# SECURITY SYSTEM FOR PROTECTING EXPENSIVE COPPER CABLES FROM ROBBERS AT ISOLATED TELECOMMUNICATION TOWERS

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## ABSTRACT

Telecommunication industry of Sri Lanka contributes significantly towards the development of the country as one of the most demanding and fastest growing industry while playing an important role in everyone's life. In telecommunication, Towers and Base Transceiver Stations (BTS) can be identified as vital components which facilitate wireless communication between user equipment and a network. As a rapidly developing technology, the most significant problem faced by the wireless telecommunication is the theft of expensive copper cable and copper tapes which are widely utilized as earthings and protection method for lightning. Some of the major reasons behind this stealing problem are the unavailability of a well-equipped and effective security system especially in the isolated towers in rural areas and the expensiveness of copper. All the service providers experience this problem and it affects their financial condition, quality of the service, security expenditure and so on. Therefore we have identified the above problem during the industrial training and therefore more convenient security system was designed by considering several systems which is capable to aware the responsible persons whenever the copper tape is cut down.

**Keywords:** *Telecommunication towers, Piezo sensor, Atmel Microcontrollers, The Vibration based Copper wire cutting sensing circuit.*

## 1.0    INTRODUCTION

### 1.1    Piezo Sensor

The LDT0-028K is a flexible component comprising a 28 μm thick piezoelectric PVDF Polymer film with screen-printed Ag-ink electrodes, laminated to a 0.125 mm polyester substrate, and fitted with two crimped contacts.

As the Piezo film is displaced from the mechanical neutral axis, bending creates very high strain within the piezopolymer and therefore high voltages are generated. When the assembly is deflected by direct contact, the device acts as a flexible "switch", and the

generated output is sufficient to trigger MOSFET or CMOS stages directly. If the assembly is supported by its contacts and left to vibrate "in free space" (with the inertia of the clamped/free beam creating bending stress), the device will behave as an accelerometer or vibration sensor[1,2].

## 1.2 Arduino Board

Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators. The microcontroller on the board is programmed using the Arduino programming language (based on Wiring) and the Arduino development environment (based on Processing)[3]. An Arduino board consists of an Atmel 8-bit AVR microcontroller with complementary components to facilitate programming and incorporation into other circuits. An important aspect of the Arduino is the standard way that connectors are exposed, allowing the CPU board to be connected to a variety of interchangeable add-on modules known as shields. An Arduino's microcontroller is also pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory, compared with other devices that typically need an external programmer[4].

All the above facts contributed for the development of the proposed new vibration sensor based Copper Wire cutting sensing device. Although many other techniques such as "Earthing Ring and potential divider" technique based new method had used as Trial and error technique in order to develop the convenient cupper wire cutting sensor without acknowledging the robbers.

## 2.0 EXPERIMENTAL

For the implementation of this system a Piezo sensor was used, as the system should be accurate and cost effective. After analyzing the requirements, the sensor circuit was designed by using an Arduino board to give an output via a LED, to indicate the vibration which is detected by the vibration sensor. Next determined how and where to place the circuit and after that decided to give the output to the alarm panel in the BTS.

## 3.0 RESULTS AND DISCUSSION

As a result of this proposed new sensing device, the problem of stealing the Copper cables and tapes in Telecommunication towers can be prevented into some extent. After

implementing this system on the copper tapes in towers, the service providers will be able to identify when a copper tape is cut down and hence they can react soon.

This project will contributes for gaining profit for the communication sector mainly by saving the money that they are spending for the down conductors and the copper cables (Earth cables) due to such robberies. By this, the organizations will have an effective and accurate system to protect copper and definitely it will provide a better solution for the existing major problem.

## 4.0 CONCLUSION

During the training period we have identified the expensive copper cable cutting problem in the isolated telecommunication towers as one of the major problems faced by the telecommunication sector. Therefore, we have designed the proposed security system to protect the copper cables/tapes used as down conductors and earth cables from robbers.Also, the technique is implemented in a mini prototype environment. With further development, this system can be applied in isolated towers since the robbers tend to rob the copper tapes in those towers. This design will be giving the necessary alarms to the operations crew at a distance controlling station. Hence, they will be able to react soon in case of robbers on the site.

## ACKNOWLEDGEMENT

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