Test Report

HARDWARE

1. Finding best IR sending method (Design level testing)

Importance :

There are two ways we can collect IR signals .Polling method and interrupt method. Therefore this test is to find best way to collect IR between those two methods.
This test is done using Arduino Uno (At Mega 328p) microcontroller. (But later move our project to the esp. 32 duel core microcontroller. You will see why? Keep reading…)

How was the test done:

- Simulate face to face shooting of two players
- Have shot 50 shots at a time ,and repeat the process 4 times
- To pull the trigger 3rd microcontroller is used
- And randomly press the both trigger
- 5 shots per a second(Fire rate)

Results

player 1 shots	player 2 shots
31	22
31	30
27	25
21	22
average	26.25

Polling method
Out of 50 shots only 26 shots are processed
(Microcontroller At mega 328p)

player 1 shots	player 2 shots
37	31
45	39
31	33
29	36
average	35.125

IN Interrupts method Out of 50 shots only 35 shots are processed (Microcontroller At mega 328p)

Conclusion

- So we planned to continue with the interrupts method
- But it not works round 70% times In face to face combat .However,
    - Face to face shooting in a combat field is very rare.
    - Fair for everyone
- Dual core microcontroller is needed make it perfect.
- We planned to test our codes in the NodeMCU ESP32 dual core microcontroller
    - Programming architecture will be the same
    - Since we are using C language its very easy Continue from there
    - IR library also available for the NodeMCU

So we moved our project to the Node MCU esp32 duel core microcontroller and do the test again

player 1 shots	player 2 shots
50	50
50	50
50	50
50	50
average	50

Out of 50 shots and all 50 shots are processed
(Microcontroller Node MCU esp32)

Therefore we continue with the Node MCU esp32 microcontroller.

2. IR shooting(Unit test)

Importance: This is the heart of the Xtag project, shooting IR signals. There fore unit test done in both ir sending and reserving.

What we tested:

Over the IR 8bit data is sent. Those data was read from another microcontroller(Esp 32).And check the whether same data is reserved.

How was the test done:

Shot IR from one microcontroller and read those data from another microcontroller and check the data by printing the shot data in the serial monitor.

Sending code and reserving code:

```
#include <Arduino.h>
#include "PinDefinitionsAndMore.h"

#define LED_shot 5
uint8_t sCommand = 213;
```

```
#define BUTTON_shot 34

void setup() {

   Serial.begin(9600);

    //Start the receiver, enable feedback LED and take LED feedback pin from the internal
boards definition
   IrSender.begin(IR_SEND_PIN, ENABLE_LED_FEEDBACK); // Specify send pin and enable
feedback LED
   IrReceiver.begin(IR_RECEIVE_PIN, ENABLE_LED_FEEDBACK,
USE_DEFAULT_FEEDBACK_LED_PIN);

   Serial.print(F("Ready to receive IR signals at pin "));
   Serial.println(IR_RECEIVE_PIN);
   Serial.println(IR_SEND_PIN);

   pinMode(BUTTON_shot, INPUT_PULLDOWN);
  attachInterrupt(BUTTON_shot, shot, RISING);


   //when shotted
    pinMode(LED_shot, OUTPUT);
     //esp_err_t esp_intr_reserve(10,0);

}


void shot_ir(){
  IrSender.sendNEC(0, sCommand, 0);
}

void IRAM_ATTR shot() {
       shot_ir();
}



void loop() {

   Serial.flush();
   if (IrReceiver.decode()) {

       shot_code = IrReceiver.decodedIRData.command;
       Serial.println("shotted");
```

```
      Serial.println(shot_code);

      IrReceiver.resume(); // Enable receiving of the next value


   }
}
```

Results and findings:

Works perfectly.

3. Bluetooth Communication

Importance: When before the game starts and while in the game time to time our gun has to communicate with the “Xtag” application. Therefore it is important to check that Bluetooth communication before implementing it.

What was tested?

Over the Bluetooth Some data is sent with Ascii Unicode from the mobile application. And verify those data from the microcontroller. And also wise versa is tested.

Results and findings:
Works perfectly. But when the microcontroller run with the all its game functionalities there can be some errors. To avoid that we came up with own own ascii character based commend system to transfer data from mobile to microcontroller. When sending shot data two unique characters are sent to find out that starts of the number and end of the number.

4. Fire range test(Physical testing)

Importance?

One of our goal is the shoot further. Therefore this test is done

What was tested?

- Range of the IR with and without the Transistor amplification.
- And also test is done is day time and night time.

How was the test done?

Shoot IR from the gun and reserve them from measured distance.

Results and findings:

- Without transistor amplification can only shoot up to 10m
- with transistor amplification can shoot up to 30m
- In the day time when the IR reserver is not cover up(when the direct sunlight hit) fire range is only 20m.But when we add a shade to that ,that problem is gone.

5. Fire accuracy test(Physical test)

Importance :

- If the IR beam is not focused enough
  - It is too easy to get a kill
  - Not challenging enough

- If the IR beam is focused too much
  - Even when u hit to head ,It did not count as a shot
- Should tune with tube diameter and the lens power

What was tested:

- Accuracy of the gun

How the test was done:

Shooting to head band by the gun from measured distance.

Results and findings:

We are still waiting to get light lenses .But still IR LED with the focusing tube performs well. But the problem is it is too easy to get a kill. We planned to continue this test.....

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