SENTRY GUN - Autonomous Turret

Project members

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Project Guide:Dr. S. Fouziya Sulthana

Project

- Problem statement:
- *during border protection many lives of a country's soldiers are lost so to prevent that*
- *a sentry gun is needed to be developed to keep the terrorists and intruders away from the countries borders*
- List of Objectives :

For a sentry gun, the following things are needed to be made:
1.A physical frame that can holster a airsoft gun needs to be designed and constructed(STRUCTURE1)
2. (A structure 2) which can rotate and manage the whole (STRUCTURE 1)
3. A base which can support the (STRUCTURE 2)
3. a distribution board for servo
4. Electronics to control the speed of the gun to shoot perfectly

As the software part is outsourced
I chose a software with following features:
Manual Control
Autonomus mode
Git link : https://github.com/sentryGun53/Project-Sentry-Gun

List of solutions

- List of possible solutions *The airsoft gun directly mounted inbetween the two supports with two bolts*
- *Servos ae directly connected without gear mechanism*
- *unique mount for the gun is made and mounted inbetween the two supports with bolts*
- *Here servos are connected to a spur gear to reduce the inertia*
- *Using a swivel bearing bearing instead of castor wheels*
- *Making separate power distribution board for servos*

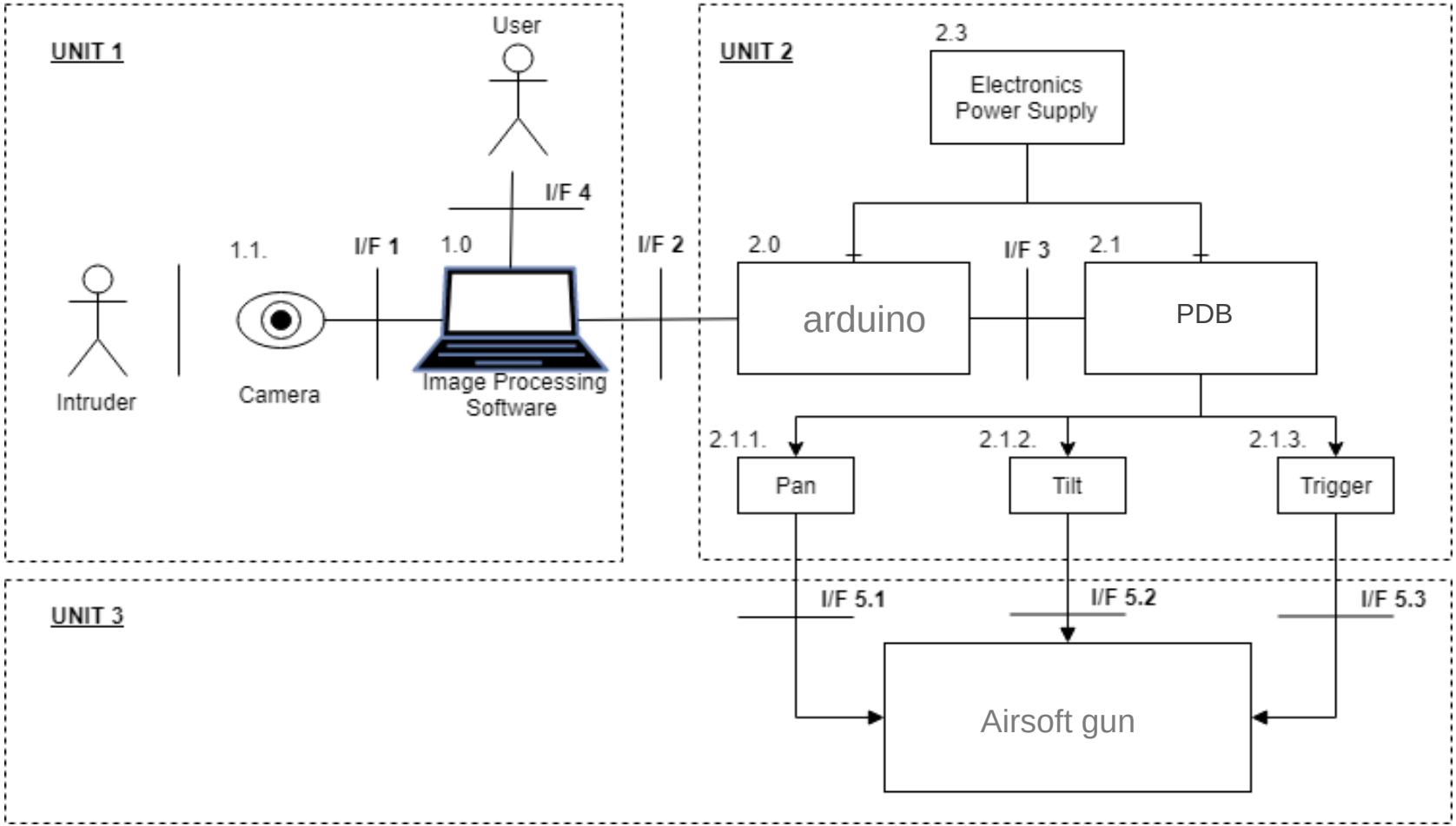
- List of criteria for evaluating the solutions *Cost*
- *Easy assembly and disassembly*
- *Easy maintenance*
- *Less inertia when the gun comes to a quick stop*
- *Reduucing the load stress on Arduino and servo*

Selected solution

- Criteria based on the solution is selected
- *“unique mount for the gun is made and mounted in between the two supports with rods*
- *Here servos are connected to a spur gear to reduce the inertia”*
- *This solution was chosen as its easy to remove the gun from the mount and using the spur gears between the rods and the servos greatly reduce the inertia*

- Tools used and analysis done on
- *I tested the following by directly making a model :*
- *Using a futaba servo with plastic gears “plastic gears not able to withstand the inertia so they broke ”*

Level 1 System Block Diagram



BUCK CONVERTER

LM2596 DC-DC Buck Converter Adjustable Step Down Power Supply Module

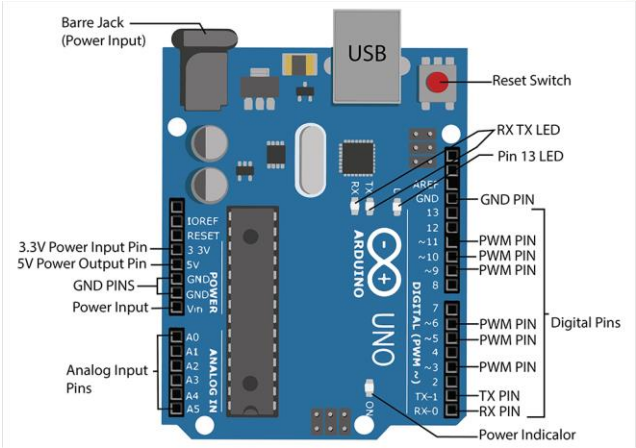
Specifications
Input Voltage - 3.2V - 40V DC
Output Voltage - 1.25V - 35V DC
Size - 43mm x 20mm x 15mm
Output Current - 2A, Max 3A

smps

Output Voltage	12V
Output Current	10A
Type	Enclosed Type
Approx. Wattage	120W

ARDUINO UNO R3

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB of which 0.5 KB used by bootloader
SRAM	2 KB
EEPROM	1 KB
Clock Speed	16 MHz

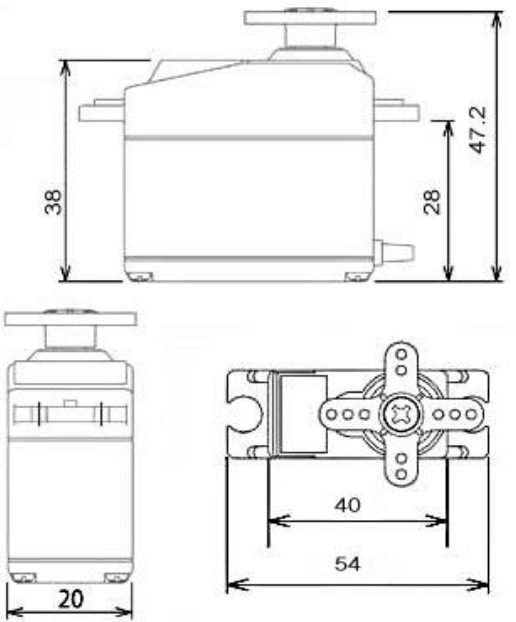


ACTUATORS

MG995 High Speed Servo Actuator

Specifications

- Weight: 55 g
- Dimension: 40.7 x 19.7 x 42.9 mm approx.
- Stall torque: 8.5 kgf·cm (4.8 V), 10 kgf·cm (6 V)
- Rotation Angle: 120deg. (+- 60 from center)
- Operating speed: 0.2 s/60º (4.8 V), 0.16 s/60º (6 V)
- Operating voltage: 4.8 V to 7.2 V
- Dead band width: 5 µs
- Stable and shock proof double ball bearing design
- Metal Gears for longer life
- Temperature range: 0 ºC – 55 ºC



Castor wheel

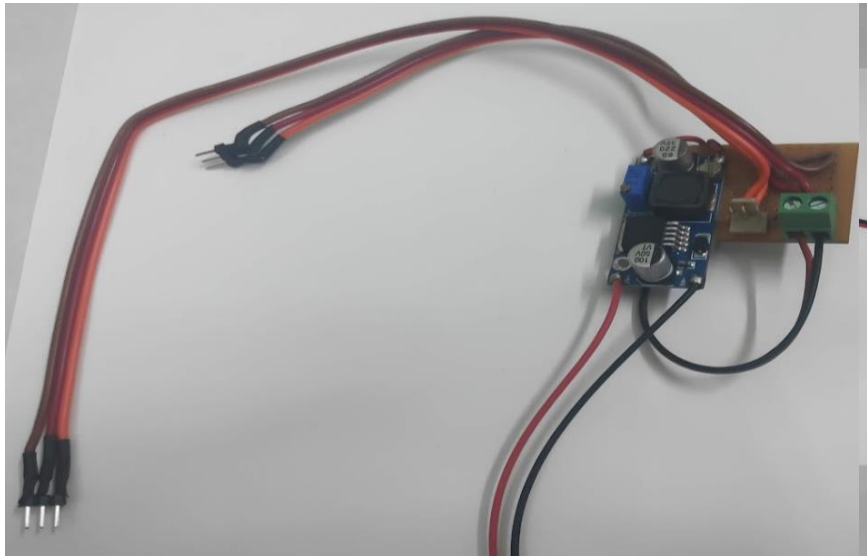
Specifications

•Base plate diameter : 38.2mm
•Wheel height : 23mm
•Mounting hole - Three, 120 Degree apart, 3.4mm diameter

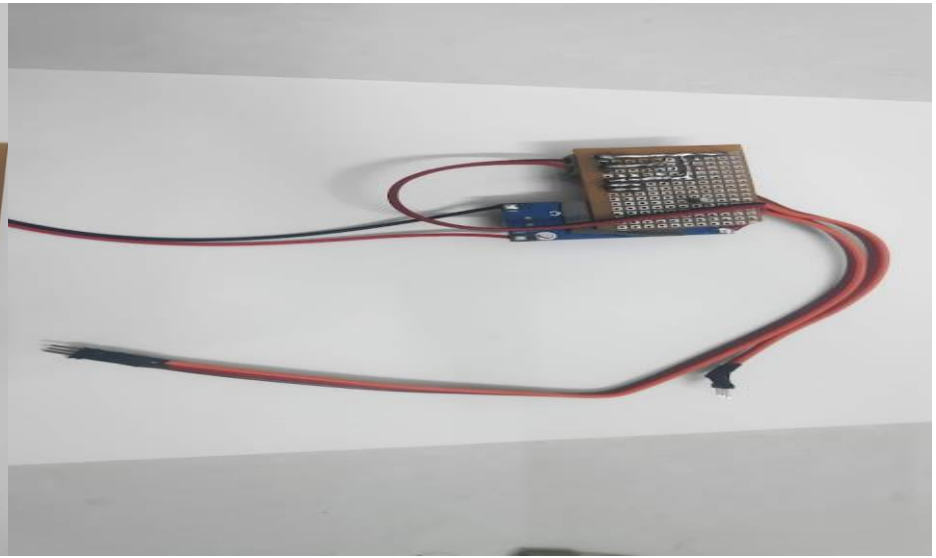
Spur gear

- No. of Teeths =25.
- Diameter=40 mm.
- Center Shaft Diameter=6 mm.
- Teeth Face Width=12.5 mm.

Custom power supply unit for fast deployment



Top view of the board



Bottom view

Project status

- Work breakdown structure

REVIEW 0
Brainstorming ideas and refining and devoloping and submitting the project proposal
Procuring materials and cutting the materials
cutting the parts and making the model
REVIEW 1
assembling the hardware and electronics together
compiling and submiting the project report and journal(first round)
calibraing the gun and the camera
REVIEW 2
testing the sentry gun
making changes to the sentry gun for smooth operation
submiting final report and journal
REVIEW 3
Final presentation

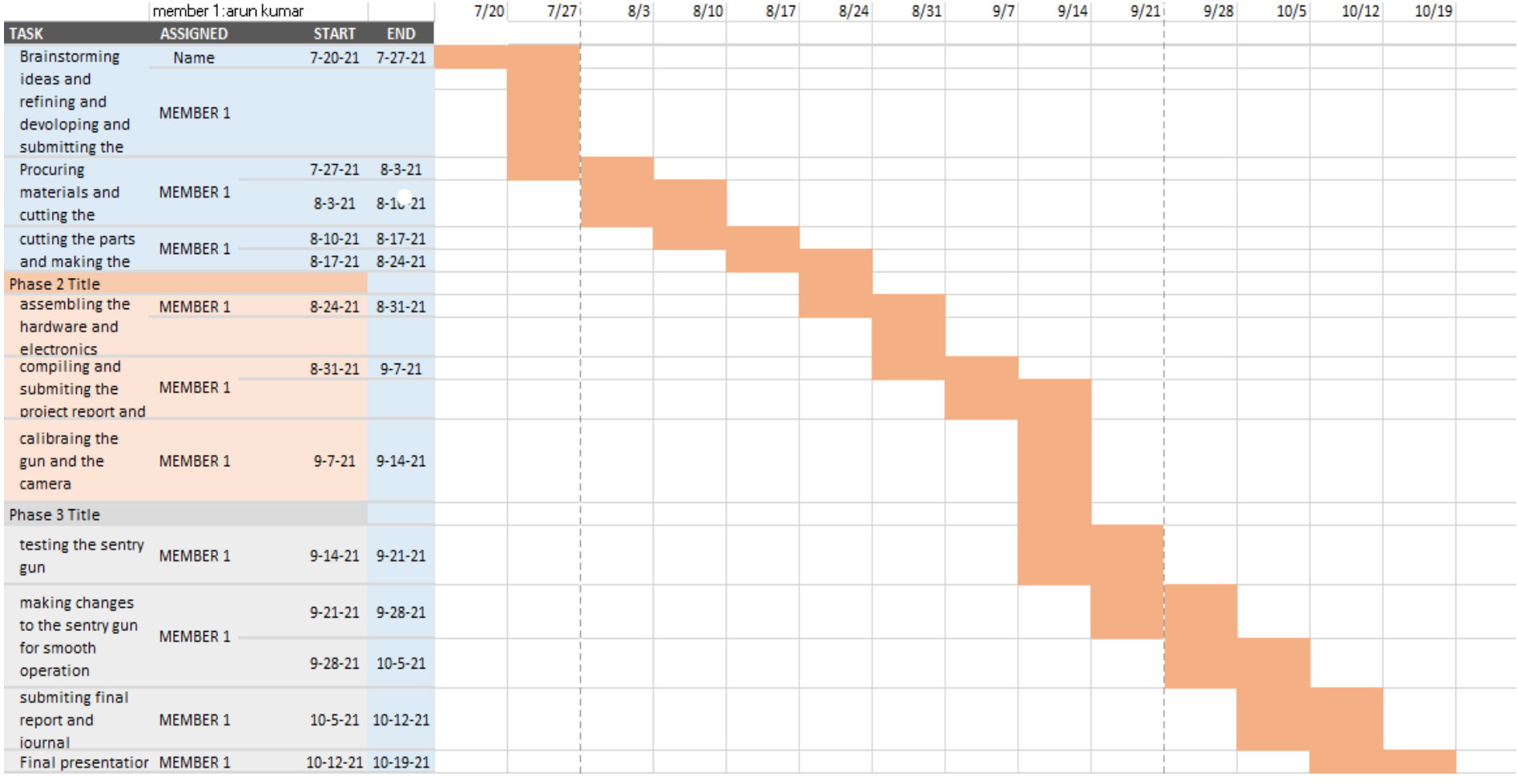
- Work responsibility matrix

1:arun kumar

TASK	ASSIGNED TO	consulted
Phase 1 Title		
Brainstorming ideas and refining and devoloping and submitting the project proposal	Name MEMBER 1	member 1
Procuring materials and cutting the materials	MEMBER 1	member 1
cutting the parts and making the model	MEMBER 1	
Phase 2 Title		
assembling the hardware and electronics together	MEMBER 1	member 1
compiling and submiting the project report and journal(first round)	MEMBER 1	mamber 1
calibraing the gun and the camera	MEMBER 1	member 1
Phase 3 Title		
testing the sentry gun	MEMBER 1	member 1
making changes to the sentry gun for smooth operation	MEMBER 1	member 1
submiting final report and journal	MEMBER 1	member 1
Final presentation	MEMBER 1	member 1

80% work completed

Gantt chart



member 1 : arun kumar

TASK	ASSIGNED	START	END
Brainstorming ideas and refining and devoloping and submitting the	Name MEMBER 1	7-20-21	7-27-21
Procuring materials and cutting the	MEMBER 1	7-27-21 8-3-21	8-3-21 8-10-21
cutting the parts and making the	MEMBER 1	8-10-21 8-17-21	8-17-21 8-24-21
Phase 2 Title			
assembling the hardware and electronics	MEMBER 1	8-24-21	8-31-21
compiling and submiting the project report and	MEMBER 1	8-31-21	9-7-21
calibraing the gun and the camera	MEMBER 1	9-7-21	9-14-21
Phase 3 Title			
testing the sentry gun	MEMBER 1	9-14-21	9-21-21
making changes to the sentry gun for smooth operation	MEMBER 1	9-21-21 9-28-21	9-28-21 10-5-21
submiting final report and journal	MEMBER 1	10-5-21	10-12-21
Final presentation	MEMBER 1	10-12-21	10-19-21

7/20 7/27 8/3 8/10 8/17 8/24 8/31 9/7 9/14 9/21 9/28 10/5 10/12 10/19