Simulation of Drainage Cleaning Robotics System using Solid Work Tinkercad software

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Abstract- **In this paper we are designing simulation using tinkercad solid work software for simulation. In simulation we used pulse width modulation (PWM) to provide very smooth action and speed varieties .for PWM pulse we used ATmega2560 microcontroller.**

In this design we used robotic system which can reduce the complex mechanism for cleaning the manhole.it will give a clear understanding of the manipulator and its subsystem interactions.

Index Terms- *tinkercad solid work software, pulse width modulation (PWM) ATmega2560 microcontroller.* **Simulation, Motor Driver IC (Integrated Circuit), pulse width modulation (PWM).** *DCRS (drainage cleaning robotic system).*

I. INTRODUCTION

The motive of the project is to automate the sewage cleaning process in drainage. In this process man has to enter the hole to cleaning using with some basic equipment like shovel and spade. Currently manual sewage banned in our country but there is requirement of some devices to clean the man hole without entering it so we introduce robotic arm system such that the robotic arm will grab the sewage. In this system we use thinker cad solid work software for design. The part of modulation contain four legs with height 96cm which provide stability. The robotic arm length 100cm and used to perform main cleaning action we design four wheel drive which provide better movement under drainage. The PWM ATmega2560 microcontroller used and also tinkercad software used.PWM basically help to run motor at various speed

II. BLOCK DIAGRAM

In this design we used Tinkercad solid work software for design. Design start with manual drawing. After Rough paper drawing, we modulate all the parts which we design. This modulation process done by using tinkercad solid work software. After modulation there is one phase that is parts are appropriate or not. If part is appropriate then is goes to assemble the part if it is not appropriate it goes to again part modulation. In part modulation again these parts ae rectifying. This cycle is continuing and repetitive.
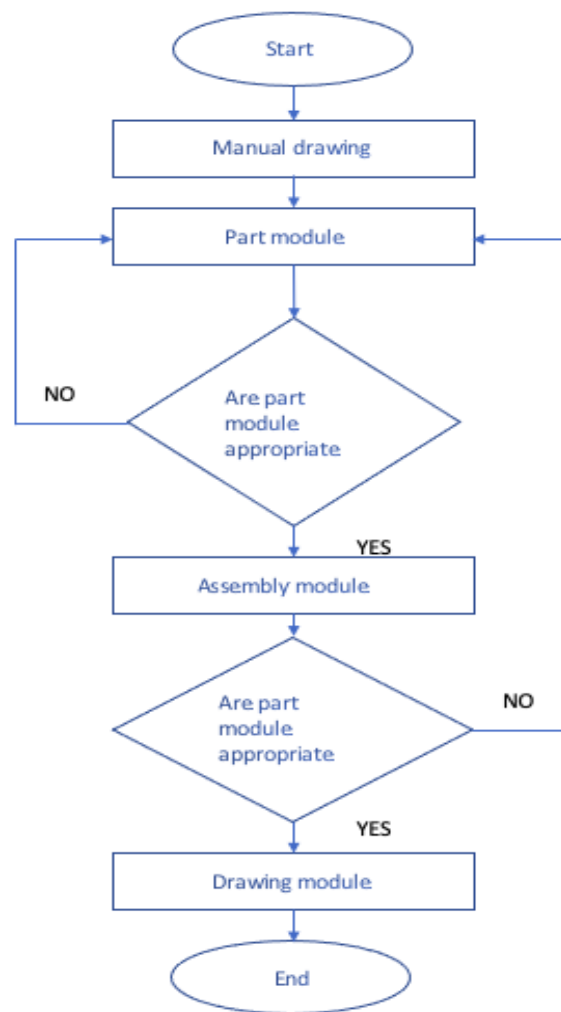

Fig. 1. Block Diagram of Control unit
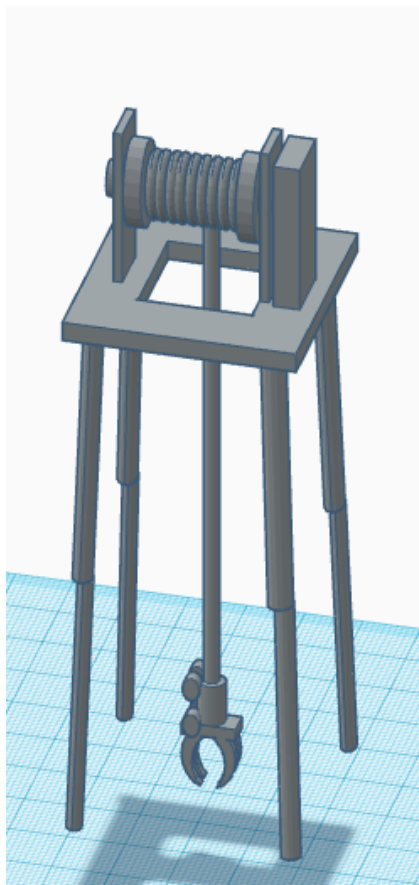
III. SOILD WORK DESIGN

Fig. 2. CAD Design

IV. DESIGN DETAILS

Total length of the robot is 130cms. It contained four legs which height is 96cms which is providing stability at any surface. Flexible pipe wounding bobbin rest on 40x40cms base. This bobbin provides pull operation to robotic arm. Whole robotic arm length is 100cms. By this robotic arm we perform main cleaning action. Main part of this robotic arm which contained two teeth which grab any object. This tooth get powered through linear motor. This prat dimension is 20.85cms. For carrying this robotic arm in drainage at horizontal direction we design a simple 4 wheel drive robot which is provide us better movement under drainage.
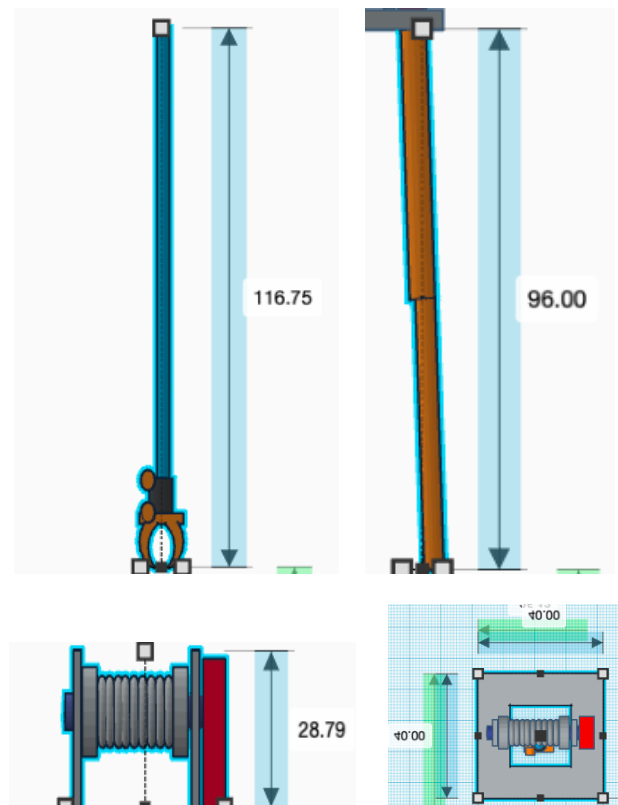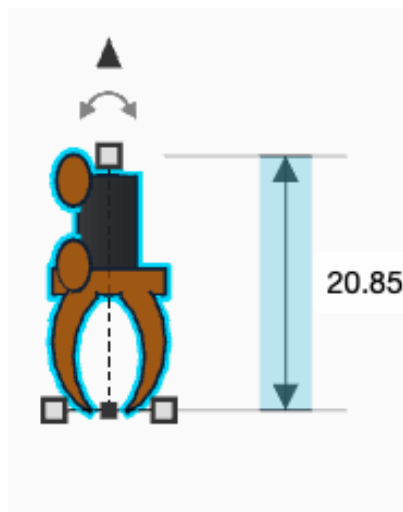

Fig. 3.

V. SIMULATION WORK

A. Main robotic Arm operation

In this simulation we used Tinkercad solid work software to perform this work. In working when we provide electric supply to the motor, motor start rotating. As we previously defined, we use linear action motor that means its shaft not act linear action but we built a mechanism which act linear action. This linear power gives to the robotic arm mainly to the teeth. By this power teeth will close and open because of this linear motor.

When power applied to the motor, motor start running as per the calculation we determined that for full expansion of teeth required 4 turns of motor shaft. This motoring action done by using PWM modulation. PWM modulation provide us very smooth action and speed varieties. For generating PWM pulse we used ATmega2560 microcontroller

B. Main motor PWM operation mode

For generating PWM pulse we used ATmega2560 microcontroller. For perform this simulation we also used Tinkercad software.

Pulse width modulation is basically help us to run motor at various speed. It also provide us smooth operation
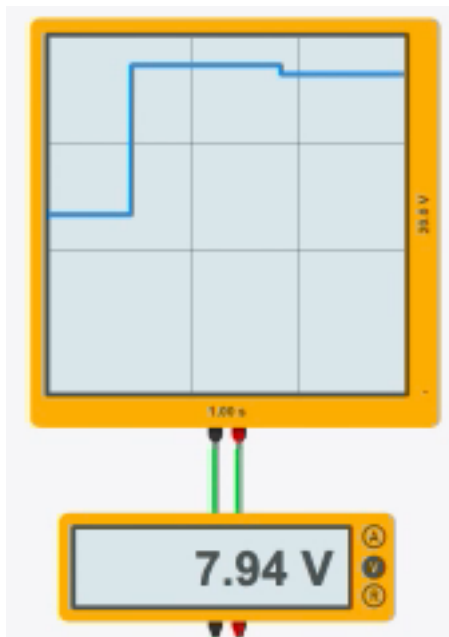
Fig. 4.   Fig. 3. Motor operation waveform

VI.   RESULTS

TABLE I.   RESULTS OF SIMULATION

Sr. No.	Motors	Operation in Modes			
		action	angle	turns	voltage
1	motor	clockwise	-	4	7.94
2	teeth	expansion	120 degree	-	-
3	motor	clockwise	-	3	7.94
4	teeth	expansion	90 degree	-	-

VII.   CONCLUSION

In this paper we have designed drainage cleaning robotics system using tinkercad solid work software and a simple four wheel drive robot which is provide for better movement under drainage.

ACKNOWLEDGMENT

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