



Uçuş Simülatörü için Joystick Arayüzü

BIL 495
1. İzleme

Şevval MEHDER

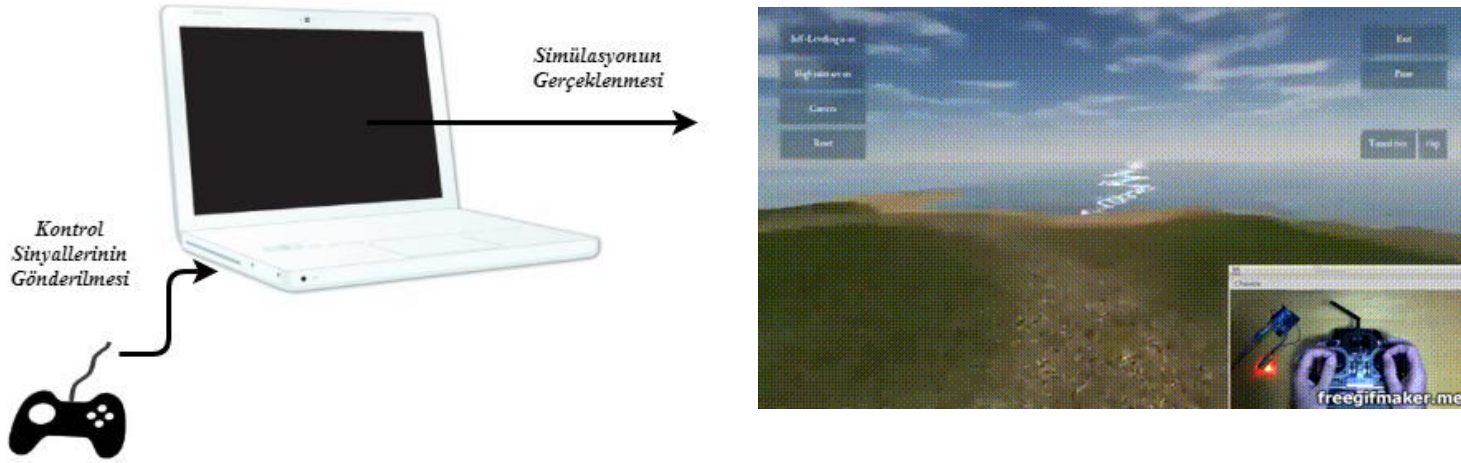
Proje Danışmanı: Prof. Dr. Erkan ZERGEROĞLU
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- Projenin Şeması ve Tanımı
- Proje Tasarım Planı
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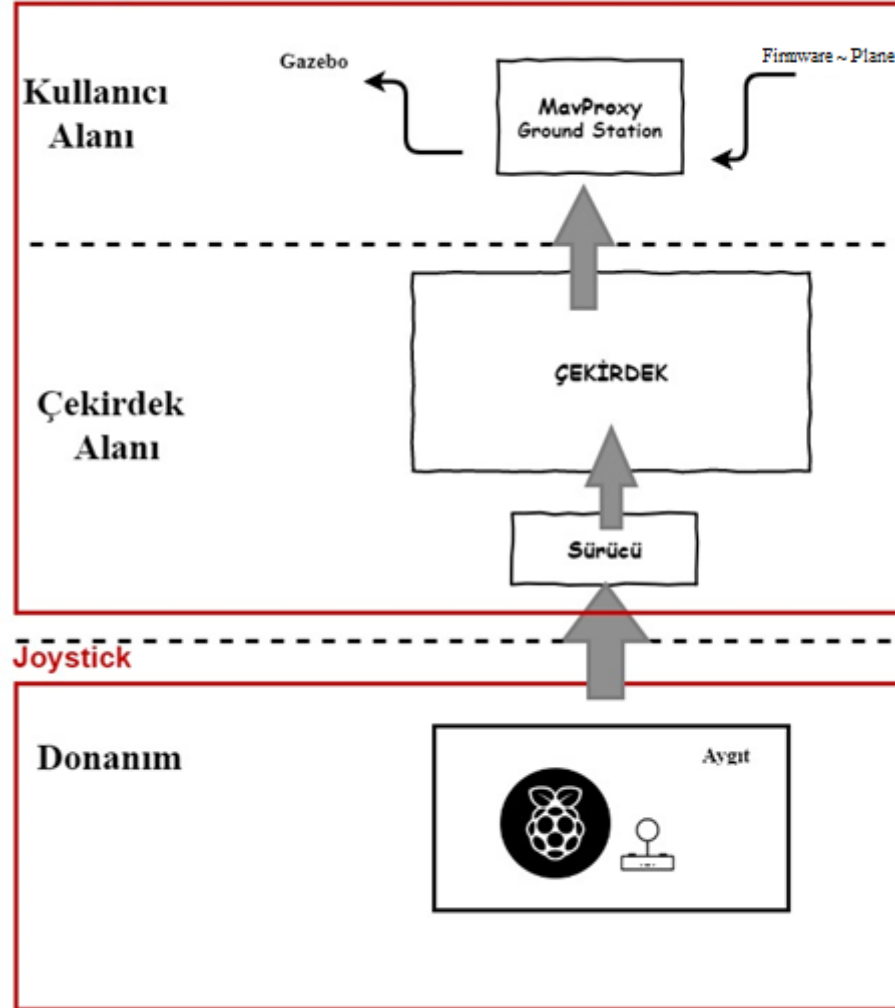
Proje Şeması ve Tanımı



- ArduPilot Simülasyon Programı için bir joystick donanımı ve arayüz hazırlanması.

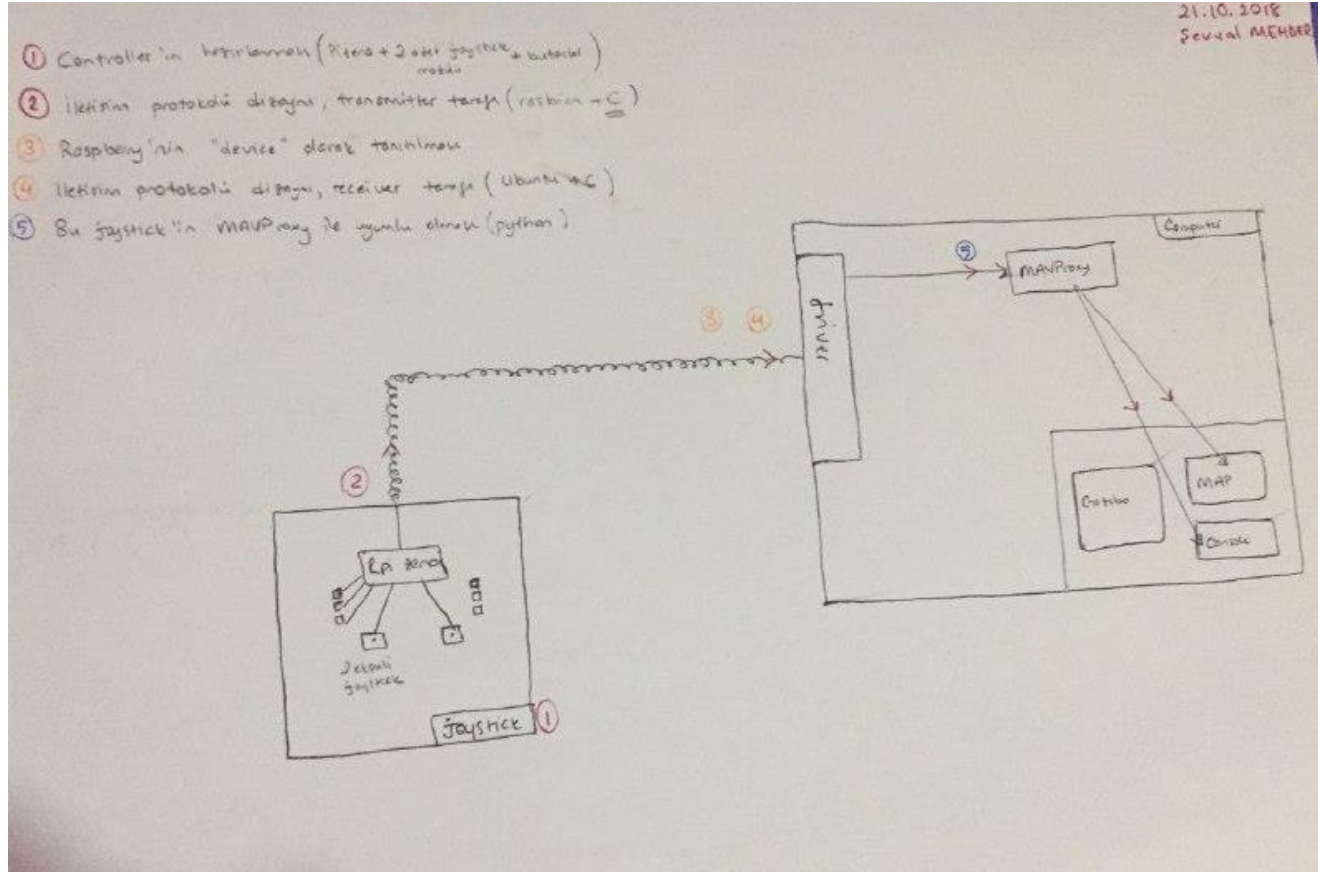
Proje Tasarım Planı

Bilgisayar



Joystick

- Süreç(process) ve enstrümantal(instrumental) diyagram çıkarıldı.



- Diyagramdaki 5. maddenin başka bir yolla denenmesi

```
seval@subuntu: ~/Desktop/FinalProject/ardupilot/ArduCopter
Loaded module console
Loaded module map
Log Directory:
Telemetry log: mav.tlog
MAV> Waiting for heartbeat from tcp:127.0.0.1:5760
STABILIZE> Received 942 parameters
Saved 942 parameters to mav.parm

STABILIZE~
STABILIZE> module load joystick
STABILIZE> MAVProxy.modules.mavproxy_joystick: Found joystick (OpenChord X RMIT Exertion Games Lab UnoJoy Joystick)
MAVProxy.modules.mavproxy_joystick: Failed to find matching joystick.
Loaded module joystick

STABILIZE> joystick probe
STABILIZE> MAVProxy.modules.mavproxy_joystick: Re-detecting available joysticks
MAVProxy.modules.mavproxy_joystick: Found joystick (OpenChord X RMIT Exertion Games Lab UnoJoy Joystick)
MAVProxy.modules.mavproxy_joystick: Failed to find matching joystick.

STABILIZE> joystick status
STABILIZE> No active joystick

STABILIZE> █

ArduCopter
Set parameter SIM_SPEEDUP to 1.000000
Creating model + at speed 1.0
Home: -35.363261 149.165235 alt=584.000000m hdg=353.000000
Starting sketch 'ArduCopter'
Starting SITL input
Using Irlock at port : 9005
bind port 5760 for 0
Serial port 0 on TCP port 5760
Waiting for connection ....
Loaded defaults from /home/seval/Desktop/FinalProject/ardupilot/Tools/autotest/default_params/copter.parm
bind port 5762 for 2
Serial port 2 on TCP port 5762
bind port 5763 for 3
Serial port 3 on TCP port 5763
Smoothing reset at 0.001
Loaded defaults from /home/seval/Desktop/FinalProject/ardupilot/Tools/autotest/default_params/copter.parm
█
```

Map

Console

TABILIZE ARM GPS: OK6 (10) Vcc 5.00 Radio: -- INS MAG AS RNG AHRS EKF LOG F
att: 100%/12.59V 0.0A Link 1 OK 100.0% (15610 pkts, 0 lost, 0.00s delay)
dg 353/0 Alt 0m AGL 0m/0m AirSpeed 0m/s GPSSpeed 0m/s Thr 0 Roll 0 Pitch 0 Wind --
P 0 Distance 0m Bearing 0 AltError 0H AspdError 0.0H FlightTime -- ETR 0:00

ready to fly fence breach
PM: GPS 1: detected as u-blox at 115200 baud
PM: EKF2 IMU0 initial yaw alignment complete
PM: EKF2 IMU1 initial yaw alignment complete
PM: EKF2 IMU0 tilt alignment complete
PM: EKF2 IMU1 tilt alignment complete
PM: EKF2 IMU0 Origin set to GPS
PM: EKF2 IMU1 Origin set to GPS
PM: EKF2 IMU0 is using GPS
PM: EKF2 IMU1 is using GPS
tight battery 100 percent



- İş planının hazırlanması

Başlangıç Tarihi: 22.10.2018

1. hafta	2. hafta	3. hafta	4. hafta	5. hafta	6. hafta	7. hafta	8. hafta	9. hafta	10. hafta	11. hafta	12. hafta	
	Raspberry Pi Zero cihazının bilgisayarda Device olarak tanınması		Aygıt sürücüsü receiver tarafının(Linux machine) gerçekleştirilmesi			Joystick üzerinden değiştirilebilecek kontrollerin(mod, rota vb) Belirlenmesi ve tasarımın gerçekleştirilmesi			Tamamlanan aygıt sürücüsü için testlerin yapılması Joystick tarafından gönderilen bilgilerin ne kadar doğru ve ne kadar gecikmeyle alındığının tespiti			
					Aygıt sürücüsü transmitter tarafının(joystick) gerçekleştirilmesi							
							Hazırlanan joystick'in MavProxy ile entegrasyonunun sağlanması				MavProxy ile testlerin yapılması	



- Driver kısmındaki görevlere başlanması:
Bilgisayara takılan aygıtın tanınması

```
#define VENDOR_ID 0x13d3  
#define PRODUCT_ID 0x3402
```

```
sevval@ubuntu: ~/Desktop/FinalProject/Driver  
sevval@ubuntu:~$ lsusb  
Bus 002 Device 001: ID 1d6b:0003 Linux Foundation 3.0 root hub  
Bus 001 Device 007: ID 13d3:3402 IMC Networks  
Bus 001 Device 003: ID 240a:8166  
Bus 001 Device 002: ID 0bda:57de Realtek Semiconductor Corp.  
Bus 001 Device 009: ID 10c4:82c0 Cygnal Integrated Products, Inc.  
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub  
sevval@ubuntu:~$  
sevval@ubuntu:~$ cd Desktop/FinalProject/Driver/  
sevval@ubuntu:~/Desktop/FinalProject/Driver$ gcc findDevices.c `pkg-config --lib  
bs libusb-1.0` -o exe  
sevval@ubuntu:~/Desktop/FinalProject/Driver$ ./exe  
We found the device[vendor ID: 13d3, product ID: 3402]  
sevval@ubuntu:~/Desktop/FinalProject/Driver$
```

```
int main(){  
  
    // Device list  
    libusb_device **devs;  
    // Count of the devices  
    size_t count;  
    // Return value  
    int r;  
    // Is device exist?  
    bool isExist;  
  
    // Call the initialize function  
    if( LIBUSB_SUCCESS != libusb_init(NULL))  
        return r;  
  
    // Get the devices  
    count = getAllDevices(&devs);  
    if( count < 0)  
        return count;  
  
    // Get memory for device and call search function  
    isExist = recognizeDevice(VENDOR_ID, PRODUCT_ID, devs);  
  
    if(isExist)  
        printf("We found the device[vendor ID: %x, product ID: %x]\n", VENDOR_ID, PRODUCT_ID);  
    else  
        printf("Device cant found :(\n");  
  
    // Frees a list of device previously discovered using get_device_list()  
    // unref_devices parameter sets 1  
    // this means the reference count of each device in the list is decremented by 1  
    libusb_free_device_list(devs, 1);  
  
    // Deinitialize libusb  
    // Should be called before termination  
    libusb_exit(NULL);  
  
    return 0;  
}
```



- Raspberry'nin device olarak tanıtılması

```
pi@raspberrypi: ~  
[ 2.615717] systemd[1]: Listening on Syslog Socket.  
[ 2.623684] systemd[1]: Listening on Journal Socket.  
[ 2.631607] systemd[1]: Listening on /dev/initctl Compatibility Named Pipe.  
[ 2.677445] systemd[1]: Listening on udev Kernel Socket.  
[ 2.685129] systemd[1]: Reached target Swap.  
[ 3.161741] dwc2 20980000.usb: 20980000.usb supply vusb_d not found, using dummy regulator  
[ 3.168762] dwc2 20980000.usb: 20980000.usb supply vusb_a not found, using dummy regulator  
[ 3.643114] dwc2 20980000.usb: EPs: 8, dedicated fifos, 4080 entries in SPRAM  
[ 3.650112] dwc2 20980000.usb: DWC OTG Controller  
[ 3.673073] dwc2 20980000.usb: new USB bus registered, assigned bus number 1  
[ 3.676309] dwc2 20980000.usb: irq 33, io mem 0x20980000  
[ 3.703358] usb usb1: New USB device found, idVendor=1d6b, idProduct=0002  
[ 3.706549] usb usb1: New USB device strings: Mfr=3, Product=2, SerialNumber=1  
[ 3.709608] usb usb1: Product: DWC OTG Controller  
[ 3.712554] usb usb1: Manufacturer: Linux 4.14.71+ dwc2_hstotg  
[ 3.715538] usb usb1: SerialNumber: 20980000.usb  
[ 3.796860] hub 1-0:1.0: USB hub found  
[ 3.813082] hub 1-0:1.0: 1 port detected  
[ 5.280566] EXT4-fs (mmcblk0p2): re-mounted. Opts: (null)  
[ 5.819609] systemd-journald[85]: Received request to flush runtime journal from PID 1  
[ 8.563947] snd_bcm2835: module is from the staging directory, the quality is unknown, you have  
been warned.
```



- 1. Libusb API: <http://libusb.sourceforge.net/api-1.0/>
- 2. RPi Zero USB aygıt desteği hakkındaki pull request: <https://github.com/raspberrypi/linux/issues/1212>
- 3. RPi Zero USB aygıt desteği hakkında adafruit dökümanı: <https://cdn-learn.adafruit.com/downloads/pdf/turning-your-raspberry-pi-zero-into-a-usb-gadget.pdf>
- 4. MavProxy joystick modülü yüklenmesi: <https://ardupilot.github.io/MAVProxy/html/modules/joystick.html>

