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Automatic Shuffling Process Using STM32F446RE

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Abstract: *The Examination process is one of the key areas for any educational institution or University. Conventional evaluation system is normally consumes more time and manpower. SuperShuffling Machine (SSM) gives the solution to the shuffling process with the help of Microcontroller unit using the randomization technique. In randomization process, six different college papers are loads in six consecutive units as per unit 50 papers, and finally, the shuffling algorithms demonstrated that the entire 300 answer scripts are mix-up randomly. After the evaluation process the scanner at the end of the collection box, scan and upload the marks automatically with the help of Image Processing. The paper shuffling machine provides many advantages for the universities and educational institutes to simplify the post-examination activities. SSM (Super Shuffling Machine) that makes shuffling and counting the semester answer scripts before the evaluation and enter the student details automatically in the server by scanning the QR code. The special feature of SSM in version 3 is planned to store the student mark directly in the database by Image processing.*

Key Word: *Radomization, Image Processing, Microcontroller, Shufling, etc,.*

I.INTRODUCTION

The Examination process is one of the key areas for any educational institution or University. Conventional evaluation system is normally consumes more time and man power. And evaluating the answered script is challenges, tedious and time consuming for evaluator institutions. Usually evaluators keeping the man power to shuffle the written answer scripts. In the case of theory exams, there is a traditional way of evaluation of answer sheets. It is followed by many universities and educational institutes. Physical handling of the answer sheet has many logistical and administrative activities.

Solution to the addressed Problem

The main objectives of the system are:

- To applied randomization technique (automatic shuffling) for semester answer scripts.
- To simplify post examination activities to result processing.

The first objective has been achieved when several college papers are shuffled for evaluation. For example, Six different college papers are loads in six different units as per unit 50 papers, and finally the shuffling algorithms demonstrated that the entire 300 different college papers is generated randomly. The second objective has been achieved when making theevaluation process quickly by reduces the man power, time and the paper counting process (Both Inlet and Outlet), Papershuffling machine provides many advantages for the universities and educational institutes to simplify post examination activities leading to result processing.

Description

The Examination process is one of the prominent areas for any educational institution or University. The conventional evaluation system is casually consuming more time and labour force. And evaluating the answered script is challenges, tedious, and time-consuming for evaluator institutions. The first objective (To apply the randomization technique for semester answer scripts) is attained when several college papers are mixing for evaluation. For example, six different college papers are loads in six Consecutive units as per unit 50 papers, and finally, the shuffling algorithms demonstrated that the entire 300 answer scripts are mixed randomly. The second objective (To simplify post- examination activities to result from processing) is attained when making the evaluation process quickly by reduces the labour force, time, and the paper counting process (Both Inlet and Outlet). The paper shuffling machine provides many advantages for the universities and educational institutes to simplify the post-examination activities leading to result from processing.

Concept

The conception of my idea is to shuffle the student's semester written answer sheets before the evaluation. The conventional evaluation system is casually consuming more time and labor force and evaluating the answered sheets is challenges, tedious, and time-consuming for evaluator institutions. The first motto (To apply the randomization technique for semester answer scripts) is edematous when several college papers are mixing for evaluation. For example, six different college papers are loads in six consecutive units as per unit 50 papers, and finally, the shuffling algorithms demonstrated that the entire 300 answer scripts are mix-up randomly. The second objective (To simplify post- examination activities to result from processing) is edematous when making the evaluation process quickly by reduces the labor force, time, and the paper counting process (Both Inlet and Outlet). Here Optical Character Recognition (OCR) is used to convert the handwritten marks into machine-coded text, whether from scanned paper documents captured bya digital camera into editable and searchable data. The paper shuffling machine provides many advantages for the universities and educational institutes to simplify the post-examination activities leading to result from processing.

Technology

Embedded systems and technology are edematous in the Periyar paper-shuffling machine. For the Mechanical design, I am using the solid works for 2D view and AutoCAD for 3D view. With creo simulation, I could analyze and validatethe performance of my 3D Virtual prototype. STM32F103C8 microcontroller coded with embedded C and C++ languages is utilized for the automation process. Nextion Intelligent HMI display is edematous to combine an onboard processor and memory touch display with Nextion editor software for HMI GUI project development.

II.LITERATURE

SURVEYShuffling Algorithms for Automatic Generator Question Paper System

Examination process is important activities for educational institutions to evaluate student performance. Thus the quality of the exam questions would determine the quality of the students produced by the institutions. Preparing exam questions is challenges, tedious and time consuming for the instructors. Usually the instructors keeping their own test bank in some form to help them prepare future exams. Current technologies help the instructors to store the questions in computer databases. The issue arise is how the current technologies would also help the instructors to automatically generate the different sets of questions from time to time without concern about repetition and duplication from the pass exam while the exam bank growing. This paper describes the usage of shuffling algorithm in an Automatic Generator Question paper System (GQS) as a randomization technique for organising sets of exam paper. The results indicate shuffling algorithm could be used to overcome randomization issue for GQS.

Shuffler: Fast and Deployable Continuous Code Re-Randomization

Bao While code injection attacks have been virtually eliminated on modern systems, programs today remain vulnerable to code reuse attacks. Particularly pernicious are Just-In-Time ROP (JIT-ROP) techniques, where an attacker uses a memory disclosure vulnerability to discover code gadgets at runtime. We designed a code-reuse defense, called Shuffler, which continuously re-randomizes code locations on the order of milliseconds, introducing a real-time deadline on the attacker. This deadline makes it extremely difficult to form a complete exploit, particularly against server programs that often sit tens of milliseconds away from attacker machines. Shuffler focuses on being fast, self-hosting, and nonintrusive to the end user.Specifically, for speed, Shuffler randomizes code asynchronously in a separate thread and atomically switches from one codecopy to the next. For security, Shuffler adopts an "egalitarian" principle and randomizes itself the same way it does the target. Lastly, to deploy Shuffler, no source, kernel, compiler, or hardware modifications are necessary. Evaluation shows that Shuffler defends against all known forms of code reuse, including ROP, direct JITROP, indirect JIT-ROP, and Blind ROP. We observed 14.9% overhead on SPEC CPU when shuffling every 50 ms, and ran Shuffler on real-world applications such as Nginx. We showed that the shuffled Nginx scales up to 24 worker processes on 12 cores.

Analysis of Casino Shelf Shuffling Machines

Casinos worldwide routinely employ mechanical card-shuffling machines for games such as blackjack and poker. For example, for a single deck game, two decks are used. While the dealer is using the first deck in the usual way, the shuffling machine mixes the second deck. When the first deck is used up (or perhaps half-used), the second deck is brought into play andthe first deck is inserted into the machine. Two-, four-, and six-deck machines of various designs are also in active use. The primary rationale seems to be that dealer shuffling takes time and use of a machine results in approximately 20% more hands per hour. The machines may also limit dealer cheating. The machines in use are sophisticated, precision devices, rented to the casino (with service contracts) for approximately $500 per month per machine.

One company told us they had about 8000 such machines in active SHELF SHUFFLING 3 use; this amounts to millions of dollars per year. The companies involved are substantial businesses, listed on the New York Stock Exchange.

One widely used machine simulates an ordinary riffle shuffle by pushing two halves of a single deck together using mechanical pressure to make the halves interlace. The randomness comes from slight physical differences in alignment and pressure. In contrast, the shelf shufflers we analyze here use computer-generated pseudo-random numbers as a source of their randomness. The pressure shufflers require multiple passes (perhaps seven to ten) to adequately mix 52 cards. Our manufacturer was keen to have a single pass through suffice.

Implementation of A 7- Segment Displays With STM32f446Re Microcontroller

Implementation of A 7- Segment Displays With STM32f446Re Microcontroller The paper presents a simple design and implementation of a7-segment Display on STM32F446RE microcontroller board. In this paper, STM32CubeMx software is used for the general code generated. STM32cubemx automatically generates code for the IDE we want to work in and in this paper we are going to use Keil ARM MDK v5 IDE. STM32 cubemx is used to initialize the STM32F446RE microcontroller peripherals pins, operating frequency, oscillator selection etc. This software is using for theGPIO Port-A pin assign for the 7-segment display and connect with STM32F446RE microcontroller. The generated code is opened by MDK ARM v5 IDE. In this section, 7-segment display is used as the output devices. Seven-segment displays are electronic display devices used as an easy way to display decimal numerals and an alternative to the more complex dot-matrix displays. STLINK v2 debugger is used for interfacing with microcontroller board and the pc.

United States Patent

The present invention provides an apparatus and method for moving playing cards from a first group of cards into a Second group of cards, wherein the Second group of cards is randomly arranged or Shuffled. The apparatus comprises a card receiver for receiving the first group of cards, a Single Stack of card-receiving compartments generally adjacent to the card receiver, the Stack generally vertically movable, an elevator for moving the Stack, a card-moving mechanism between the card receiver and the Stack for moving cards one at a time into a Selected one of the compartments, another card moving mechanism for moving cards from one of the compartments to a Second card receiver and a microprocessor that controls the card-moving mechanisms and elevator.

III.PROPOSED SYSTEM

Introduction

The conception of my idea is to shuffle the student's semester written answer sheets before the evaluation. Because the conventional paper shuffling processes are casually consuming more time and labor force. The first objective is to apply the randomization technique while the several college papers are mixing for evaluation. For example, six different college papers are loads in six consecutive units as per unit 50 papers, and finally, the shuffling algorithms demonstrated that the entire 300 answer scripts are mix-up randomly. The paper shuffling machine provides many advantages for the universities and educational institutes to simplify the post-examination activities leading to result from processing.

Components

DescriptionBuzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke. In this project we used it for an intimation purpose.

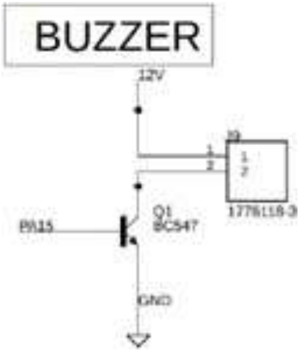

Fig 1. *Buzzer*

STM32F446RE

The STM32F446xC/E devices are based on the high-performance Arm Cortex-M4 32-bit RISC core operating at a frequency of up to 180 MHz. The Cortex-M4 core features a floating point unit (FPU) single precision supporting all Arm single-precision data-processing instructions and data types. It also implements a full set of DSP instructions and a memory protection unit (MPU) that enhances application security.

The STM32F446xC/Edevices incorporate high-speed embedded memories (Flash memory up to 512 Kbytes, up to 128 Kbytes of SRAM), up to 4 Kbytes of backup SRAM, and an extensive range of enhanced I/Os and peripherals connected to two APB buses, two AHB buses and a 32-bit multi-AHB bus matrix. All devices offer three 12-bit ADCs, two DACs, a low-power RTC, 12 general-purpose 16-bit timers including two PWM timers for motor control, two general- purpose 32-bit timers. They also feature standard and advanced communication interfaces.

Fig 2. *STM32F44RE*

PWM Motor Control

As its name suggests, pulse width modulation speed control works by driving the motor with a series of “ON-OFF” pulses and varying the duty cycle, the fraction of time that the output voltage is “ON” compared to when it is “OFF”, of the pulses while keeping the frequency constant

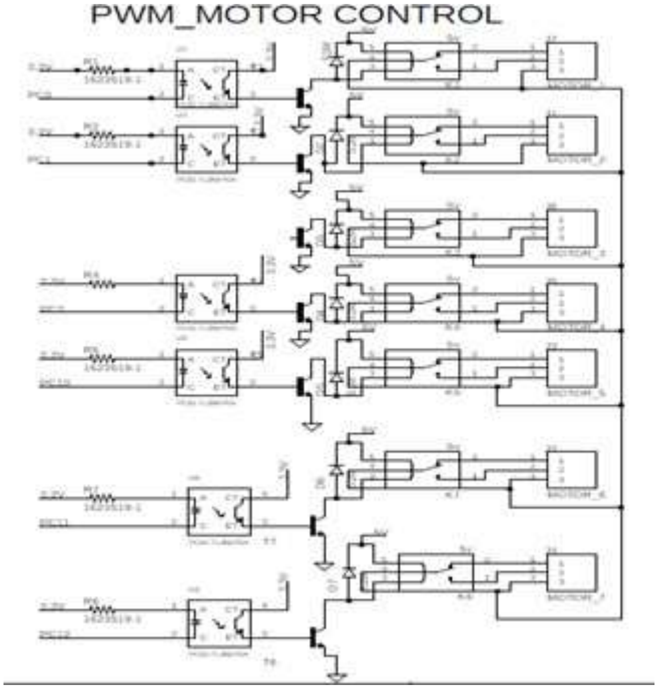

Fig 3. *PWM Motor Control*

Hall Effect Sensor

The Hall-effect Sensor is able to distinguish between the positive and negative charge moving in opposite direction. The magnetic field detected by the hall-effect sensor is converted to the suitable analog or digital signal that can be read bythe electronic system, usually a motor control system.

Magnetic sensors convert magnetic or magnetically encoded information into electrical signals for processing by electronic circuits.

Magnetic sensors are solid-state devices that are becoming more and more popular because they can be used in many different types of application such as sensing position, velocity or directional movement. They are also a popular choice of sensor for the electronics designer due to their non-contact wear free operation, their low maintenance, robust design and as sealed Hall Effect; devices are immune to vibration, dust and water.

Hall Effect Sensors are devices which are activated by an external magnetic field. We know that a magnetic field has two important characteristics flux density, (B) and polarity (North and South Poles). The output signal from a Hall Effect sensor is the function of magnetic field density around the device. When the magnetic flux density around the sensor exceeds a certain pre-set threshold, the sensor detects it and generates an output voltage called the Hall Voltage, VH. Consider the diagram below.

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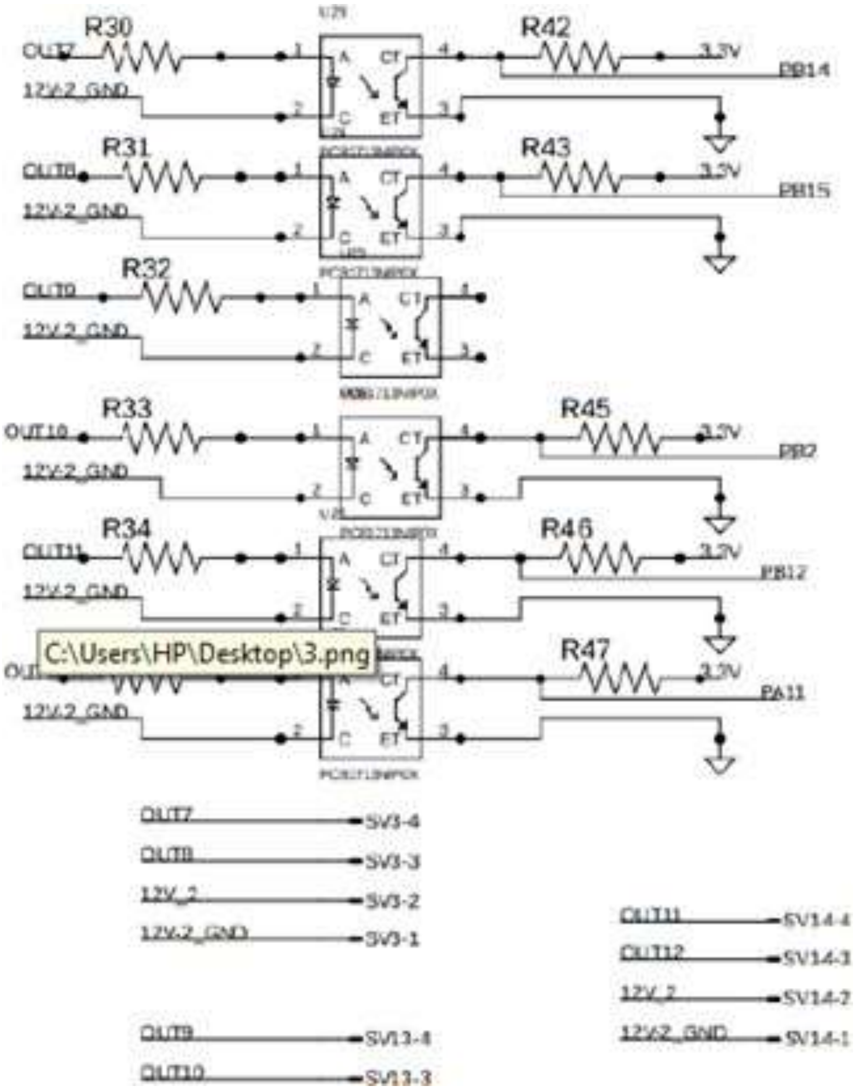

***Fig 4**. Hall Effect Sensor*

EEPROM

EEPROM (also E^{2}PROM) stands for electrically erasable programmable read-only memory and is a type of non volatile used in computers, integrated in microcontrollers for smart cards and remote keyless systems and other electronic devices to store relatively small amounts of data by allowing individual bytes to be erased and reprogrammed. EEPROMs are organized as arrays of floating gate transistors. EEPROMs can be programmed and erased in-circuit, by applying special programming signals. Originally, EEPROMs were limited to single-byte operations, which made them slower, but modern EEPROMs allow multi-byte page operations. An EEPROM has a limited life for erasing and reprogramming, now reaching a million operations in modern EEPROMs. In an EEPROM that is frequently reprogrammed, the life of the EEPROM is an important design consideration.Flash memory is a type of EEPROM designed for high speed and high density, at the expense of large erase blocks (typically 512 bytes or larger) and limited number of write cycles (often 10,000). There is no clear boundary dividing the two, but the term "EEPROM" is generally used to describe non-volatile memory with small erase blocks (as small as one byte) and a long lifetime (typically 1,000,000 cycles). Many microcontrollers include both: flash memory for the firm wares and a small EEPROM for parameters and history.

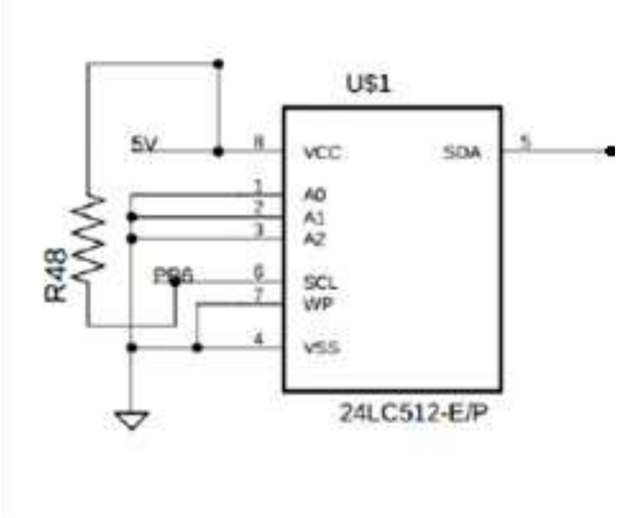

Fig 5. *EEPROM*

STM32F446RE Pin Details

S.N	Description	Pin Details
1.	**Photoelectric Sensor**	PC8,PC9,PB8,PB9,PA7,PC7
2.	**Hall Effect Sensor(1)**	PA8,PB10,PB5,PC4,PB13
3.	**Hall Effect Sensor(2)**	PB14,PB1,PB2,PB12,PA11
4.	**EMPTY PIN**	PA12, PC5,PC6
5.	**Output Pins (MOTOR Driver)**	PC1,PC2,PC3,PC10,PC11,PC12
6.	**Buzzer**	PA14
7.	**UART(1)**	PA10- TX1 PA9- Rx1
8.	**UART(4)**	PA0-TX4 PA1-RX4
9.	**I2C (1)**	PB7- SCL PB6- SDA

Table 1. *STM32F44RE Pin Details*

Nextion HMI display

Nextion is a Human Machine Interface (HMI) solution. Nextion displays are resistive touch screens that makes iteasy to build a Graphical User Interface (GUI). It is a great solution to monitor and control processes, being mainly applied to IoT applications. There are several Nextion display modules, with sizes ranging from 2.4" to 7". The Nextion hasa built-in ARM microcontroller that controls the display, for example it takes care of generating the buttons, creating text,store images or change the background. The Nextion communicates with any microcontroller using serial communication at a 9600 baud rate. So, it works with any board that has serial capabilities like Arduino, Raspberry Pi, ESP8266, ESP32, andso on.

Fig 6. Nextion HMI Display

Photo electric sensor

Photo Electric Sensor detects objects, changes in surface conditions, and other items through a variety of optical properties. A Photoelectric Sensor consists primarily of an Emitter for emitting light and a Receiver for receiving light. When emittedlight is interrupted or reflected by the sensing object, it changes the amount of light that arrives at the Receiver. The Receiver detects this change and converts it to an electrical output. The light source for the majority of Photoelectric Sensors is infrared or visible light (generally red, or green/blue for identifying colors).

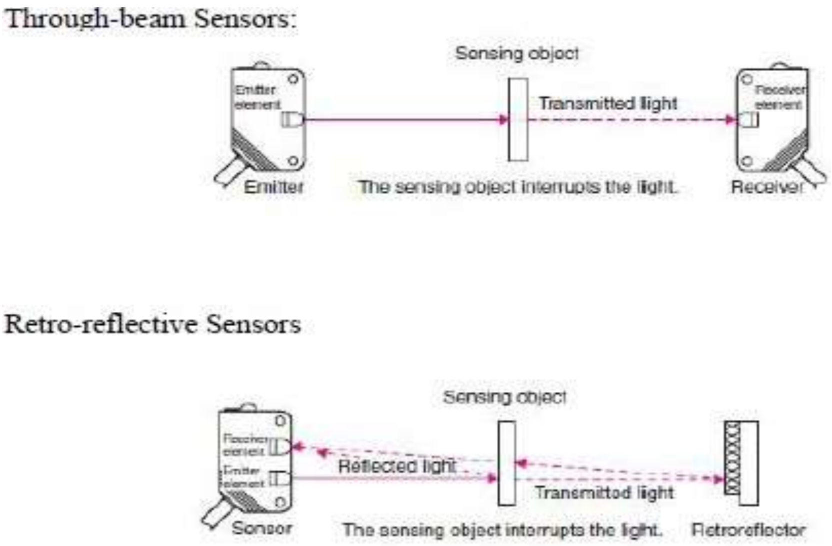

***Fig 7**. Nextion HMI Display*

IV.CONCLUSION

We are planned to use this automation process using STM32F446RE in our own product named as "Super Shuffling Machine". Now, we were developed the working prototype model. And also we have planned for next product design which we were attached in the annexure. We found some disadvantages in this first working prototype model like Large Size, HeavyWeight and Accuracy missing. In future, we planned to develop it as product and want to change it as a successfully commercialized product. And we sure that, it is a completely new product to the market and the patent application wereregistered.

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