



emStart Sprint 2 Status Report

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Project Recap



Background Recap

- Emulating system for an existing small radio telescope(SRT) in order to verify its operation as expected this includes its mechanical movement and Radio.
- As an additional requirement it must also emulate the rotation of the earth during testing.

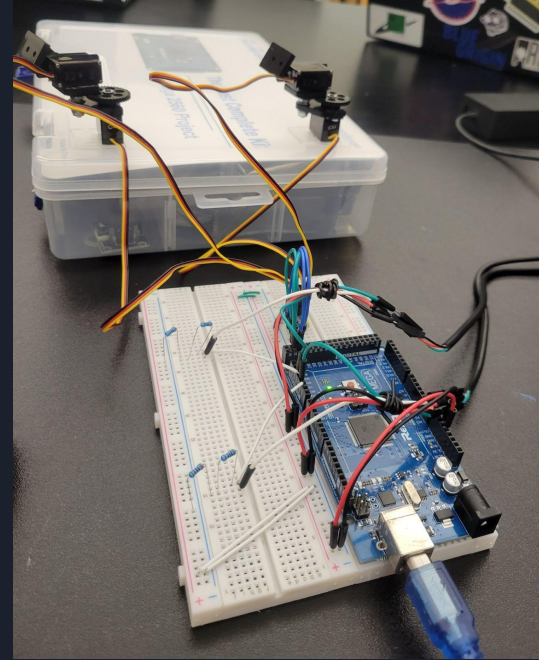


Sprint 2 Accomplishments



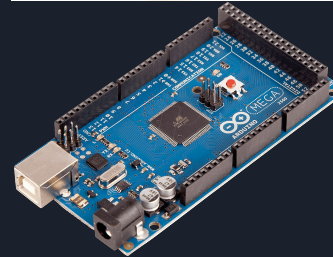
Obstacles

- Serial communication issues
- Servo actuation in the way we want it
- Hardware mounting
- Wire management
- Weight of servos



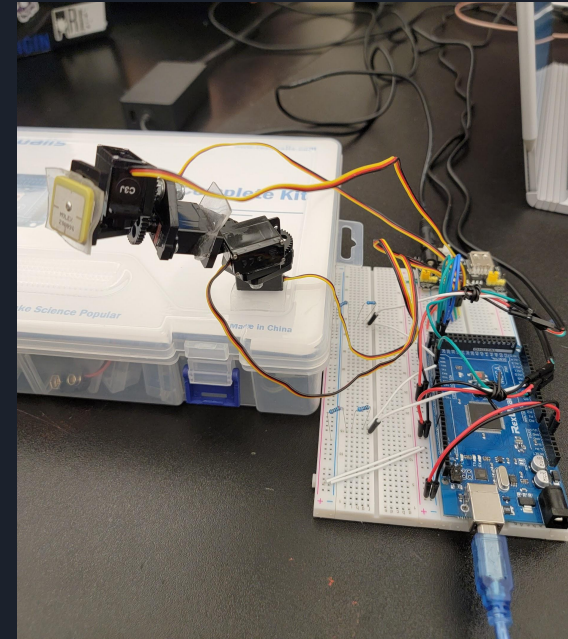
Additional Hardware Acquisition

- Arduino Mega
- USB Serial Cables
- Double Sided Tape
- Mounting Board

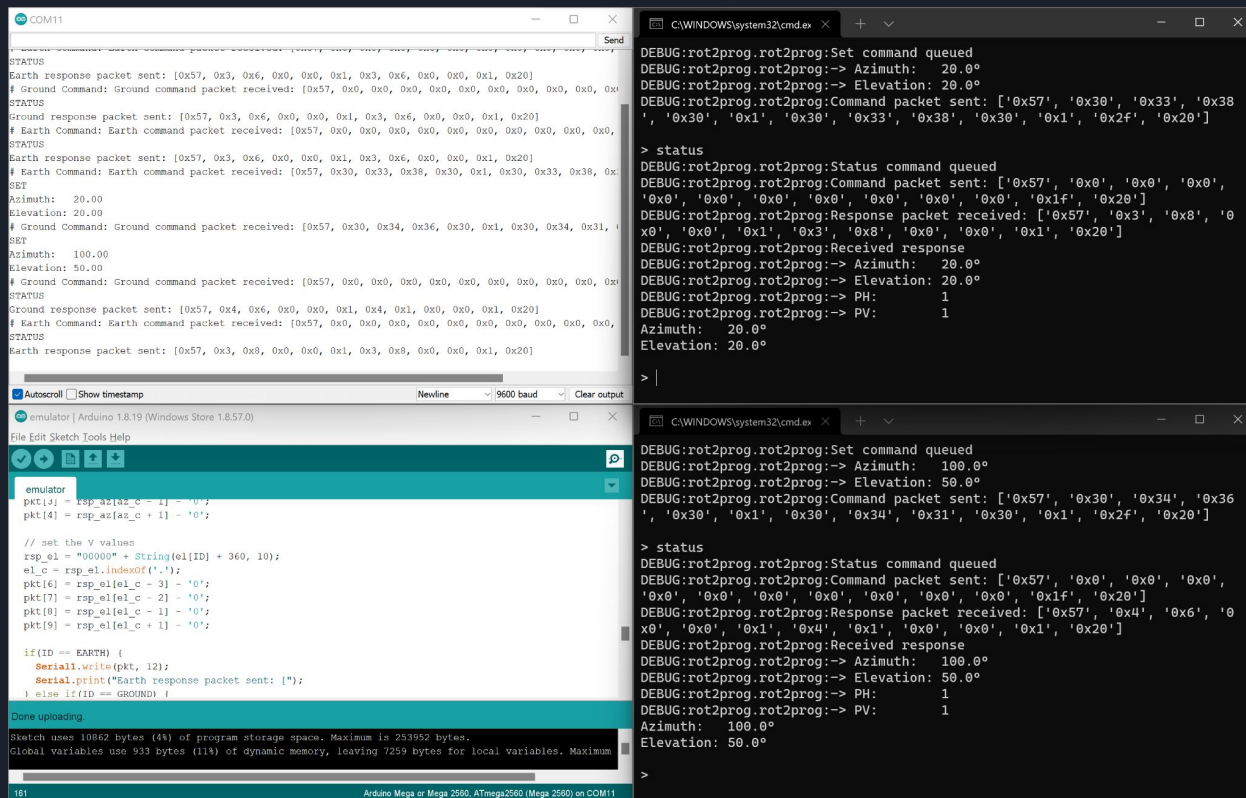


Hardware Progress

- Ground and Earth Servo Systems have been assembled and wired.
- Wiring for communication systems have been completed and verified.
- Patch antenna has been mounted to a new coax cable to facilitate ease of movement



Software Progress



```
COM11
Send
STATUS
Earth response packet sent: [0x57, 0x3, 0x6, 0x0, 0x0, 0x1, 0x3, 0x6, 0x0, 0x0, 0x1, 0x20]
# Ground Command: Ground command packet received: [0x57, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0]
STATUS
Ground response packet sent: [0x57, 0x3, 0x6, 0x0, 0x0, 0x1, 0x3, 0x6, 0x0, 0x0, 0x1, 0x20]
# Earth Command: Earth command packet received: [0x57, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0]
STATUS
Earth response packet sent: [0x57, 0x3, 0x6, 0x0, 0x0, 0x1, 0x3, 0x6, 0x0, 0x0, 0x1, 0x20]
# Earth Command: Earth command packet received: [0x57, 0x30, 0x33, 0x38, 0x30, 0x1, 0x30, 0x33, 0x38, 0x30, 0x1, 0x20]
Azimuth: 20.00
Elevation: 20.00
# Ground Command: Ground command packet received: [0x57, 0x30, 0x34, 0x36, 0x30, 0x1, 0x30, 0x34, 0x31, 0x30, 0x1, 0x20]
Azimuth: 100.00
Elevation: 50.00
# Ground Command: Ground command packet received: [0x57, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0]
STATUS
Ground response packet sent: [0x57, 0x4, 0x6, 0x0, 0x0, 0x1, 0x4, 0x1, 0x0, 0x0, 0x1, 0x20]
# Earth Command: Earth command packet received: [0x57, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0, 0x0]
STATUS
Earth response packet sent: [0x57, 0x3, 0x8, 0x0, 0x0, 0x1, 0x3, 0x8, 0x0, 0x0, 0x1, 0x20]

emulator | Arduino 1.8.19 (Windows Store 1.8.57.0)
File Edit Sketch Tools Help
emulator
pkt[3] = rsp_el[el_c - 1] - '0';
pkt[4] = rsp_el[az_c + 1] - '0';

// set the V values
rsp_el = "00000" + String(el[ID] + 360, 10);
el_c = rsp_el.indexOf('.');
pkt[6] = rsp_el[el_c - 3] - '0';
pkt[7] = rsp_el[el_c - 2] - '0';
pkt[8] = rsp_el[el_c - 1] - '0';
pkt[9] = rsp_el[el_c + 1] - '0';

if (ID == EARTH) {
  Serial.write(pkt, 12);
  Serial.print("Earth response packet sent: ");
} else if (ID == GROUND) {
  // ...
}

Done uploading.
Sketch uses 10862 bytes (4%) of program storage space. Maximum is 253952 bytes.
Global variables use 933 bytes (11%) of dynamic memory, leaving 7259 bytes for local variables. Maximum is 8191 bytes.
```

```
C:\WINDOWS\system32\cmd.exe
DEBUG:rot2prog.rot2prog:Set command queued
DEBUG:rot2prog.rot2prog:-> Azimuth: 20.0°
DEBUG:rot2prog.rot2prog:-> Elevation: 20.0°
DEBUG:rot2prog.rot2prog:Command packet sent: ['0x57', '0x30', '0x33', '0x38', '0x30', '0x1', '0x30', '0x33', '0x38', '0x30', '0x1', '0x20']
> status
DEBUG:rot2prog.rot2prog:Status command queued
DEBUG:rot2prog.rot2prog:Command packet sent: ['0x57', '0x0', '0x0', '0x0', '0x0', '0x0', '0x0', '0x0', '0x1f', '0x20']
DEBUG:rot2prog.rot2prog:Response packet received: ['0x57', '0x3', '0x8', '0x0', '0x0', '0x1', '0x3', '0x8', '0x0', '0x1', '0x20']
DEBUG:rot2prog.rot2prog:Received response
DEBUG:rot2prog.rot2prog:-> Azimuth: 20.0°
DEBUG:rot2prog.rot2prog:-> Elevation: 20.0°
DEBUG:rot2prog.rot2prog:-> PH: 1
DEBUG:rot2prog.rot2prog:-> PV: 1
Azimuth: 20.0°
Elevation: 20.0°
>

C:\WINDOWS\system32\cmd.exe
DEBUG:rot2prog.rot2prog:Set command queued
DEBUG:rot2prog.rot2prog:-> Azimuth: 100.0°
DEBUG:rot2prog.rot2prog:-> Elevation: 50.0°
DEBUG:rot2prog.rot2prog:Command packet sent: ['0x57', '0x30', '0x34', '0x36', '0x30', '0x1', '0x30', '0x34', '0x31', '0x30', '0x1', '0x20']
> status
DEBUG:rot2prog.rot2prog:Status command queued
DEBUG:rot2prog.rot2prog:Command packet sent: ['0x57', '0x0', '0x0', '0x0', '0x0', '0x0', '0x0', '0x0', '0x1f', '0x20']
DEBUG:rot2prog.rot2prog:Response packet received: ['0x57', '0x4', '0x6', '0x0', '0x0', '0x1', '0x4', '0x1', '0x0', '0x1', '0x20']
DEBUG:rot2prog.rot2prog:Received response
DEBUG:rot2prog.rot2prog:-> Azimuth: 100.0°
DEBUG:rot2prog.rot2prog:-> Elevation: 50.0°
DEBUG:rot2prog.rot2prog:-> PH: 1
DEBUG:rot2prog.rot2prog:-> PV: 1
Azimuth: 100.0°
Elevation: 50.0°
>
```




Current Demo of System



Final Sprint Goals

- Improve documentation
- Simplify code
- Improve SRT code
- Finely tune the attenuator
- Add Earth GUI features
- Manual for High Schoolers



Questions?



Thank You!

