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ARDUINO BASED AUTOMATIC SHOE CLEANING MACHINE

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ABSTRACT

Designing and building an intelligent, automated polishing equipment is the goal of our project. All employees in any firm are required to follow the dress code, which includes wearing shoes. It takes time to wear clean shoes on a regular basis in today's hectic society. This device lessens the complexity of currently accessible items on the market. Because this project is new and practical, our product works better in any kind of company. The clever automatic shoe polishing machine's design meets the demands of the current market environment. The machine's ability to carry out the necessary function with a high degree of accuracy is the main innovative feature of this project. the device that simultaneously cleans the bottoms of the shoes and has a sole cleaner. The chosen mechanism is extremely straightforward and offers the safest and most adaptable operations for an extended lifespan. This project's mobility and flexibility qualities are its highlights.The shoe polishing machine's integrated blue-tooth feature helps the staff shine their shoes more wisely. When it comes to shoe polishing, this project works better than any traditional technique.

KEYWORD: *Design, Fabrication, Shoe polishing, Smart, Blue-tooth*

1. INTRODUCTION

In today's corporate environment, appearance is crucial to projecting professionalism.This is why properly shining and polishing shoes is more important. Hand-polishing the shoe could cause harm to the leather's surface. The shoe's life will be shortened in this way.Beyond this, polishing will require a significant amount of time and labor. However, the automatic shoe polishers that are currently on the market will not perform the desired shine and will require additional time to polish.

A shoe is a type of footwear designed to keep the human foot comfortable and safe while doing different tasks. Since leather is used to make most shoes, it needs to be treated very carefully and polished frequently to keep its glossy look. This calls for the use of a waxy paste or cream called shoe polishing wax, which is first uniformly applied to the shoe with a cloth or brush. The next step is buffing, which involves rubbing it hard to create a glossy finish. This increases the shoe's lifespan as well. The manual application of this wax takes a lot of time. This machine's functions include properly gripping the shoe, putting a layer of polishing wax all over it, and buffing it to give it a shiny appearance while causing the least amount of damage possible.

Although there are many different kinds of machines, a sophisticated manner of manufacturing them allows users to operate them while also satisfying their never-ending demands. Nevertheless, this kind is still open to further change. In a short amount of time, the automatic shoe polishing machine polishes your shoes, saving you strength and work. Because of this, we have invented a machine that will give your shoes the ideal look and excellent shine every day. Professionals want their shoes to look nice and last longer, but they sometimes forget to perform the necessary steps.

More focus should be placed on the automation of the primary issues that emerged with manual machine types. Professionals primarily focus on simpler and more intelligent ways to live. It has been determined for the advancement of innovation after taking all of these aspects into consideration. In the coming sections the motivation, objectives, and the fabrication of ourinnovation have been discussed clearly.

2. AIM ANDPROBLEM STATEMENT

Aim: In light of the aforementioned characteristics of the shoe-polishing machine, an effort has been made to create a novel device that might carry out the necessary tasks more effectively and affordably.

One of the main goals of the current effort is to minimize the need for human labor. The Other ones are

- To enhance the quality of the polished features
- To shorten the time needed for shoe care To provide sole polishing as an extra feature
- To give the consumer a high-quality, shiny product at a reasonable price while taking ergonomics into account and saving time.

Problem Statement: The first shoe shine machine was created, and it was incredibly difficult to use. In today's corporate environment, appearance is crucial for professionalism. In this context, shining and properly polishing shoes is very important.Hand-polishing the shoe could cause harm to the leather's surface. The shoe's life will be shortened in this way. It

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will require a lot of time and human labor to polish beyond this. However, the automatic shoe polishers that are now on the market will not apply the appropriate shine and will require additional time to polish. An ergonomically built and more efficient shoe polishing equipment is necessary to address all of these challenges. In order to overcome all of these challenges, the machine is equipped with two side and one top brushes, which cover the entire shoe section and yield higher-quality shoe polish than those found in the market today.Additionally, it cuts down on how long shoe polishing takes. In order to eliminate the requirement for polish application and physical labor, the machine uses a polishing dispenser.

3.LITERATURE REVIEW

By incorporating a polishing function, the design of an innovative shoe-sole cleaning machine is recognized as a requirement for development. To protect themselves and maintain a clean environment, all working professionals are required to wear clean shoes when they enter their facility. The integrated shoe polishing and sole-cleaning facility that previous researchers created took these qualities into consideration.

From the standpoint of the industry, the creation of an autonomous shoe polishing machine has the potential to relieve the challenges associated with currently available products on the market while also promoting their use in offices [1]. Later on, a shoe-cleaning and shoe-polishing machine was developed in tandem due to the necessity to meet various customer requirements, including compactness and cost-effective characteristics [2]. The automatic closed-loop speed regulation of a DC motor is based on pulse width modulation, or PWM. Using an Atmega-8L microcontroller as a feedback system, the authors investigated how to use the PWM approach to control the speed of the DC motor under various load situations. It was determined that PWM can maintain constant speed under various load scenarios [3].

According to reports, an innovative approach to phase control is created by utilizing ARDUINO software to code a program. The ARDUINO controller receives user input and produces firing pulses for the TRIAC, which regulates the induction motor's speed [4]. An Arduino controller kit is utilized to carry out the entire procedure, and Tera-Term software and an Arduino microcontroller are used for the serial monitor and microcontroller. This leads to the induction motor's variable speed control [5].

The shoe polishing machine uses sensor equipment to polish the shoe in a brief amount of time while requiring only one or a single coin [6].

A reasonably priced, semi-automatic sole washing device has been available recently. The simplest method of cleaning shoes has been made possible by the design and fabrication of a sole cleaner [7]. The motor's speed changes as a result of the signals' duty-cycle variation. The motor's ripple current is obtained using data acquisition (DAQ) and is utilized as a feedback component. An industry standard control algorithm that is frequently employed is the proportional-integral-derivative (PID) control.

As of right now, the research merely presents specific sensor/device approaches for the coin-based operation of the shoe-polishing machine. The current project aims to use an integrated mechanism to design and build a fully automatic shoe-cum-sole polishing machine. Ecological sustainability and energy efficiency are essential components for optimizing resource utilization. [9].

In this work, we have made use of the Arduino Processer, which provides an integrated mechanism that uses Bluetooth connectivity to help the user in the remote mode. The industry should transition to automation or semi-automation in order to increase productivity and produce high-quality goods at a reasonable cost.Automation is a good idea for repetitive operations. One of the tasks that is primarily performed by hand in the steel door industry is the packing of doors [10].

Among similar possibilities, fuzzy TOPSIS (Technique for Order Preference by Similarities to optimal answer) is one of the finest ways to find the optimal answer. Additionally, it can be applied to automate the procedure and get rid of doubt and ambiguity in the choosing process [11]..

The goal of this research is to automate the process of shining and polishing shoes without requiring human intervention [12]. The primary function of the integrated sensor is to detect and quantify the dimensions, weight, and magnetic characteristics of the coin that is being stored. Only when there is actual physical touch between the sensors and the human do they function.

4. METHODS AND METHODOLOGY

The project's goal is to develop a shoe-shinning device that solves issues with traditional methods and produces high-quality results that are either identical to those achieved by hand shining shoes or drastically better. Coins are deposited by the user into the machine's external coin slot. When a coin crosses the infrared sensor, the IR transmitter transmits signals towards the coin, which are subsequently reflected to the IR receiver. The IR sensor then transfers the singles to the Arduino board, which in turn transfers the signals to the power supply board, which in turn transfers the signals to the 2 mode relay.the signals are processed by the relay and then sent to the transformer that converts 12 volts.The power is converted to an AC motor via the transformer.The motor begins operating when it gets impulses from the transformer**..** The block diagram of the shoe-polishing machine mechanism is represented in Figure 1

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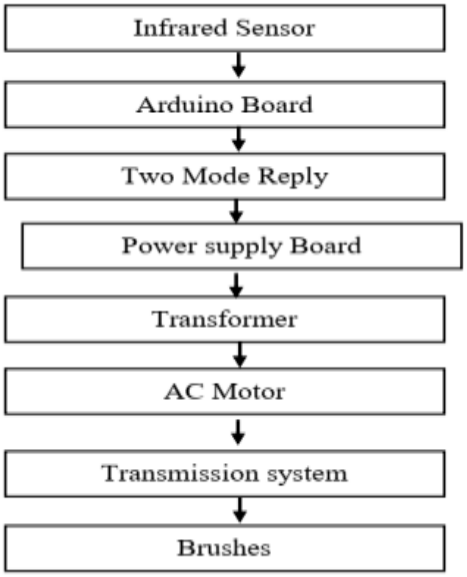

Fig.1.Block Diagram

A secured container or receptacle used to store change placed in coin-operated devices such as turnstiles, pay phones, and pinball machines. a secured container to hold the coins put into coin-operated devices (like pay phones). One term for a coin collector is numismatic or numismatist. Numismatic refers to the study or gathering of banknotes.This includes coins, medals, paper money, and tokens. It can also refer to an individual who examines or gathers banknotes. The coin collecting box is represented in Figure 2.

Fig.2. Coin Collection Box

IR Sensors

The IR Sensor module exhibits remarkable adaptability to ambient light. It consists of two tubes: an infrared transmitter and a receiver tube. The emitting tube emits a specific frequency when it encounters an obstacle detection direction (a reflecting surface). The infrared reflected the receiver tube receiving, and following comparator circuit processing, the green LED illuminates. The signal output generates a digital signal, which is a low-level signal. The detection distance can be adjusted between 2 and 10 cm, with a potentiometer knob. The working voltage range for this module is 3.3V to 5V.Its block diagram is shown in figure3.

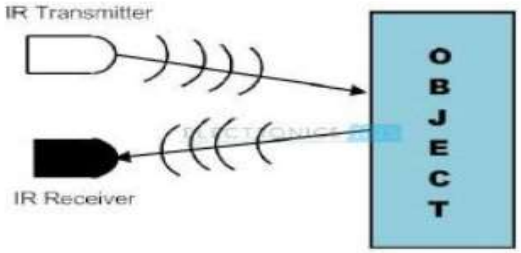

Fig.3.I nfra Red sensor

Arduino Board

An open-source microcontroller board based on the ATmega328 chip is called the Arduino Uno R3.This board features an onboard 16 MHz ceramic resonator, 6 analog input pins, 14 digital input/output pins, an ICSP header, an onboard DC power jack, a USB port, and a microcontroller reset button. Figure 5 shows the Arduino board that is being used in this experiment. Everything required to sustain the microcontroller is contained in it. Using the board is alsovery easy, simply connect it to a computer with a USB cable or power it with a DC adapter or battery

External (non-USB) power sources include batteries and wall-wart AC-to-DC adapters. To connect the adapter, insert a 2.1mm center-positive connector into the power jack on the board. Also leads from a battery can be inserted in the Gnd and Vinpin headers of the Power connector. A 6 to 20 volt external supply can power the board. However, if the supply is less than 7V, the 5V pin might only provide 5V, which could make the board unstable. The voltage regulator may overheat and harm the board if more than 12V is used. For Arduino Uno, a recommended voltage range is 5v to 12v.

Fig.4.Arduino Board

Power Supply Board

The regulated power supply is appropriate for microcontroller applications that require exact voltage to function since it can accept unregulated inputs ranging from 7.5V to 15V AC or DC and output regulated outputs of 5V and 12V. The power transformer or wall-mounted DC adapter can supply the input.

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Fig.5.Power Supply Board

5.WORKING PRINCIPLE

This machine's introduction facilitates efficient operation by consolidating cleaning and polishing tasks into a single location. It lessens the labor of humans. This gadget is affordable and portable; it not only fulfills the requirement but also gives the faculty member who wears the shoe on a daily basis a new way of life. Coins are deposited by the user into the coin slot outside the machine.

When a coin crosses the infrared sensor, the IR transmitter transmits signals towards the coin, which are subsequently reflected towards the IR receiver. The IR sensor then transfers the signals to the Arduino board, which in turn transfers the signals to the power supply board, which in turn transfers the signals to the 2 mode relay.the signals are processed by the relay and then sent to the transformer that converts 12 volts.

The power is converted to an ac motor via the transformer. The motor turns on when it gets the signals from the transformer. The sole cleaning brush shaft and shoe polishing brush shaft are connected by the chain drive, which converts the motor's power into the sole cleaning brush shaft. This module can be the best option for you if you're seeking for a wireless module that can send data to and from a microcontroller and your computer or smartphone. You may need to check at the CSR8645 module for multimedia transfers, such as songs or images, as this module is not designed to transfer such types of files. Upon powering on the module, you ought to be able to identify the Bluetooth device as "HC-05." Once connected, you can initiate communication with it by entering the default password, 0000.

The photograph of the system has been shown in fig.6

Fig.9 .Photograph of the Machine

We have reached the following conclusions in the current work. It is possible to further enhance this work by making some changes. The following findings were reached by the primary goal of designing and building an autonomous smart shoe cleaning machine that runs on coins:

- When the user applies wax polish to their shoes, the rotary brushes attached to the shaft help polish the shoes and the high-speed rotation of the brushes helps clean the shoe sole effectively.
- The machine would work better in a commercial setting because it is coin-operated. in order to efficiently handle the machine's upkeep.
- Additionally, it performs the buffing process to make the shoes appear shining.

The project has a better design at the academic level, but it is not yet finished for the commercial application. Only conventional shoe sizes are compatible with the suggested design. The created apparatus has the capacity to polish a pair of shoes in just 120 seconds.The created coin-based automatic smart shoe polishing equipment can initially be linked to a variety of gadgets, including PCs, tablets, and smartphones.

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