Automatic Coagulation Process of Rubber

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ABSTRACT –Natural is used extensively in many applications and products, either alone or in combination with other materials. In most of its useful forms, it has a large stretch ratio and high resilience, and also is water-proof. Rubber is harvested mainly in the form of the latex from the rubber tree or others. The latex is a sticky, milky and white colloid drawn off by making incisions in the bark and collecting the fluid in vessels in a process called "tapping". The latex then is refined into rubber that is ready for commercial processing. In major areas, latex is allowed to coagulate in the collection cup. The coagulated lumps are collected and processed into dry forms for sale. After extracting white latex from the trees another main process comes into act where the collected solution is been mixed with the desired ratio of water and some weak acid (methanoic acid or ethanoic acid or formic acid) this process is called mixing process which leads to coagulation of rubber.
Key Words: Arduino Uno, motor driver, solenoid valve, flow rate sensor, 12v Dc motor, switches, 12v Adapter.

I. INTRODUCTION
After extracting white latex from the trees another main process comes into act where the collected solution is been mixed with the desired ratio of water and some weak acid (methanoic acid or ethanoic acid or formic acid) this process is called mixing process which leads to coagulation of rubber. In most of the small scale rubber plantation they make use of manual process for the mixing of the latex.

To overcome from the manual process design a suitable automatic machine which performs the mixing process by consuming less time ,doesn't requires any skilled labourers and also without any wastage of rubber sap.

This automatic machine improves the quality of the rubber sheet by adjusting the flow of solvents in required ratio & mixing all the ingredient in standard ratio.

II. PROPOSED ARCHITECTURE
Arduino Uno
The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller. The board is equipped with sets of digital and analog input/output (I/O) pins. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable

Motor Driver IC (L298N)
The L298N is an integrated monolithic circuit in a 15- lead Multi Watt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver de-signed to accept standard TTL logic level sand drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the in-put signals. The emitters of the lower transistors of each bridge are connected together rand the corresponding external terminal can be used for the connection of an external sensing resistor. An additional Supply input is provided so that the logic works at a lower voltage.

Solenoid Valve
Solenoid valves is used to convert Electrical energy into Mechanical system. Solenoid valve isused to open, close, mix, or divert media in an application.

Flow Rate Sensor
The Flow Rate Sensor is an instrument used measure linear, nonlinear, mass or volumetric flow rate of a liquid or a gas.
Flow meters measure either volume or

mass. The flow (Q) is equal to the cross-section area of the pipe (A) in a volumetric flow meter, and the velocity of the flowing fluid

Dc Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields.

▌ IMPLIMENTATION AND WORKING

The block diagram of automatic mixing machine for coagulation of rubber as shown in figure 1.
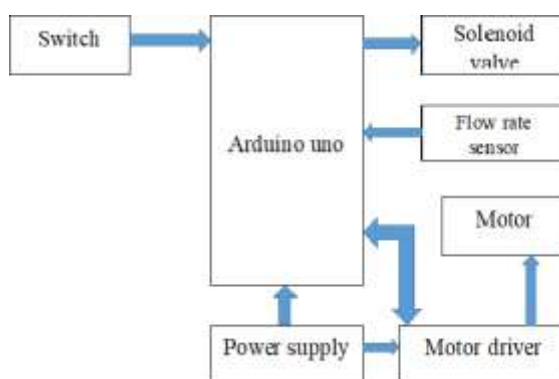

Fig. 1 Block diagram of automatic mixing machine for the coagulation process of rubber

WORKING:

Here the automatic mixing coagulation process can be classified into some following steps below:
- Storing
- Inlet of solvent
- Mixing
- Collection

Storing:

The extracted latex from the rubber trees, water and the dilute acid needs to store in a separate container.

Inlet of solvent:

The particular amount solvents needs to get collected in the mixing container for the mixing process. This can be done by using flow rate sensor and solenoid valve. We need to set the quantity required and flow rate sensor will sense the flow and when it reach the value it sends signal to solenoid valve and it stops the flow.

Mixing:

When all the solvents is collected in a mixing container, dc motor is used to mix the solution in equal proportion for a particular amount of time.

Collection:

The mixed solution are collected in a collector/tray after the mixing process gets completed. As soon as the tray/collector gets filled, the filled tray/collector is moved forward using conveyer for further process and the empty tray/collector is ready to collect the next mixed solution.
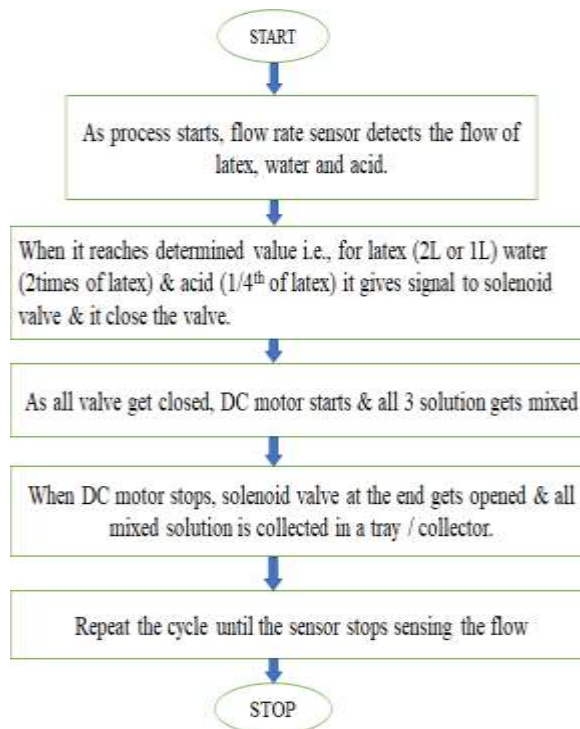
IV. FLOWCHART:

Fig. 2 Flowchart of automatic mixing machinefor coagulation process

V. EXPECTED MODEL:

Fig.3 3D model expected for the automaticmixing machine for coagulation process

VI. EXPECTED OUTCOME:

This project will helps us to obtain a high quality rubber sheets by mixing all the solvents such as latex, water and acid in equal ratio, without causing wastage of rubber sap and improving the quality by consuming less amount of time and without any skilled labourers.

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