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Voltage Swings Detection Using Arm Processor & Automation of Industries Using BLYNKK Cloud Computing Technology

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Abstract: **- A fault in a power system is any failure which interfere with the normal operation of the system, short circuit between the lines, insulation failure of equipments or flash over of lines initiated by a lightning stroke are the main causes for these faults. These faults leads to voltage swings in the system. The aim of this project is to develop a system that will help to remotely control the system during voltage swings, our project mainly focuses on automatic control of voltage swings, the proposed system is connected to any electrical system.**

The voltage detector detects the fall or rise in voltage, comparing to the fixed threshold voltage during faults. when the voltage exceeds threshold levels using ARM 1176j2f-Sa7 processor and GSM module. A measure is transmitted to the line operators indicating fault is being occurred. The system operators staying away from the stations can remotely operate the circuit breakers using BLYNKK applications in their smart phone which control the relay board connected to the GPIO pins of an ARM processor

I. INTRODUCTION

A Protective relay is an automatic device by means of which an electrical circuit is indirectly controlled 9opened or closed) and is governed by a change in the same or another electrical circuit.

ARM processor based relay is used to perform all functions of a relay. It measures electrical quantities, makes comparisons, performs computations, and sends tripping signals. It can realize all sorts of relaying characteristics, even irregular curves which cannot be realized by electromechanical or static relays easily.

Computer hardware technology has tremendously advanced since earky 1970's and new generations of computers tend to make digital computer relaying a viable and better alternative to the traditional relaying systems. The advent of microprocessors in the 1970s initiated a revolution in the design and development of numerical protection schemes. Microprocessors have afforded us in protective relaying the remarkable capability of sampling voltages and currents at very high speed, manipulating the data to accomplish a distance or over current measurement ,retaining fault information and performing self .checking functions. With the development of economical, powerful and sophisticated microprocessors, there is a growing interest in developing microprocessor .based numerical protective relays which are more flexible because of being programmable and are superior to conventional electromechanical and static relays. The main features which have encourages the design and development of microprocessor based numerical protective relays are their economy, compactness, reliability, flexibility, adaptive capability, self checking ability and improved performance over conventional relays, A number of desired relaying characteristics such as over ccurrent , directional , impedence, reactance, mho, quadrilateral, elliptical, etc. can be obtained using the same interface. Using a multiplexer, a microprocessor can get the desired signals to obtain a particular relaying characteristic. Different programs are used to obtain different relaying characteristics using the same interfacing circuitary.

A microprocessor by itself cannot perform a given task, but must be programmed and connected to a set of additional system devices which include memory elements and input/output devices. In general a set of system devices, including the microprocessor which acts as CPU, memory and input/output devices, interconnected for the purpose of performing some well defined task is called a microcomputer or a microprocessor based system, the single chip microcomputer is called microcontroller. The interconnection of the different components, which is a primary concern in the design of a microprocessor based

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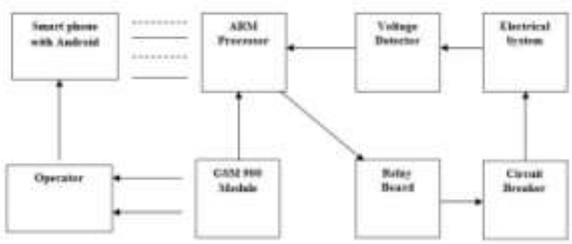
system, must take in to account the nature and timing of the signals that appear at the interfaces between components. For the purpose of achieving compatibility of signals, it is generally necessary to select appropriate components and design supplementary circuits. Therefore to connect an input/output device toa microprocessor, an I/O interface circuit is typically interposed between the device and the system bus which is a communication path between the microprocessor and the I/O devices (peripherals). This circuit serves to match the signal formats and timing characteristics of the microprocessor interface to those if I/O interface. The overall task of connecting I/Odevices and microprocessors is termed interfacing.

II. METHODOLOGY:



Initialization of Raspberry Pi with arm processor, Raspberry Pi is preinstalled with respbian operating system At the begging of the operating system , go to terminal Sudo respi-config

Enable SSH via connection

Ethernal connection is given to Raspberry Pi board, at the terminal , go and install wiring –pi software WiringPi is maintained under GIT for ease of change tracking, however there is a Plan B if you're unable to use GIT for whatever reasons (usually your firewall will be blocking you, so do check that first!) If you do not have GIT installed, then under any of the Debian releases (e.g. Raspbian), you can install it with: sudo apt-get install git-core If you get any errors here, make sure your Pi is up to date with the latest versions of Raspbian: sudo apt-get update sudo apt-get upgrade To obtain WiringPi using GIT: git clone git://git.drogon.net/wiringPiIf you have already used the clone operation for the first time, thencd wiring Pigit pull origin Will fetch an updated version then you can re-run the build script below.

To build/install there is a new simplified script: cd wiringPi./build Raspberry Pi GPIO pins can be now controlled by cloud GPIO. Reboot the system,

III. VOLTAGE DETECTING DEVICE FOR ELECTRICAL SYSTEM

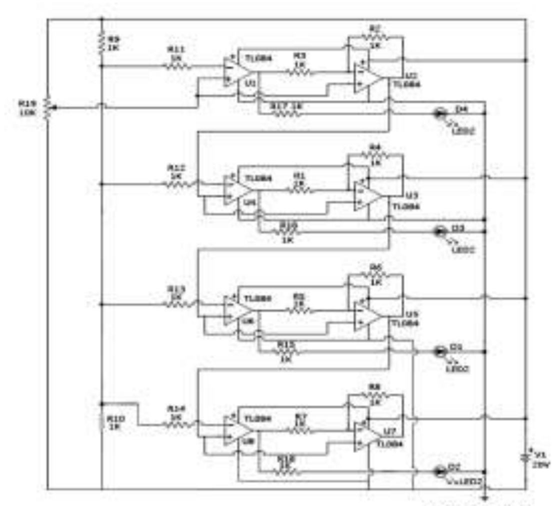
Development

The working of this circuit is like that of decimal division to parallel portion transformation. For this reason, the circuit intensifies a sign and looks at it to a reference voltage. The circuit can be separated into various stages. Number of stages can be expanded or diminished by. Every stage contains two OP-AMPs(TL084). One of them (OP-AMP at the left side) is utilized for examination reason. The other (OP-AMP at the right side) is utilized as a non-modifying enhancer with a settled increase (EXACTLY 2). The information voltage is associated with the non-modifying pin/terminal of each OP-AMP. The advanced yield is gotten from the yield of the contrasting OP-AMP and the yield of the speaker OP-AMP is nourished to the info of the following stage. To acquire a reference voltage, two resistors are utilized.

Working An info voltage is connected. The OP-AMP utilized as a comparator contrasts the information voltage and the reference level. In the event that it surpasses a specific reference level, the comparator yield goes high and there is enhancement alongside subtraction operation is performed by the increasing OP-AMP. In the event that the info voltage is not exactly the reference voltage, just the enhancement operation is performed. The yield of the intensifier OP-AMP is acquired to lower stages.

The yield of my advantage is the yields acquired from the comparator OP-AMPs. They together speak to twofold number.

Circuit Diagram



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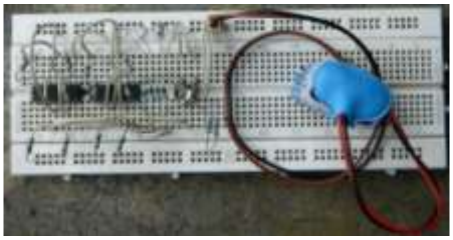
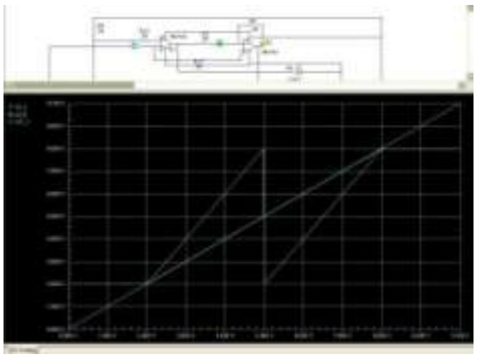




IV. TESTING

To see if the circuit is working or not, use a potentiometer, connect its two ends to the two poles of the battery, connect the wiper to the first stage of the circuit. Now as the potentiometer is swiped across its range, a count can be observed represented by the four LED's. It will be a binary count, either upward or downward. Any electrical system which has to be protected from voltage swings are connected to an voltage detector circuit. For example in an over head lines a phase line and a neutral line is connected to an voltage detector. The input voltage applied to voltage applied to voltage detector the opamp used a comparator that amplifies the input voltage with reference levels.

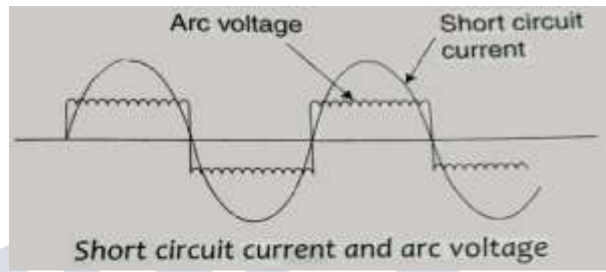
If it exceeds a certain reference level

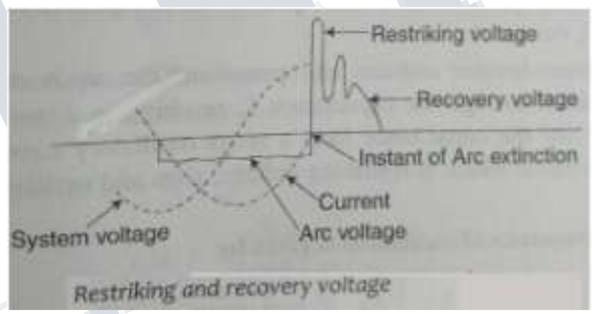
The comparator goes high and there is an amplification along with subtraction is performed by amplifying group. If the input voltage is less then the reference voltage only amplification is performed. The output is inherited by lower stages.the output of obtained by comparator,together represents a binary number this is read by the ARM processor connected to an Raspberry Pi board.

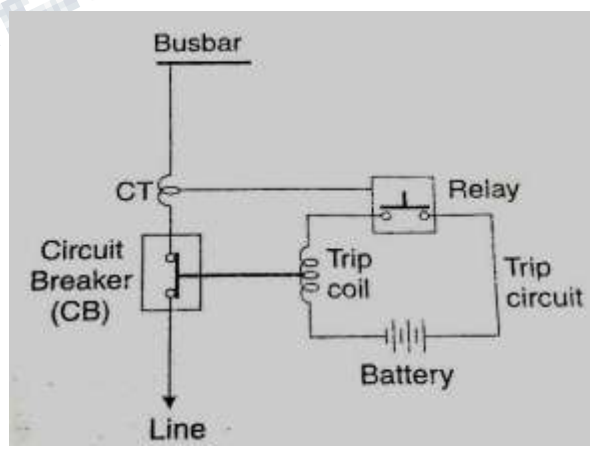
RESPERRY PI With ***ARM*** processor, the ARM processor detects the binary code given from the voltage detector. It exceeds a certain value, program is done to Raspberry Pi ARM Processor such that a security is sent to the operator of electrical system

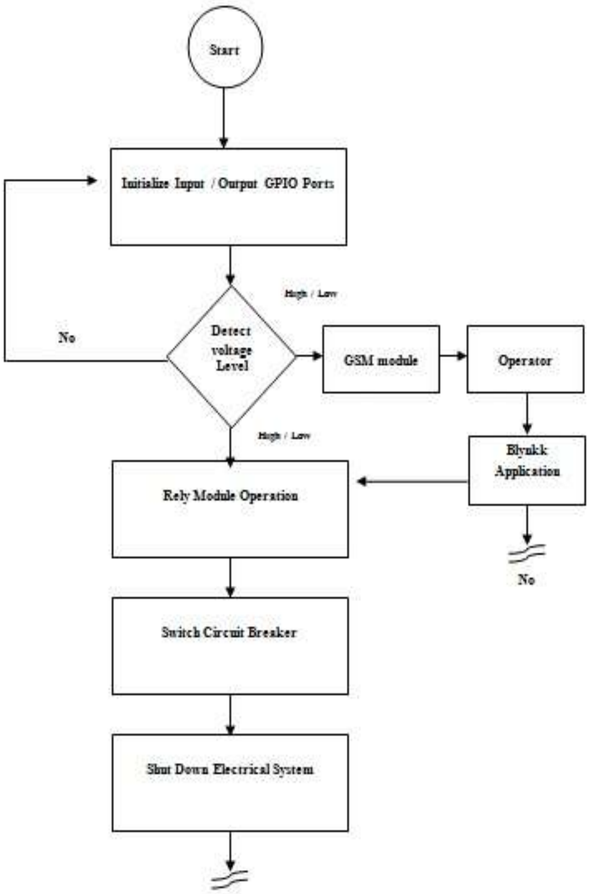
Now the operator getting a message can remotely control the relay board connector to the ARM processor, whose GPIO pins are controlled by blynkk android mobile application. & thus the operator can connected & disconnect systems at his will without being at the system premesis. Automation of Industries can be done using a android application

Relay & circuit breaker: Now the relay being controlled by the operator by the mobile application operates the circuit breaker connected to the electrical system.









Flow Chart of working model

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