

AUTOMATIC SYRINGE PUMP USING STEPPER MOTOR

Shaikh Ahsanul Haque¹ Shaikh Umer² Wasim Zaidi³ Shaikh Hasan⁴ Prof. Rajan Deshmukh⁵
^{1,2,3,4}Student ⁵Faculty

^{1,2,3,4,5}Department of Electronics & Telecommunication Engineering,
^{1,2,3,4,5}RCOE Bandra (W), Maharashtra, India.

Abstract— Sometimes while it's come to giving medicine perfectly to a patient we require more time for designing and setting up. Therefore, to reduce time and efforts we are designing this project.

In this paper ,there is a design of Automatic Syringe Depositor.

Where depositing and retracting of syringe is done automatically. This paper focuses on designing and implementation of Automatic Syringe Depositor Using Arduino Uno.

Keywords :- Arduino uno, Stepper motor, Syringe, Syringe holder etc.

I. INTRODUCTION

A syringe depositor or syringe pump is a small infusion pump (some include infuse And withdraw capability), used to gradually administer small amounts of fluid (with or without medication) to a patient or for use in chemical and biomedical research.

It is used to supply the medicine to patient in rare cases like Diabetes, Insulin Injection etc. A syringe depositor is a device that can accurately deliver small amounts of liquid.

Syringe pumps are commonly used in hospitals for administering drugs Intravenously and in labs for biological experiments.

Syringe Depositor are also useful for delivering IV medication .

Another use of syringe depositor is in palliative care, to continuously administer analgesics (painkillers), antiemetics (medication to suppress nausea and vomiting) and other drugs. This prevents periods during which medication levels in the blood are too high or too low, and avoids the use of multiple tablets (especially in people who have difficulty swallowing).As the medication is administered subcutaneously, the area for administration is practically limitless, although edema may interfere with the action of some drugs.

II. RECOGNITION OF PROJECT

There are no method of giving medicine doses so precisely except syringe depositor.

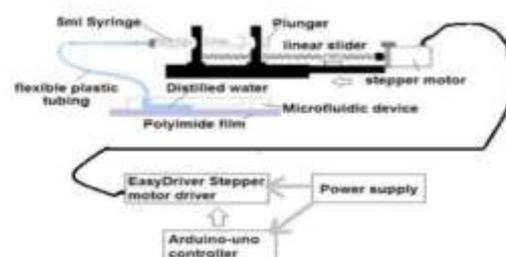
In some cases of emergency and diabetes the medicine of some amount (eg:- 10ml) should be given within an hour no more nor less or it can cause serious problems for patient.

The syringe is filled up with the drug/medicine. The programming is done is such a way that the microcontroller commands the stepper motor to rotate in specific angle so that the medicine can be injected in the patient's body.

We can vary the speed of stepper motor as we wish. In the case of medication should be slowly pushed in over the course of several minutes, this device saves the time and reduces errors.

In high-resource hospitals, syringe pumps are used to provide rehydration fluids, dextrose to hypoglycemic infants, and antibiotics to infants with infection

3.BLOCK DIAGRAM



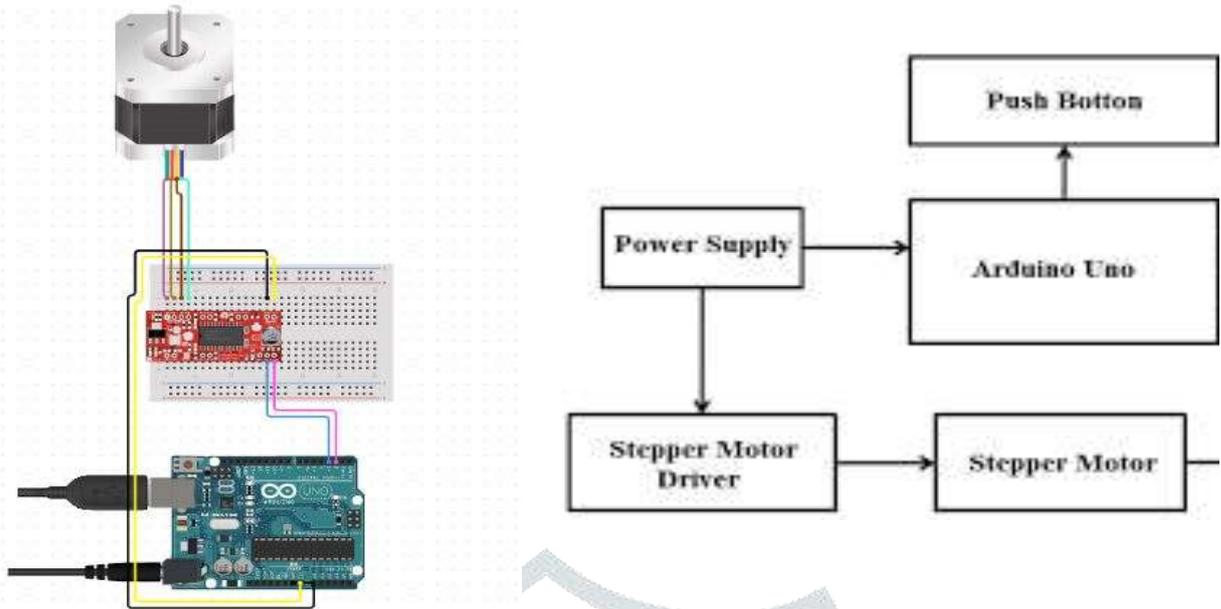
Power supply is connected to Arduino Uno

Arduino is connected to EasyDriver (Stepper Motor Driver)

EasyDriver (Stepper Motor Driver) is connected to Stepper Motor

Syringe is mounted on holder,connected to Stepper Motor by

Linear slider



Additional Power supply is connected to Arduino for powering Stepper Motor

Arduino consist sets of Analog and Digital pins

VIN (analog pin) is connected to (+ve) pin of Power In of ED

GND (analog pin) is connected to (-ve) pin of Power In of ED

Pin 2 (digital pin) is connected to Direction Input pin of ED

Pin 3 (digital pin) is connected to Setup Input pin of ED

Stepper Motor consist of 6 pins

Center Tap 1, Coil 1, coil 2, Coil 3, Coil 4, Center Tap 2.

Center Tap 1 & Coil 2 is connected to Motor Coil A

Coil 3 & Coil 4 is connected to Motor Coil B

Center Tap 1 & Coil 2 is connected to Motor Coil A

Coil 3 & Coil 4 is connected to Motor Coil B

12 volt DC supply is connected to Arduino.

- Stepper motor is connected to Arduino via motor shield.
- Arduino will command the Stepper motor to rotate for a specific angle.
- Stepper motor will force the medicine to be injected.
- After completion of injecting medicine, syringe is replaced with a new syringe for next patient.

V. ADVANTAGES

1. Syringe pumps are fast and easy to use
2. Syringe pumps allow the user to define the total volume of fluid and deliver it in accurate speed.
3. Syringe pumps are capable of generating high pressures of several hundred bar
4. The mean flow rate of liquid in a syringe pump remains constant even with varying resistance in an experiment.

VI. DISADVANTAGES

Without limit switch positioning is difficult while some time motor torque unbalance and it is in result in differ in the distance of actual and Processing from that positioning return to zero some errors occur in distance.

VII. FUTURE SCOPE

These syringes ensure safety and reduce the time consumed in injecting the liquid. They reduce the chances of contracting diseases majorly and are reusable in nature. Owing to these factors they are being widely adopted by a huge portion of population, which is driving the market growth. Automatic retractable safety syringes are used in treatment of cancer, diabetes, tuberculosis, polygenic diseases, and other diseases owing to their time-saving and safety benefits. These diseases are growing massively across the globe and causing a major rise in the demand for syringes as they are utilized on regular basis by the patients. Patients find automatic retractable safety syringes highly efficient and easy to use. Patients can use these syringes by themselves which saves a lot of time and cost.

We are pleasure to conclude on the topic “Automatic syringe pump” .The detail of this project has been made by members of team sincerely with the inspiration of our tutor

As our main aim was to overcome the problem of cost and using the Syringe pump, From this project we achieved that.

And with little modification on this project , It can be used in industry.

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