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AUTOMATED BEVERAGE DISPENSER

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***Abstract* —**

People in commercial locations can use the automatic vending machine to meet their basic necessities. The embedded system-based vending machine's usage is inevitable, and demand for it is rising quickly. In today's hectic world, people tend to forget to bring their own necessary necessities with them and instead choose to buy the items locally, turning to vending machines to satisfy their cravings. But nowadays, many would rather utilise digital payment methods than carry cash because of the cashless nature of doing so.

We thus design a digital payment system that makes use of RFID tags in order to reduce the requirement for modern payment methods. This system restricts access to just RFID-enabled devices to prevent machine abuse. Here, we have created a vending machine for educational facilities that students may use to purchase necessities like sanitary napkins, masks, and first aid supplies.

When a specific product is chosen and the RFID tag is accessible, the machine will dispense the product while subtracting the appropriate amount from the tag. Each student in a particular class receives a single RFID tag that they can all use. The person in charge can refresh the RFID tag with a master card. The LCD display has the ability to show both the product's balance and remaining amount. You can monitor the liquid's flow rate and code it using a flow rate sensor so that the flow is stopped using a stopper after a predetermined amount of time.

Keywords

RFID, arduino, flow rate sensor, water pump

INTRODUCTION

In the extreme summer heats, students in our college campus can often be seen crowding near the fruit canteen for getting some sort of cold beverage. There is so much demand for these cold beverages, that people can be seen pushing through crowds just to get a single glass of juice. By our project we are planning to eliminate the requirement of a person to give juice to the students, it can be automated using a machine.

I. METHODOLOGY/EXPERIMENTAL

A. Components and their working

1) Arduino:-

The open-source electronics prototyping platform Arduino is built on adaptable, user-friendly hardware and software. The Atmel microcontroller series is used on this board. You can use a variety of Arduino hardware models.

Further information about Arduino products, you can visit on websitehttp://arduino.cc/en/.

You must one Arduino hardware to follow practices in this book. I recommend to obtain one of the following Arduino hardware:

Arduino Uno
Arduino Leonardo
Arduino Mega 2560
Arduino Due

You can buy this product on your local electronic store. You also can order it by online.

Find it on http://arduino.cc/en/Main/Buy. The following is the list of Arduino store you can buy Arduino store, http://store.arduino.cc/

Amazon, http://www.amazon.com

Cooking-hacks, http://www.cooking-hacks.com/index.php/shop/arduino.html

RS Components, http://www.rs-components.com Element 14, http://www.element14.com EXP-Tech, http://www.exp-tech.de

Because Arduino is an open-source hardware, people can build it. It's called Arduino compatible. Generally it's sold in low prices

1.1) Arduino Uno:-

The Arduino Uno is a microcontroller board.

What's on the board?

There are many varieties of Arduino boards that can be used for different purposes. Some boards look a bit different from the one below, but most Arduino have the majority of these components in common:

Power

(USB / Barrel Jack)

Every Arduino board needs a way to be connected to a power source. The Arduino UNO can be powered from a USB cable coming from your computer or a wall power supply that is terminated in a barrel jack. In the picture above the USB connection is labelled (1) and the barrel jack is labelled (2).

NOTE: Do NOT use a power supply greater than 20 Volts as you will overpower (and thereby destroy) your Arduino. The recommended voltage for most Arduino models is between 6 and 12 Volts.

Pins (5V, 3.3V, GND, Analog, Digital, PWM, AREF)

The pins on your Arduino are the places where you connect wires to construct a circuit (probably in conjuction with a breadboard and some wire. They usually have black plastic 'headers' that allow you to just plug a wire right into the board. The Arduino has several different kinds of pins, each of which is labeled on the board and used for different functions.

• GND (3): Short for 'Ground'. There are several GND pins on the Arduino, any of which can be used to ground your circuit.

• 5V (4) & 3.3V (5): As you might guess, the 5V pin supplies 5 volts of power, and the 3.3V pin supplies 3.3 volts of power. Most of the simple components used with the Arduino run happily off of 5 or 3.3 volts.

• Analog (6): The area of pins under the 'Analog In' label (A0 through A5 on the UNO) are Analog In pins. These pins can read the signal from an analog sensor (like a temperature sensor) and convert it into a digital value that we can read.

• Digital (7): Across from the analog pins are the digital pins (0 through 13 on the UNO). These pins can be used for both digital input (like telling if a button is pushed) and digital output (like powering an LED).

• PWM (8): You may have noticed the tilde (~) next to some of the digital pins (3, 5, 6, 9, 10, and 11 on the UNO). These pins act as normal digital pins, but can also be used for something called Pulse-Width Modulation (PWM). We have a tutorial on PWM, but for now, think of these pins as being able to simulate analog output (like fading an LED in and out).

• AREF (9): Stands for Analog Reference. Most of the time you can leave this pin alone. It is sometimes used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

Reset Button

Just like the original Nintendo, the Arduino has a reset button (10). Pushing it will temporarily connect the reset pin to ground and restart any code that is loaded on the Arduino. This can be very useful if your code doesn't repeat, but you want to test it multiple times. Unlike the original Nintendo however, blowing on the Arduino doesn't usually fix any problems.

Power LED Indicator

Just beneath and to the right of the word "UNO" on your circuit board, there's a tiny LED next to the word 'ON' (11). This LED should light up whenever you plug your Arduino into a power source. If this light doesn't turn on, there's a good chance something is wrong. Time to re-check your circuit!

TX RX LEDs

TX is short for transmit, RX is short for receive. These markings appear quite a bit in electronics to

indicate the pins responsible for serial communication. In our case, there are two places on the Arduino UNO where TX and RX appear – once by digital pins 0 and 1, and a second time next to the TX and RX indicator LEDs (12). These LEDs will give us some nice visual indications whenever our Arduino is receiving or transmitting data (like when we're loading a new program onto the board).

Main IC

An IC, or integrated circuit, is the black object with all the metal legs (13). Imagine it as the Arduino's brain. The primary integrated circuit (IC) in the Arduino varies slightly depending on the type of board used, however it is often from the ATMEL company's ATmega range of ICs. This can be crucial since, before loading a new programme from the Arduino software, you might need to know the IC type (along with your board type). The top side of the IC often has this information written on it. Reading the datasheets is frequently a smart idea if you want to learn more about the distinctions between various ICs.

Voltage Regulator

Actually, you shouldn't (or can't) play with the voltage regulator (14) on the Arduino. But knowing that it exists and what it is for may be helpful. The voltage regulator controls the amount of voltage that is allowed to enter the Arduino board, doing precisely what it claims it will. Consider it as a sort of gatekeeper that prevents additional voltage from entering the circuit. It has its limitations, so don't connect your Arduino to anything with a voltage higher than 20 volts.

2) RFID

RFID READER

A device used to analyse an RFID tag is known as an RFID per user. The tag responds by sending back its information when radio waves are sent by the per user's reception device. The range at which a tag can be read can be affected by a number of factors (the read range). The recurrence used for distinguishable proof, the reception apparatus acquisition, the polarisation and direction of the per-user receiving wire and the transponder radio wire, along with the positioning of the tag on the object to be distinguished, will all have an impact on the RFID system's theoretical range.

3)RFID TAG

A RFID tag is a central processor joined with a receiving wire in a conservative bundle; the bundling is organized to permit

the RFID tag to be connected to an item to be followed. “RFID” stands for Radio Frequency Identification. The label’s reception apparatus gets signals from a RFID peruser or scanner and afterward returns the sign, as a rule with some extra information (like a remarkable chronic number or other redid data).RFID labels can be minuscule – the size of a huge rice grain. Others might be the size of a little soft cover book.

4) RC522
The RC522 is a 13.56MHz RFID module that is based on the MFRC522 controller from NXP semiconductors. The module can supports I2C, SPI and UART and normally is shipped with a RFID card and key fob. It is commonly used in attendance systems and other person/object identification applications
RC522 Pin Configuration

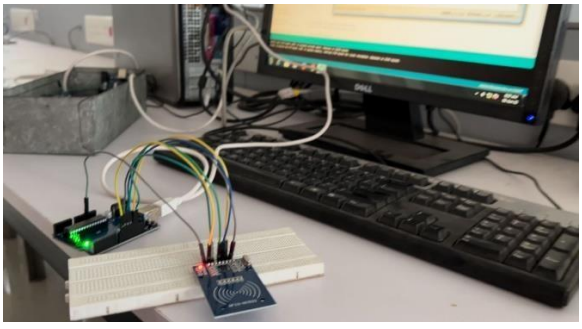
RC522 Features

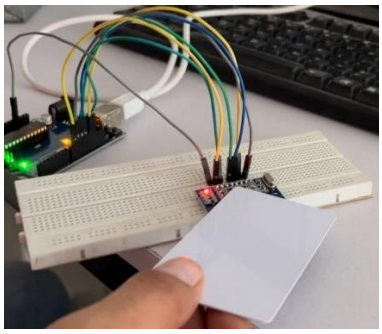
13.56MHz RFID module
Operating voltage: 2.5V to 3.3V
Communication : SPI, I2C protocol, UART
Maximum Data Rate: 10Mbps
Read Range: 5cm
Current Consumption: 13-26mA
Power down mode consumption: 10uA (min)

5)Water Flow sensor
Water flow sensor consists of a plastic valve from which water can pass. When water flows through the valve it rotates the rotor. By this, the change can be observed in the speed of the motor. This change is calculated as output as a pulse signal and this is how we measure the water. In our project we are using this for the purpose of measurement of the juice /beverage to be served. When the sufficient amount of juice passes through the flow sensor , the the system automatically cuts off the juice supply serving the user near accurate amount of juice

II. Results and Discussions

Following figures are the results of specimen





III. Future Scope

For a big number of users, a cloud-based solution enables smooth integration with a standard infrastructure but consumes more power. Future upgrades to the intelligent beverage dispenser could include many more features.

Conclusion
The increased intelligence of every day, sensor objects implemented in devices offers opportunities for new applications and services.

X .Acknowledgment

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