NATIONAL INSTITUTE OF TECHNOLOGY AGARTALA
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DIGITAL LOCKING SYSTEM

DEPARTMENT : ELECTRONICS & INSTRUMENTATION ENGINEERING

~SUBMITTED BY~

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4th SEMESTER

DIGITAL LOCKING SYSTEM

~ DIGITAL ELECTRONICS PROJECT ~

ABSTRACT

An auxiliary power system is designed to provide supplementary power to support essential functions during main power outages or fluctuations. This system ensures the continuity & reliability of critical operations by supplying power to essential equipments, such as emergency lightings, safety systems & communication devices. Typically an auxiliary power system includes components such as backup generators and battery storage. It is integral to maintaining operational stability & safety in various settings including industrial plants, data centres, & healthcare facilities. Its effectiveness hinges with the primary power infrastructures and timely activation during power disruption.

CONTENTS

COMPONENTS

SL.NO.	COMPONENT	SPECIFICATIONS	QUANTITY
1	BATTERY	9V,4V	3
2	LEDs	RED,GREEN	2
3	Diodes	—	2
4	BULB	—	1
5	NPN TRANSISTOR	50V,800mA	1
6	RESISTORS	100Ω,1kΩ	6
7	CAPACITOR	470mF	3
8	BREADBOARD	—	1
9	NAND Gate	74HC00	1
10	CONNECTING WIRES	—	AS REQD.

ESTIMATED COST: ₹660.00

CIRCUIT DIAGRAM

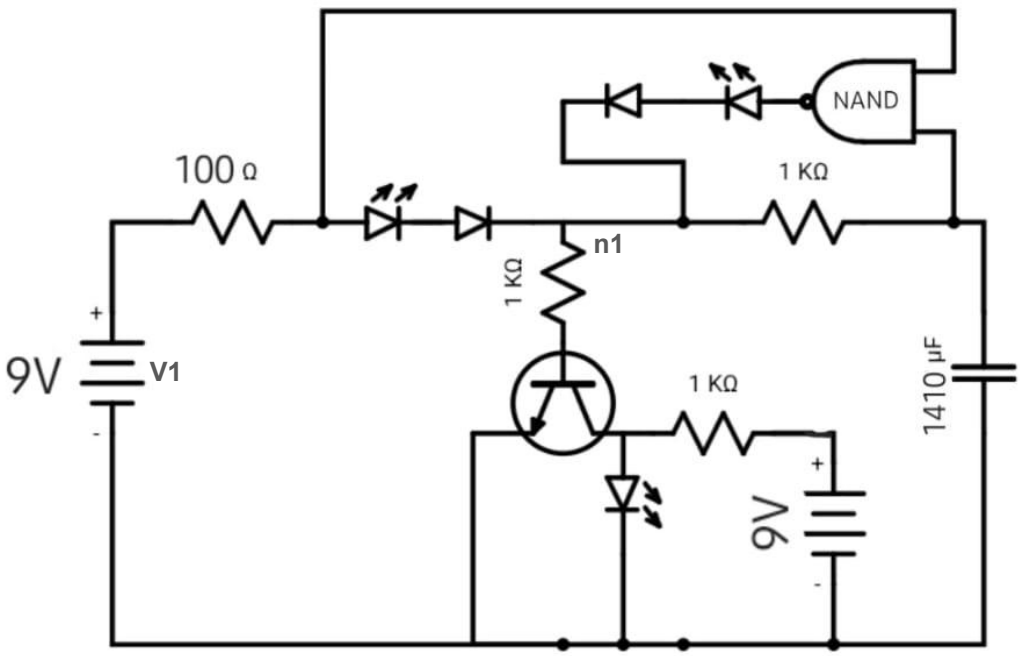

FIG: CIRCUIT DIAGRAM FOR OUR AUXILIARY POWER SYSTEM

WORKING PRINCIPLE

In our project we have made an auxiliary power system, which can store and amplify energy and use it for the load when there is a cut in the main line. This sub-system can be installed in devices of utmost importance so that, it can ever run by itself when there is power cut. This sub-system is meant for devices operated by AC sources but, a model has been made by rectifying an AC source and converting it to DC by default. We came up with a circuit using various electronic components, which is capable of doing the aforesaid functions. The description on how this works is represented:

ABBREVIATIONS:

V = Input voltage
L1 = LED 1 (Green)
L2 = LED 2 (Red)
C = Capacitor
B1 = Bulb (load)
Q1 = npn transistor
R = Resistor

- **CASE 1: When Main line is supplying power**

  When there is power in the main line i.e. V1 is connected, current flowing through the V1 i.e. the 9V battery we have used, flows through the 100Ω Resistor & subsequently through the LED & diode, thus lightening the Green LED. A branch from the same line goes to one input terminal of the NAND gate. The current then separates at the node n1 containing the transistor (Amplifying) & directly to the load. The transistor is biased in CE configuration, to yield maximum amplification. Thee yellow LED which is being used as the load here glows. A 9V source is used as Vcc .From the node another branch directly goes to the capacitor and charges them. From the capacitors one branch goes to another input terminal of the NAND gate. The capacitor is in charging mode ,as it accept charge which flowing from the main line.Here, NAND gate receives logic from both the input (as there is live connection in both branches) and gives out logic zero as output, as a result, the LED 2 i.e. red LED does not glow .the glowing of green LED and yellow LED represents that there is power coming from the main line.

- **CASE 2: When there is power cut**

  When there is a power cut i.e. V1 is disconnected. In this case, the green LED does not glow because there is no active power source to it. As there is no live source, the capacitor starts discharging and the NAND

gate receives logic 1 from the capacitor input and gets logic 0 from the main line input. Therefore, the output gives out logic 1, as a result the red LED glows, which shows that there is a power cut. The current from the capacitor flows and reaches the transistor, which amplifies the current and passes it to the yellow LED , which acts as load. Hence, it works as an Auxiliary Power System, when there is no main line power.

REFERENCES

YOUTUBE CHANNELS :

- Engineering Funda
- ALL ABOUT ELECTRONICS
- #LearningElectronics
- EETutorials

WEBSITES

- https://ocw.mit.edu
- https://www.eeeguide.com
- https://www.researchgate.net