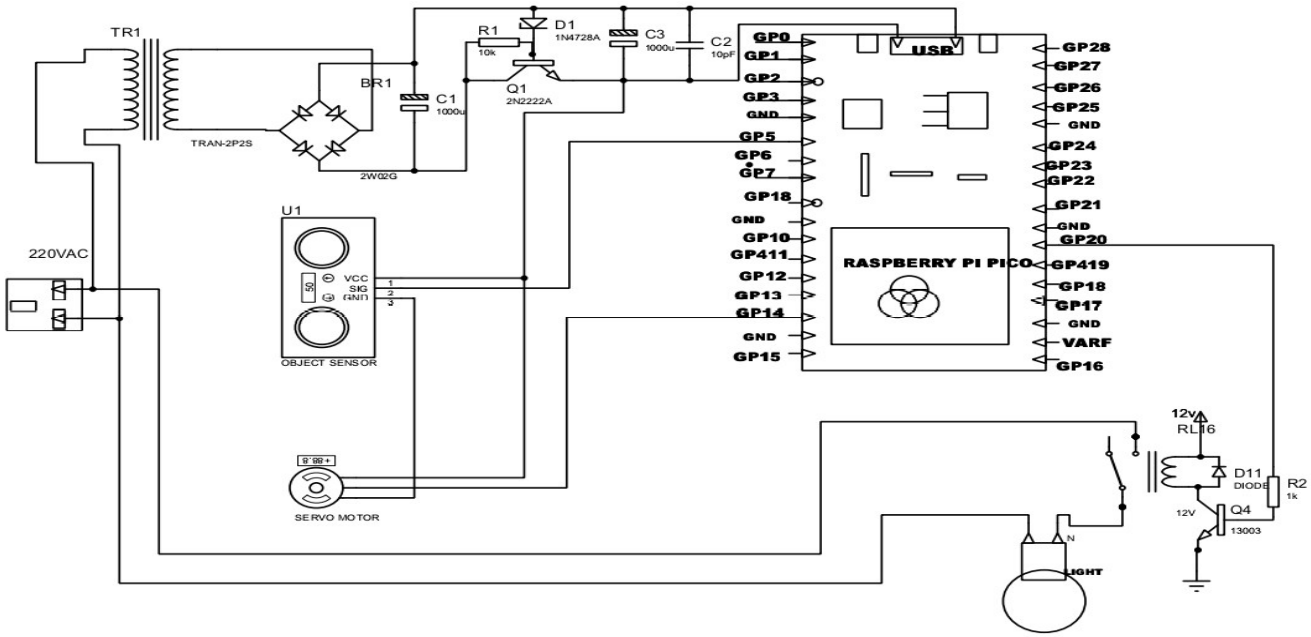
Design and calculations.

- DESIGN
- Certainly! Designing an automatic door opener with lighting control using Arduino involves integrating sensors, a motor driver, and relays for controlling the door and lights. Below is a basic outline of the design and calculations.

CALCULATIONS

1. **Motor Power Supply:**
    1. Calculate the motor's power requirements (voltage and current).
    2. Ensure the motor driver can handle the required current.
    3. Provide a separate power supply for the motor if needed.
2. **Relay Power Supply:**
    1. Determine the voltage and current requirements of the lighting system.
    2. Make sure the relay can handle the lighting system's power.
3. **Safety Considerations:**
    1. Implement safety features, like an emergency stop button.
    2. Ensure that the door movement is smooth and won't cause harm.
4. **Sensor Placement:**
    1. Place the sensors strategically for effective motion and presence detection.

CIRCUIT



- FIGURE 2: CIRCUIT DIAGRAM

PICTURE OF CONSTRUCTED WORK

RECTIFICATION UNIT

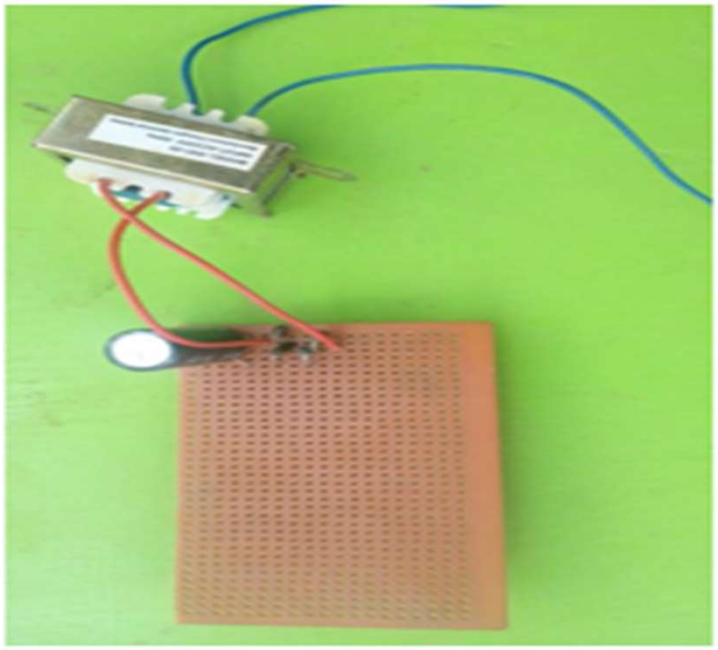


FIGURE 3: RECTIFACTION UNIT

REGULATION UNIT

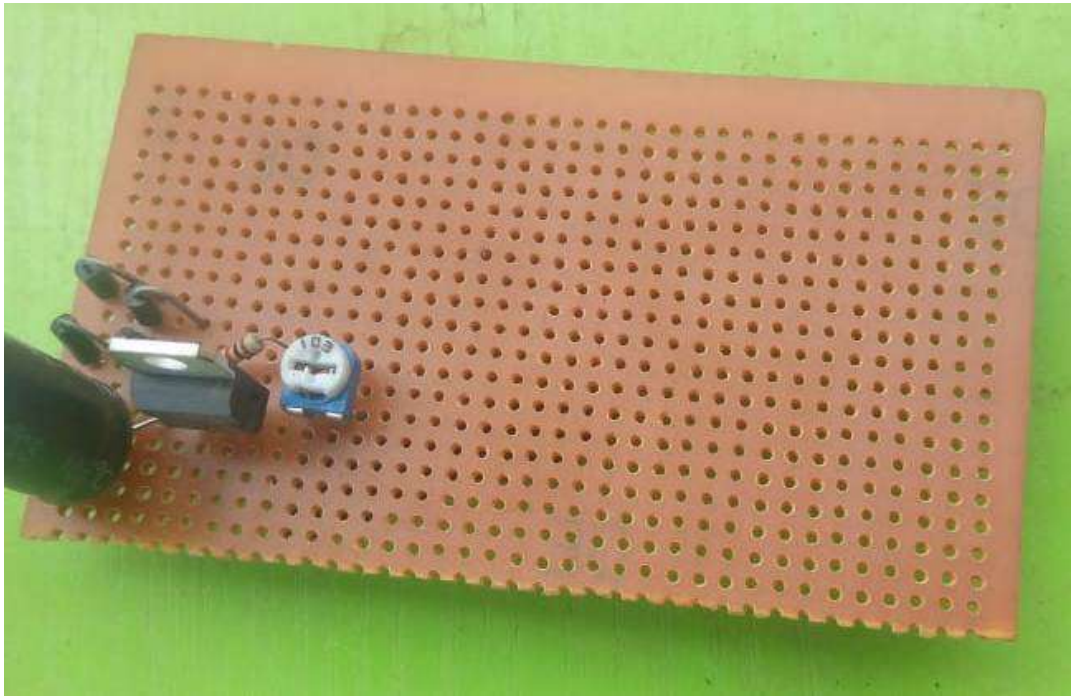


FIGURE 4: REGULATION UNIT

PIR SENSOR

FIGURE 5: PIR SENSOR

ATMEGA 328

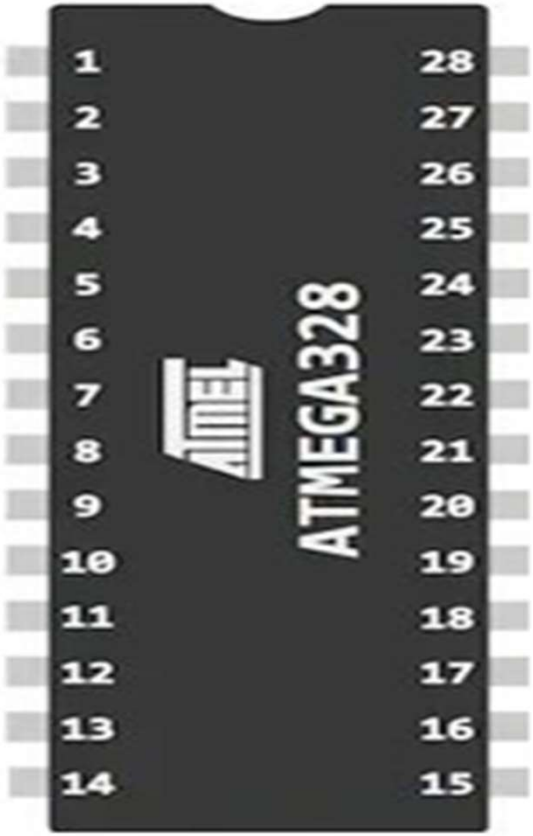


FIGURE 6: ATMEGA328

DRIVER AND SWITCHING UNIT

FIGURE 7: DRIVER AND SWITCHING UNIT

RESULT FROM TESTS

POSITION OF THE SYSTEM	TIME BEFORE PIR SENSOR IS ESTABLISHED(S)	POSITION LIGHT	TIME FOR COMPLETE OPERATION OF OPENING AND CLOSING THE DOOR (S)
Off	0	Off	0
ON	20-30	ON	6-8

BILL OF ENGINEERING AND MEASUREMENT

S/N	DESCRIPTION	QTY	UNIT	RATE (₦)	AMOUNT IN NAIRA
1.	Lamp holder	1		250	250
2.	100W Lamp	1		250	250
3.	Power cable	3		500	1,500
4.	Casing	1		10,000	10,000
5.	LM 317 Regulator	1		500	500
6.	Capacitor	4		500	2,000
7.	IC Holder	1		200	200
8.	Jumper wire	2		500	1,000
9.	D.C motor with Holder	1		5,000	5,000
10.	D.C Relay	3		700	2,100
11.	Transistor 2n2222	3		450	1,350
12.	Crystal Oscillator	1		500	500
13.	Arduino Uno board	1		30,000	30,000
14.	PIR Sensor	1		20,000	20,000
15.	Vero Board	1		1,500	1,500
16.	Stepdown Transformer	1		3,000	3,000
17.	IN 4007 diodes	7		350	2,450
	WORKMANSHIP				10,000
	TRANSPORT				20,000
	TOTAL AMOUNT				111,600

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You are welcome.

THANK YOU