

Electronic projects for ICT for Rural Development

Project Report

Submitted in Partial fulfilment of the requirements
for ICT

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Abstract

The aim of the projects was to pass on the benefits of current enhancements in electronics technology to the Rural population of India in a cost effective and robust manner to resolve problems related to ICT. We have been successful in providing two solutions, one for recycling fused tube lights and the other for providing protection to pump motors of farmers from rising water tables due to unpredictable rain.

CONTENTS

Abstract

Table of Contents

1. PROJECT GOALS AND MOTIVATION	1
2. APPROACH	1
3. ACCOMPLISHMENTS / SOLUTIONS	1
a. Recycling burnt out tube lights	1
b. Water table alarm for wells with pump protection	1
4. PROJECT DETAILS	1
a. Recycling burnt out tube lights	1
b. Water table alarm for wells with pump protection	2
5. CONCLUSION	4

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1. Project goals and motivation

The goal of this project is two fold:

- To provide cheap practical solutions to resolve ICT problems
- Secondly to try and pass on the benefits of evolving technology to Rural Indian population.

2. Our Approach

We selected our projects based on problems from **Kalbag's list of electronics projects** presented on our ICT website. We selected projects that we thought would be firstly practically implementable and secondly be affordable and useful to Rural India.

3. Accomplishments/ Solutions

- Recycling burnt out tube lights.** We made a small electronics circuit which can light almost all burnt out tube lights. The main motivation was to use discarded burnt out tubes at a cost lower than the cost of new tube light. Our circuit accomplishes this with a handful of components at a cost of Approx Rs 40/- the same as the cost of a new tubelight. rod without the fixture.
- Water table alarm for wells with pump protection.** Farmers have wells where the water table goes down below 9 meters and then the pumps don't pump out water. So they lower the pumps on a hanging platform. When the rains come, the table rises, and some times it floods the motor and they have to rewind the motor. This happens every year. Our circuit is a two stage system warning the farmer first of the rising water table at two stages and secondly not allowing the farmer to switch on the pump if it is immersed in water. The pump does not switch on till it is reasonably dry. The circuit is robust and can be made from handful of components and should cost less than Rs 100/- to implement.

4. Project details

a. Recycling burnt out tube lights.

The circuit diagram below shows the circuit used. The circuit is self explanatory in nature. A list of components is provided separately. The approx cost of these components is Rs 40/-

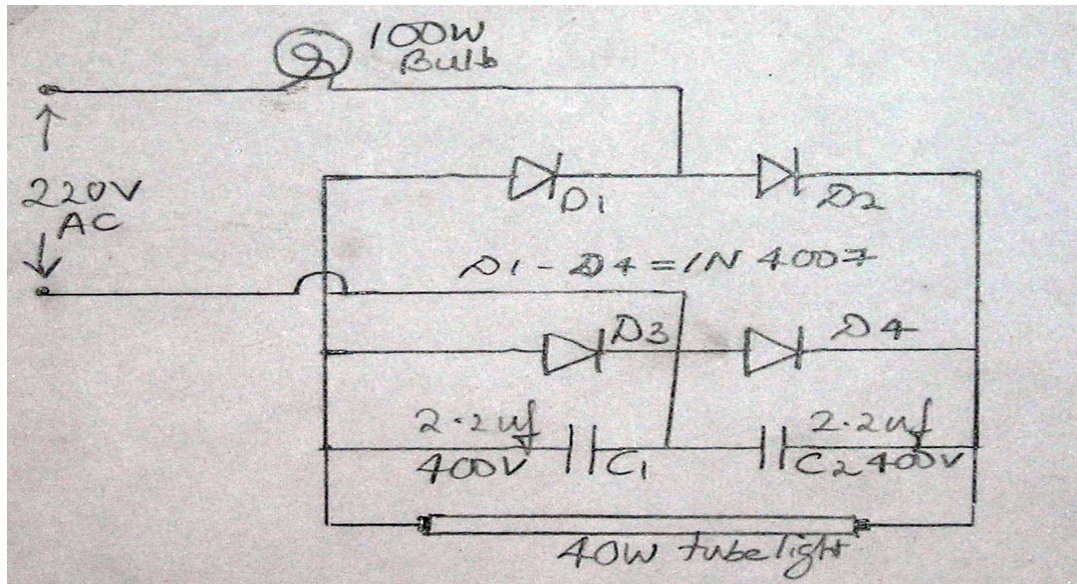


Fig: Circuit for lighting burnt tube lights

Components list:

1. Diodes D1-D4---IN4007
2. Capacitors C1,C2-----2.2uF 400V Bipolar (same as used in ceiling fans)
3. L1-----100W 220V lamp

b. Water table alarm for wells with pump protection

The circuit diagram below shows the circuit used. The circuit uses two transistors as a switch. When water touches the electrodes the base gets forward biased and the transistor switches on. Both probes use similar circuits the only difference being transistor T2 is a Darlington pair to provide higher current to energise the relay and also drive the beeper. Diode D4 provides protection to T2 from spikes generated due to energising and de-energising of the relay coil. The relay selected is an ordinary 9V relay with the contacts rated at 10A 220V. LED's are used for visual indication and a beeper is used for audio alarm. The probes can be made from ordinary aluminium wire as it does not get corroded on contact with water. The NC contacts of the relay are used in series with the water pump to act as a switch. On second Alarm the motor is cut off from the mains supply thus preventing damage to the motor from water. A backup 9V battery is provided with a PTT switch to permit the farmer to check the water levels in the absence of electricity. The battery is normally not connected and should last for a very long time virtually not requiring replacement. The battery portion of the circuit is optional and can be removed to further cut down cost but this is not recommended by the author. The unit is meant to be mounted next to the pump on off switch. The circuit at

present works for single phase motors and can be adapted to 3Ph motors by simply replacing the relay with one suitable for 3Ph operation. A list of components is provided separately. The approx cost of these components is around Rs 50/-.

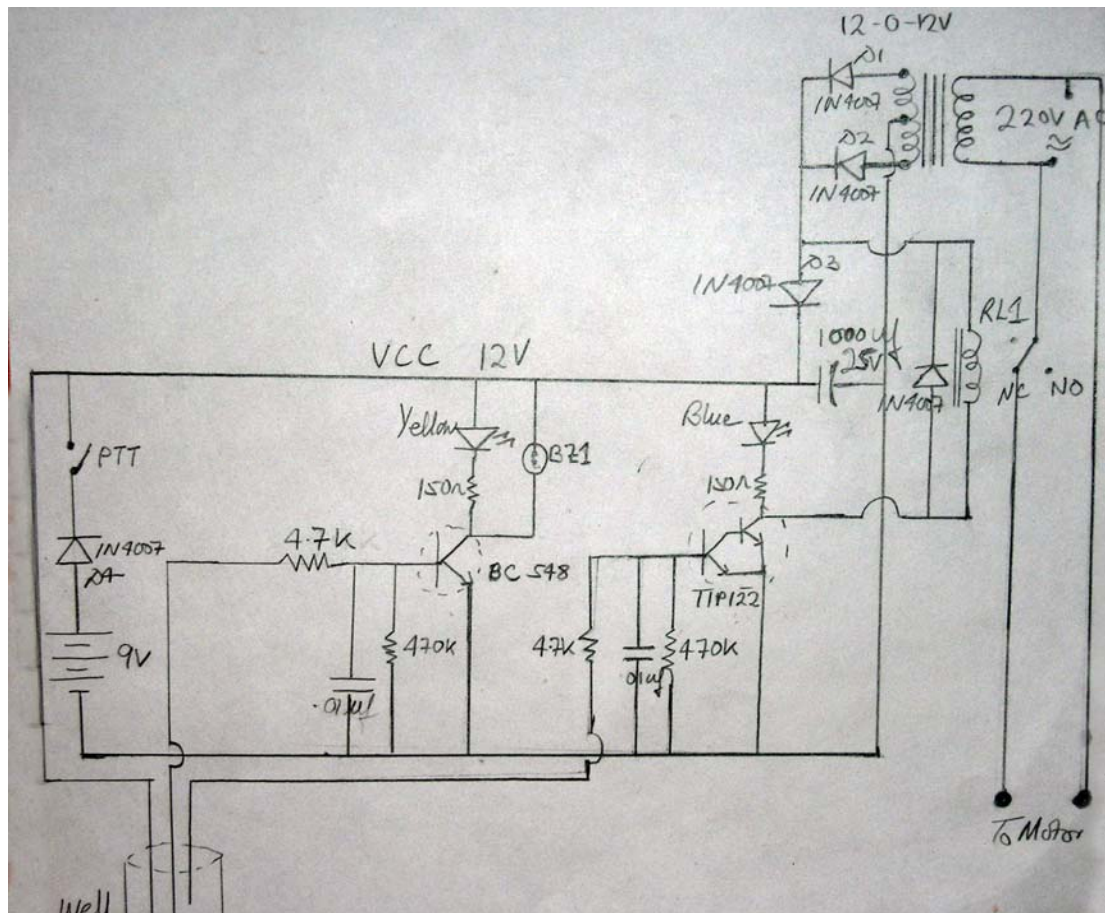


Fig: Circuit for water level indication and pump protection

Components list:

1. Diodes D1-D4---IN4007
2. Resistor R1, R3—4.7K
3. Resistor R2, R4—470K
4. Resistor R5—1K
5. Resistor R6, R7----150ohms
6. Capacitors C1,C2----.01uF
7. Battery 9V
8. Relay 12V 400ohm coil with contacts rated at 220V 10A
9. Transistor T1---BC548
10. Transistor T2---TIP122
11. Transformer TR----220V to 12V AC step down.
12. BZ1---Buzzer 6V

13. LED----- blue, yellow (3mm)

Note: A similar buzzer can be added with the blue LED in same manner if required. The probes can be common household Aluminium electric wire with sleeve removed.

5. **Conclusion**

These solutions have been tested for a limited period of time by the author and no problems were evident from the short trials.

The tube light circuit though generic may not work for all tube lights as it depends on what is the condition of the burnt out tube light, but should work in 90% of the cases flawlessly. Sometimes the tube may have to be touched with your hand in case the voltage at your location is low.

The water level indicator and controller work without a problem. The recommended distance between the probes is about 1-2 cm however larger distance should not pose any problems. The build quality of the circuit and components such as relay quality are important for the circuit to work for many years. Relays from PLA are generally found to be of good quality but are costly.
