IJAREEIE

e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

Volume 10, Issue 5, May 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.122

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 7.122|

||Volume 10, Issue 5, May 2021||

DOI:10.15662/IJAREEIE.2021.1005028

IoT on the Basis of Energy Meter of Load Parameters Analysis

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ABSTRACT: This paper is result on Internet of things (Iot) based energy meter with load parameter analysis. In the most of the developing countries, the effort of collecting electricity utility meter reading and detecting illegal usage of electricity is a very difficult and time consuming task which requires a lot of human resources. Energy meter reading and monitoring system using Internet of Things (IoT) present an efficient and cost-effective way to transfer the information of energy consumed by the consumer wirelessly as well as it provides facilities to detect the illegal usage of the electricity. Aim of this study is to measure electricity consumption in the household using IoT and telemetric communication techniques. Also this study aims to detect and control the energy theft. The microcontroller is employed to coordinate the activities with digital energy meter system and to connect the system to a Wi-Fi network and subsequently to the Internet and Server. A passive infrared sensor is engaged with the system to detect when any illegal alteration happen in the metering system. In such case, system will send an alert to the server as well as it has the facility to disconnect and re-connect the electricity supply automatically. The proposed system is capable of continuously monitor and being notified about the number of units consumed to the energy provider and consumer. The energy consumptions are calculated automatically internet by using a network of Internet of Things.

KEYWORDS: **Component, formatting, style, styling, insert.**

I.INTRODUCTION

The systems consists of a microcontroller Wi-Fi module, LCD display, V/I controller. EEPROM, RTC. In the system Microcontroller continuously reads the energy meter using the Wi-Fi module. It is used to transmit the information to the receiver. Irregularities of bills and reduce man power are overcome by AMR system in high buildings and luxury housing plots. System the e-meter will sense the energy consumed and automatically this method is more useful for the current scenario. The increase in power or energy consumption is automatically increase the cost to avoid these types of problem this paper will be helpful to protect our house more save and save more energy and cost. Cayenne.com is used as a cloud server to communicate between the consumer and Electricity board. Voltage and current values are sensed by the sensor and stored in the server.

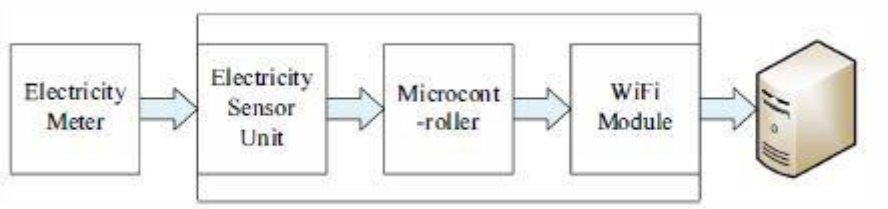

Fig.1. block for Energy Monitoring Using IoT

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II.SYSTEM MODEL AND ASSUMPTIONS

a. Arduino Nano controller

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328 (Arduino Nano 3.x). It has more or less the same functionality of the ArduinoDuemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

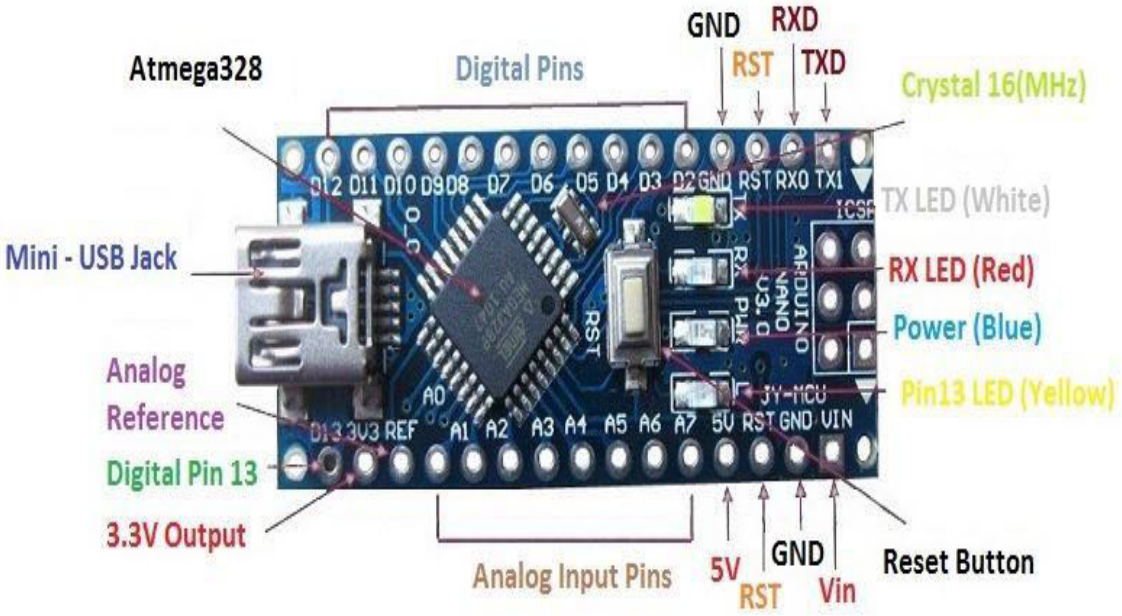

Fig.2. Arduino Nano controller

2.1. WiFi ESP8266 Controller

The ESP8266 is a low-cost Wi-Fi microchip, with a full TCP/IP stack and microcontroller capability, produced by Espressif Systems. Processor: L106 32-bit RISC microprocessor core based on the TensilicaXtensa Diamond Standard 106Micro running at 80 MHz ,32 KiB instruction RAM ,32 KiB instruction cache RAM ,80 KiB user-data RAM ,16 KiB ETS system-data RAM.NodeMCU is a low-cost open source IoTplatform..It initially included firmware which runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which was based on the ESP-12 module.

2.2 Current Sensor

The current is detected from by utilizing current transformer and it is corrected at the main operation amp stage and enhancer at the second operation amp arrange. Current Transformer Ratio 1:1000 is used in this project.

2.3. Voltage Sensor

To get DC motion from an AC framework for contribution to a microcontroller, we are utilizing this voltage detecting circuit. The circuit gives a precise technique to making this DC flag. The voltage is detected by utilizing a potential transformer and the got flag is amended at the primary operation amp stage and enhancer at the second operation amp arrange. Potential Transformer Step down 230V to 12V is used in this project.

2.4Relay 5VDC

5V DCgeneral purpose relay is use for switching purpose according to input command to the controller.

2.5SMPS 5V/1A

SMPS switch mode power supply having output of 5V DC output for controller as well as other dc power fed component .

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2.6 Raspberry Pi (Server)

A personal web server is "the cloud," except you own and control it as opposed to a large corporation. Owning a little cloud has a lot of benefits, including customization, free storage, free Internet services, a path into open source software, high-quality security, full control over your content, the ability to make quick changes, a place to experiment with code, and much more.he Raspberry Pi® is a single-board computer developed in the UK by the Raspberry Pi Foundation with the intention of stimulating the teaching of basic computer science in schools. The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It's a capable little PC which can be used for many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video. The design is based around a Broadcom BCM2835 SoC, which includes an ARM1176JZF-S 700 MHz processor, Video Core IV GPU, and 512 Megabytes of RAM. The design does not include a built-in hard disk or solid-state drive, instead relying on an SD card for booting and long-term storage. This board is intended to run Linux kernel based operating systems.

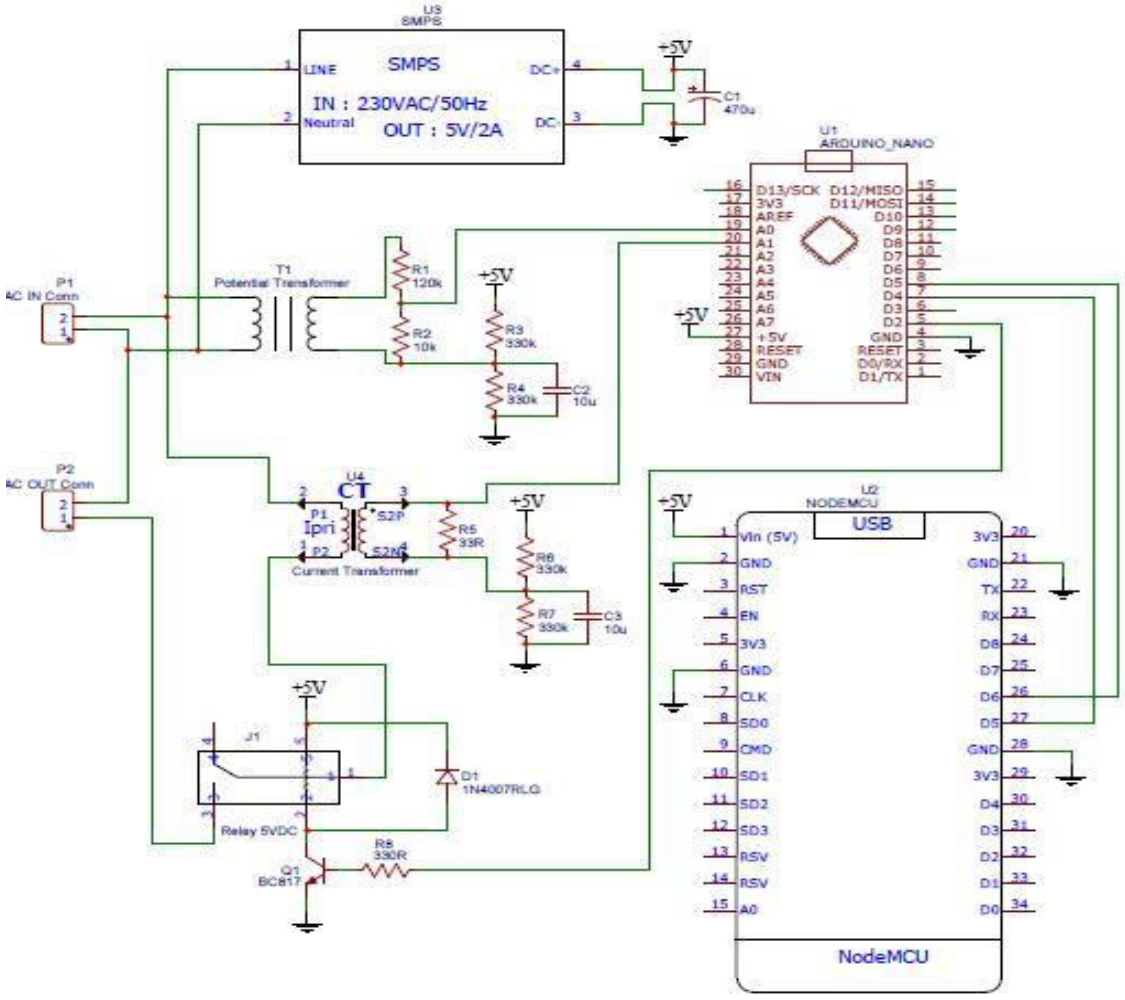

Fig.3. Schematic circuit diagram of constructed hardware

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III. RESULT AND DISCUSSION

Working and results of project **:**The Arduino board is designed in such a way that it is very easy for beginners to get started with microcontrollers. This board especially is breadboard friendly is very easy to handle the connections. Let's start with powering the Board. Powering you ArduinoNano: There are totally three ways by which you can power your Nano.USB Jack: Connect the mini USB jack to a phone charger or computer through a cable and it will draw power required for the board to function Vin Pin: The Vin pin can be supplied with a unregulated 6-12V to power the board. The on-board voltage regulator regulates it to +5V ,+5V Pin: If you have a regulated +5V supply then you can directly provide this o the +5V pin of the Arduino.There are totally 14 digital Pins and 8 Analog pins on your Nano board. The digital pins can be used to interface sensors by using them as input pins or drive loads by using them as output pins. A simple function like pin Mode() and digital Write() can be used to control their operation. The operating voltage is 0V and 5V for digital pins. The analog pins can measure analog voltage from 0V to 5V using any of the 8 Analog pins using a simple function liken analog Read()

Serial Pins 0 (Rx) and 1 (Tx): Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip. External Interrupt Pins 2 and 3 pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. PWM Pins 3, 5, 6, 9 and 11 pins provide an 8-bit PWM output by using analog Write() function. SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK) pins are used for SPI communication. In-built LED Pin 13 pin is connected with an built-in LED, when pin 13 is HIGH – LED is on and when pin 13 is LOW, its off. I2C A4 (SDA) and A5 (SCA) used for IIC communication using Wire library. AREF used to provide reference voltage for analog inputs with analog Reference() function. AC input signals are continuously fed to Arduino Nano controller through CT and PT . That real time energy metering data of current and voltage send to Raspberry Pi (Server) byWiFi ESP8266 Controller which store data in cloud.

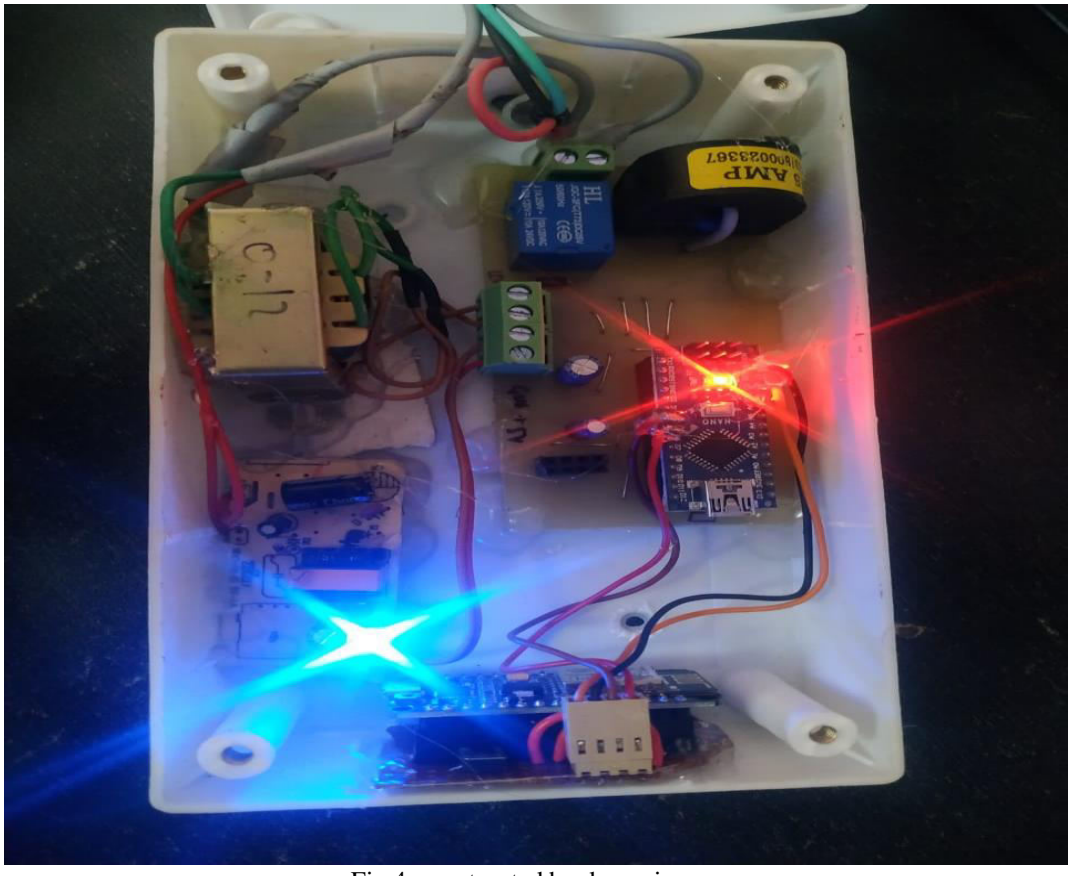

Fig.4. constructed hardware image

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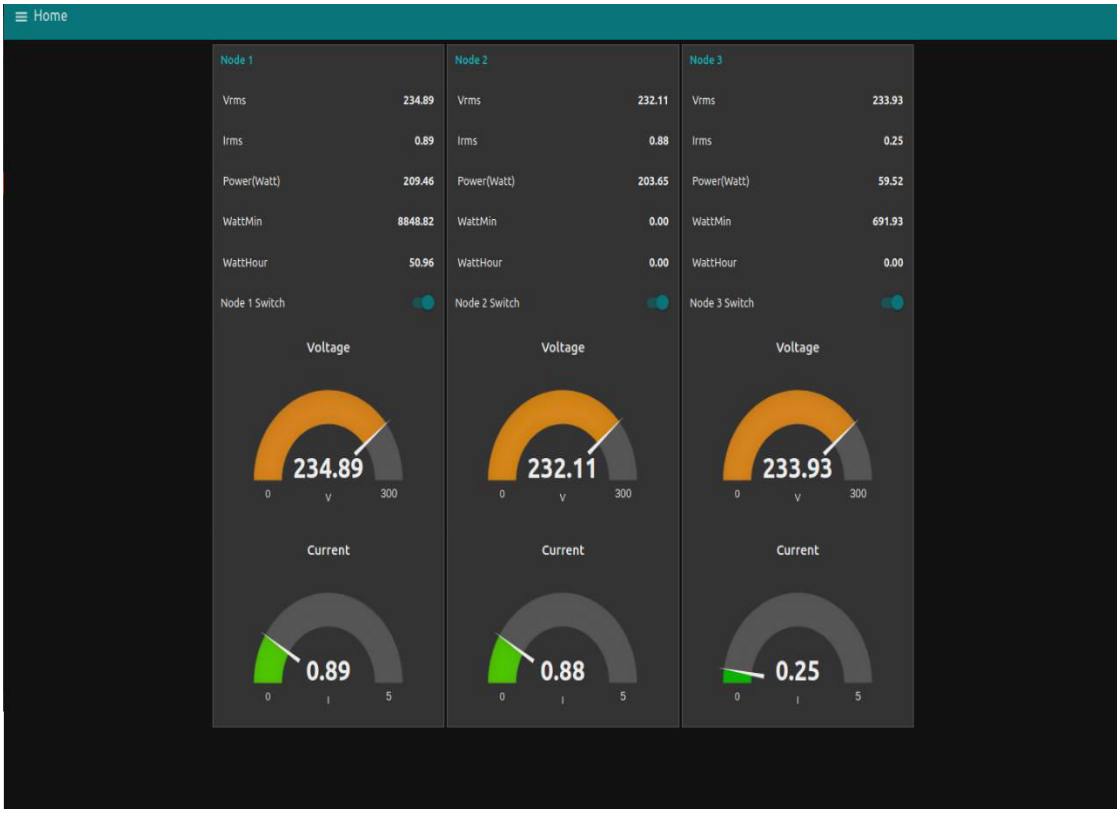

Fig.5. Real time data of voltage , current and power consumption .

Fig.6. Graphical analysis of real time data of voltage , current and power consumption .

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IV.CONCLUSION

The main cause for the design of IOT based E-meter is to reduce the power consumption in house. It avoids the human intervention reduces the cost, save human power. It works both automatically and manually. This computerization for diminish the work costs as well as makes the framework more effective and exact. It continuously monitor system or load parameter to such as current, voltage , power to trace abnormalities in power consumption

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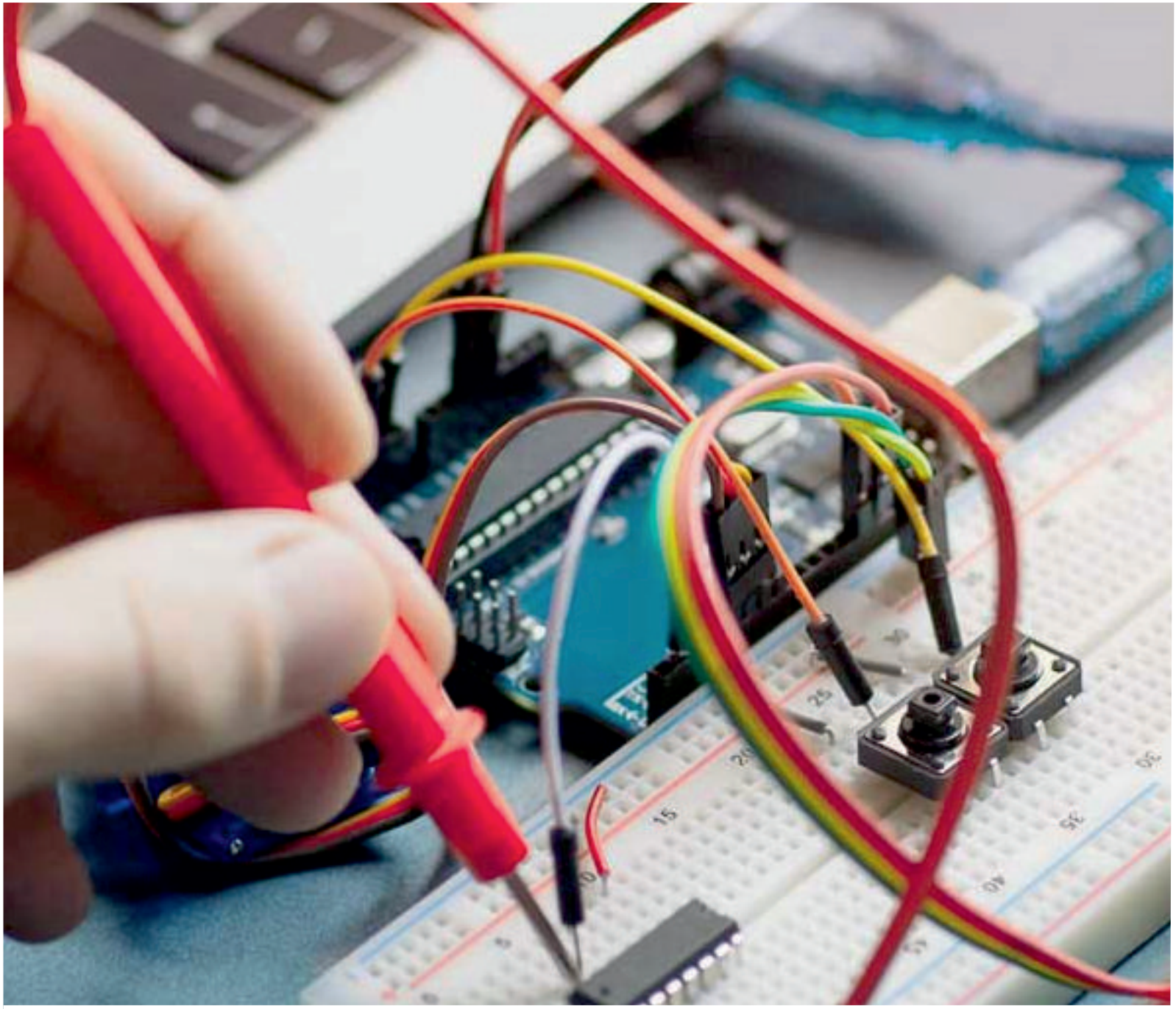

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7.122

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