

AUTOMATIC CANNON FILLING BOT

Ayush Tripathi¹, Amit Kumar Tiwari², Saurav Patel³, Vikash Mishra

¹⁻⁴Student, Dept. of Electrical Engineering, MITS Gwalior, M.P., India

Abstract - Till now most of the weapon system of our country is monitored manually which increases the risk of life of soldiers operating the system. The Cannon used in the war needs to be filled with cannon ball manually by soldiers. So, this Robot is basically Designed to help soldiers in the War Field. Instead manually now the Cannon balls will be filled using this robot. Being a Robot, it can go to Unsafe zone where soldiers have a risk of life. This robot uses the combination of micro-servomotor, Arduino-UNO and potentiometer in which Arduino-UNO board is programmed to guide the micro-servo motors and Arduino's analog input is given to potentiometer.

Key Words: Arduino UNO, Micro -Servomotors, ATMEGA -328, MATLAB, Robotic arm.

1. INTRODUCTION

Indian economy is developing economy in which peoples are constantly putting their efforts to make it bigger. The defense sector is important part of Indian economy. Today Technology is advancing in every field and defense sector is also not left untouched There are many equipment's in the field of defense in which we can use robotics Cannon is one of them. This bot is an attempt to connect cannon with technology. So far, the cannon ball which is being filled in the cannon is filled by soldiers with his own hands which always keeps his life in danger during the war. This work can be done automatically with the help of this bot. If this cannon ball can be filled from some distance where cannon is being operated then this can be of significant help for the soldiers in the war zone. After collaborating this bot with automatic vehicle, it can send to even opponent's territories.

The Servo mechanism is a close loop system that is used for automatic output controlling. The closed loop system may be positive feedback or negative feedback. Mostly negative feedback system is preferred. In the servo mechanism the device is being controlled by feedback input instead of variable input. Feedback signal is error signal which is being generated by comparison of input and output signal. Servo system has mainly three parts i.e. controller, output sensor and feedback system. Servomotor can possess both linear and rotatory motion. Servomotor can be rotated at any desirable angle accurately and precisely. The servomotor can be controlled by micro-controller or 555 IC. Servo mechanism is preferred for high torque and low speed applications. Servomotor consists of gearbox, potentiometer, DC motor and control circuit. The low speed in the motor is achieved by gear box. The error signal discussed above is generated by potentiometer by comparing input and output. This error signal will act as an input for control unit and control unit will guide gear box accordingly.

The mechanical arm can be programmed to work like a human arm. The mechanical arm can also grab the objects like human arm. The mechanical arm will work on the principle of servo mechanism so it will also possess translational and rotational motion. The mechanical arm is connected by servomotor through joints. A Cartesian arm bot has axis form of a cartesian co-ordinate system. These types of bot have application in handling machine tool and arc welding. A cylindrical arm bot has axis form of cylindrical co-ordinate system. These types of bot have application in assembly operation purpose and spot welding. A spherical bot has axis form of spherical coordinate system. These types of bot have application in fettling machines. A humanoid robot has independent fingers and thumbs and they use fingers to grad the objects just like human. The potentiometer has two terminals connected to resistive element and third one is connected with adjusted wiper. The wiper position will decide the desirable voltage thus it work as a variable resistor. At a time two terminal can be used the wiper terminal and any one of other two terminals. The potentiometer follows the linear V-I Characteristics. The potentiometer can be of thumbwheel pot or trimmer pot or slider pot or digital pot.

2. LITRATURE REVIEW

[1] WMHW Kadir, RE Samin, BSK Ibrahim Designed an internet controlled robotic arm. The robot is controlled by Arduino Uno that interfaced with the internet using Arduino Ethernet Shield. [2] R. Jagan, P. Rana Singh, CH. Ashirvadam, K. Navitha designed a robotic arm control through human arm movement using potentiometer. They used potentiometer as a sensor and the controlled the servomotors interfacing it with micro controller.

[3] Anusha Ronanki, M. Kranthi designed and implemented Robotic arm Using Proteus Design tool and Arduino uno. They controlled the arm by the interaction with the human hand using flex sensor, Arduino Uno, RF module (Wi-Fi Module), & servo

motor. [4] Ali Medjebouri and Lamine Mehennaoui Manufactured and Analysed the Robotic Arm with SCARA Configuration using servo drives and Arduino microcontroller controlling it with android app with Bluetooth module.

[5] Abdellatif Baba designed a 4-axis robotic arm control. They used 5 servo-motors for 4 axis movement and controlled it via Bluetooth module connected to Arduino Nano microcontroller. [6] Ksm Sahari and Hong Weng Khor designed the Robot Arm Control based on MATLAB with Arduino interface. They controlled the servos by using Arduino Uno with MATLAB and Simulink. [7] Mohd Ashiq Kamaril Yusoffa, Reza Ezuan Saminb, Babul Salam Kader Ibrahimc designed a Pick and Place robot using micro controller and controlled it using smart phones via Bluetooth module.

3. EXPERIMENTAL SETUP AND RESULTS

The controller that we are using in our bot is ATMEGA-328 and it is programmed using Arduino software. The Arduino is collaborated with potentiometer and servomotors. The potentiometers we using is connected to Arduino board through its analog pins A0-A3. The servomotors here used will be connected to digital Pins of Arduino board. The analog input from potentiometer is given to Arduino board and the digital response (PWM signal) from Arduino is fed to servomotors.

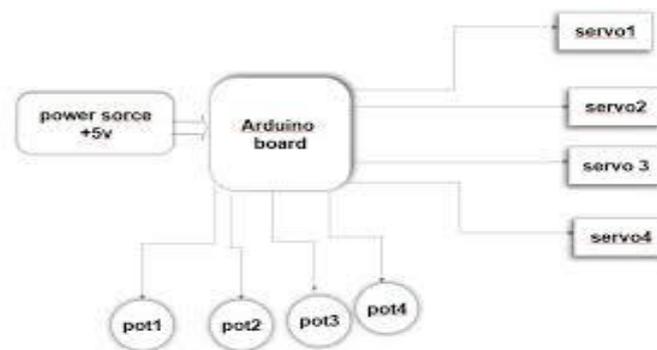


Fig -1: BLOCK DIAGRAM

The block diagram shown here shows how different components needs to be connected. The components we are using here are Arduino UNO board, four micro-servomotor (SG90), four 10k Potentiometer, 5V power Source. The arm is designed using cardboard, micro- servomotors are fitted in the joints such that motion of one servomotor doesn't affect the motion of other. The structure like hands is made using cardboard and servomotor is attached such that it will garb the cannon ball. And other servomotors will be used to take the cannon ball from one place to another. Each Potentiometer will be controlling each servomotor.

1. The Connection will be done using circuit diagram.
2. The four potentiometers will be connected to A0, A1, A2, A3 pin of Arduino respectively. The control pin of these potentiometers will be connected to Arduino and power pin to power source through breadboard.
3. The Controlling pin of Servomotor will be connected to Digital pin 6,7,8,9 respectively and controlling pin to power source through Breadboard.
4. The Arduino board will be connected to power source (9v Battery) through Switch.
5. The Arduino will be programmed using open platform Arduino software.
6. In the teach mode of the robot, each servo position is saved in the memory unit after 25ms.
7. In play mode of the robot, the sketch reads the array step by step and moves the robot arm.
8. Now we can pick the cannon ball and place it into cannon using potentiometer.

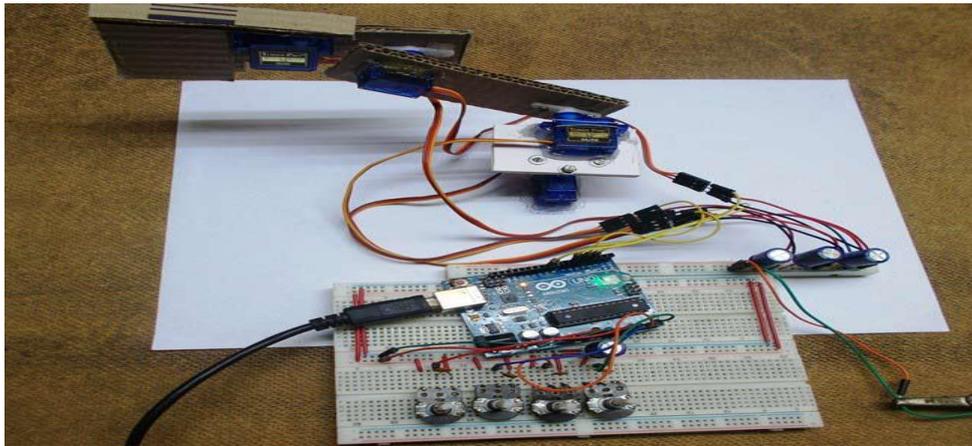


Fig -2: FINAL PRODUCT

4. FUTURE SCOPE

The bot can be correlated with automatic vehicle and controlling the arm with Bluetooth module or Wi-Fi module to make it fully automatic system. The system can be made more efficient to use by adding more features to it like object detector, bomb diffuser, metal detector.

5. CONCLUSIONS

The proposed design of Automatic Cannon filling bot is implemented successfully. The paper has undergone various aspects to design an Automatic cannon filling bot using Servo-mechanism considering various aspects of it, using potentiometer as a sensor and Arduino micro-controller. It is found that bot is working properly to pick and place the cannon ball with good accuracy.

REFERENCES

- [1] WMHW Kadir, RE Samin, BSK Ibrahim. Internet controlled Robotic Arm. Procedia Engineering. 2012
- [2] R. Jagan, P. Rana Singh, CH. Ashirvadam, K. Navitha "Auto & Manual Control of Robotic Arm Using PLC", Vol. 6, Issue 8, August 2017.
- [3] Anusha Ronanki, M. Kranthi "Design and Fabrication of Pick and Place Robot to be used in Library" Vol. 4, Issue 6, June 2015.
- [4] Ali Medjebouri and Lamine Mehennaoui, "Active Disturbance Rejection Control of a SCARA Robot Arm" Vol.8, No.1 (2015).
- [5] Abdellatif Baba "ROBOT ARM CONTROL WITH ARDUINO" Technical Report · June 2017.
- [6] Ksm Sahari and Hong Weng Khor, "Design and Development of A 4-Dof Scara Robot for Educational Purposes", Article in Jurnal Teknologi · January 2011.
- [7] Mohd Ashiq Kamaril Yusoffa, Reza Ezuan Saminb, Babul Salam Kader Ibrahimc, Wireless Mobile Robotic Arm, International Symposium on Robotics and Intelligent Sensors 2012 (IRIS 2012), 1072 – 1078.