Multipurpose Rover

Create a working model of the rover fitted with sensors for the measurement of different factors

- Adding the feature of obstacle detection
- Procure the sensors and the base for the rover that will form the basic structure.
  - Calibrate the sensors along with the arduino so that they measure different parameters
    - Adding a water sensor
    - Adding a temperature and humidity sensor
    - Adding a smoke sensor
  - Adding wheels to the base for off-road movement

Procure the right kind of camera that is required for our rover

- Calibrate camera such that it streams live video
  - Live video will help us to control the movement of the rover
- Fix it to the body of the rover

Control the rover's movement via web

- Procure the required modules
  - Installing the required libraries to control the required movement
    - Calibrate them on arduino so that we can use the web to controld the movement
- Create a web app that has buttons
  - Buttons are used to control the movement by giving them commands

Website that displays various parameters to study the environment the rover is sent to

- Gain enough knowledge that would enable us to create a website
  - Website will display the values acquired by the sensors
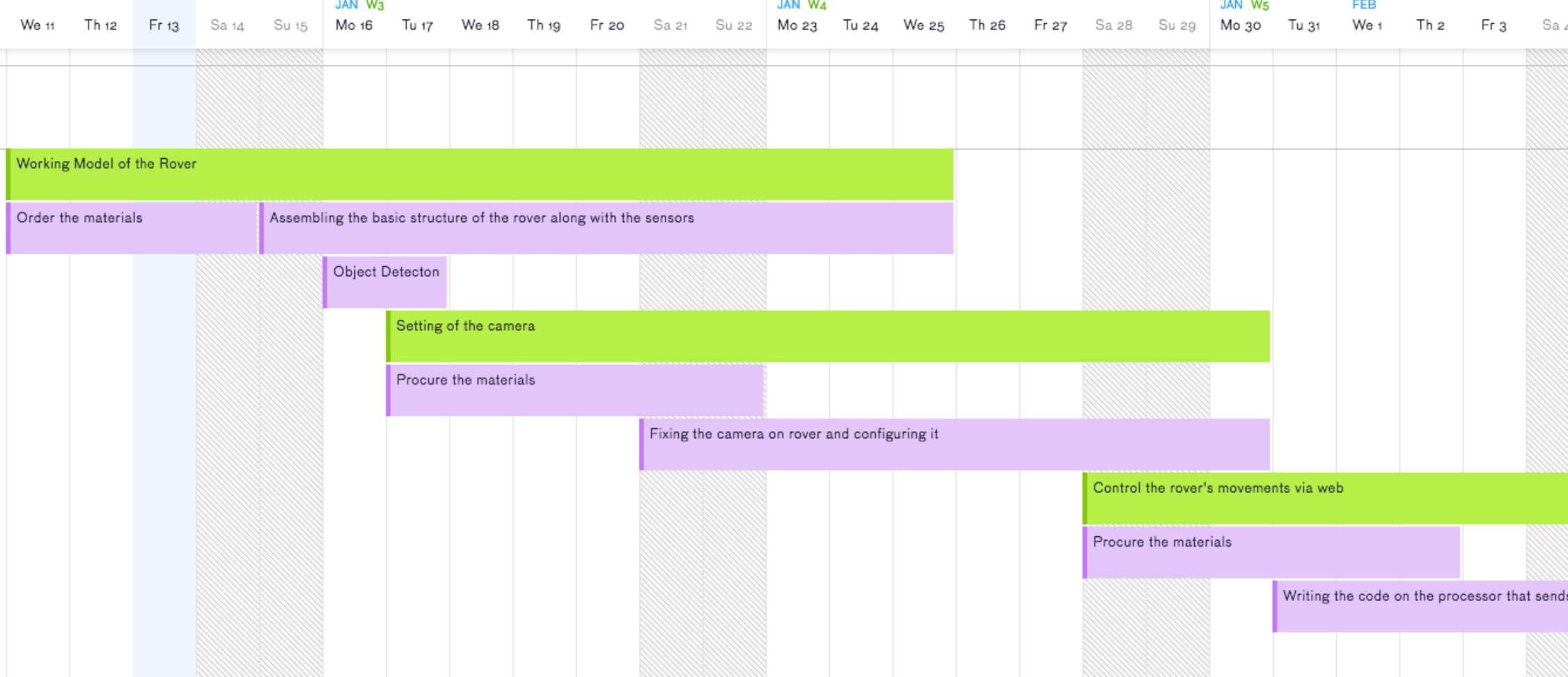   - Configure the different modules that will help us to send data to web
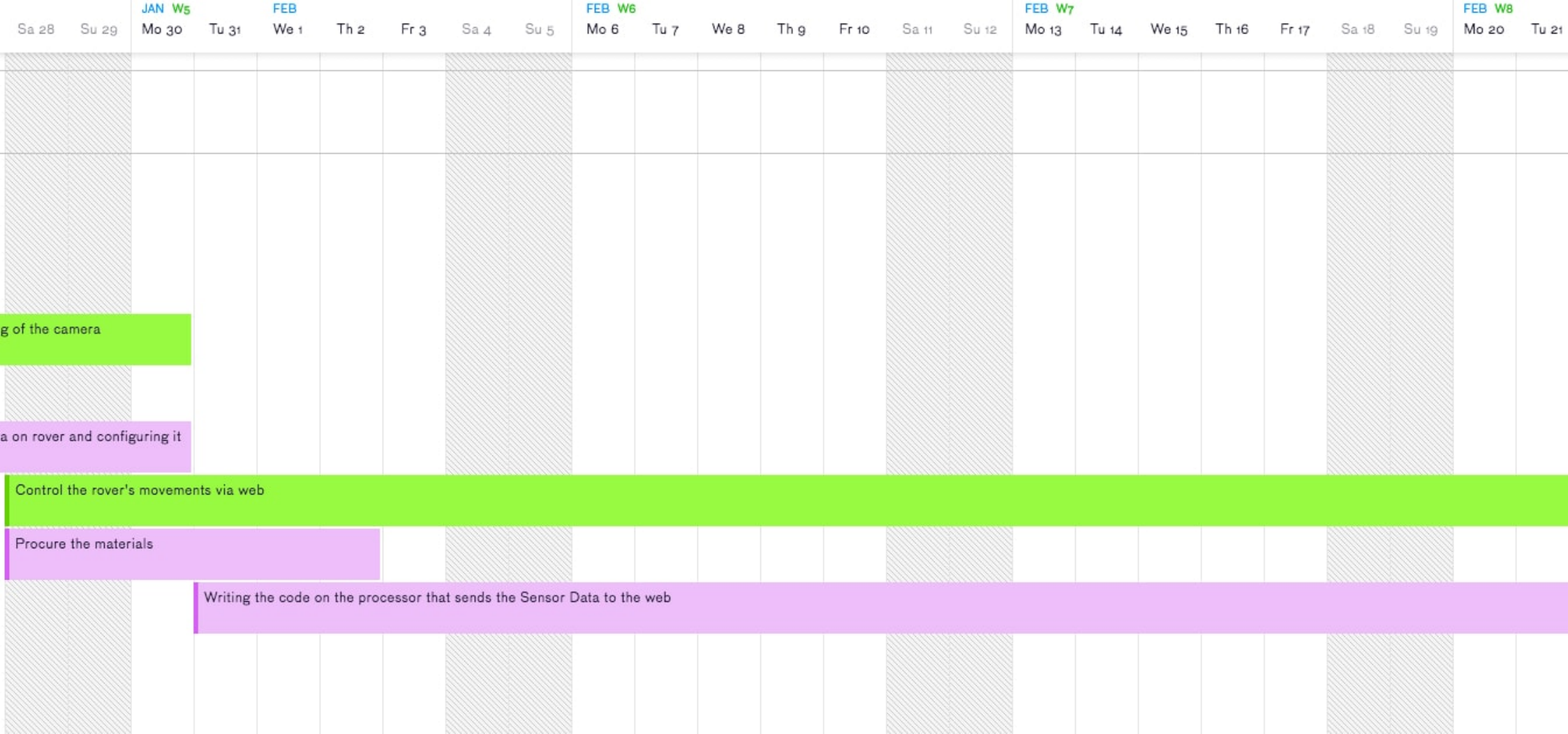 - Setup the website in such a way that it represents the data which is comprehedible to the user
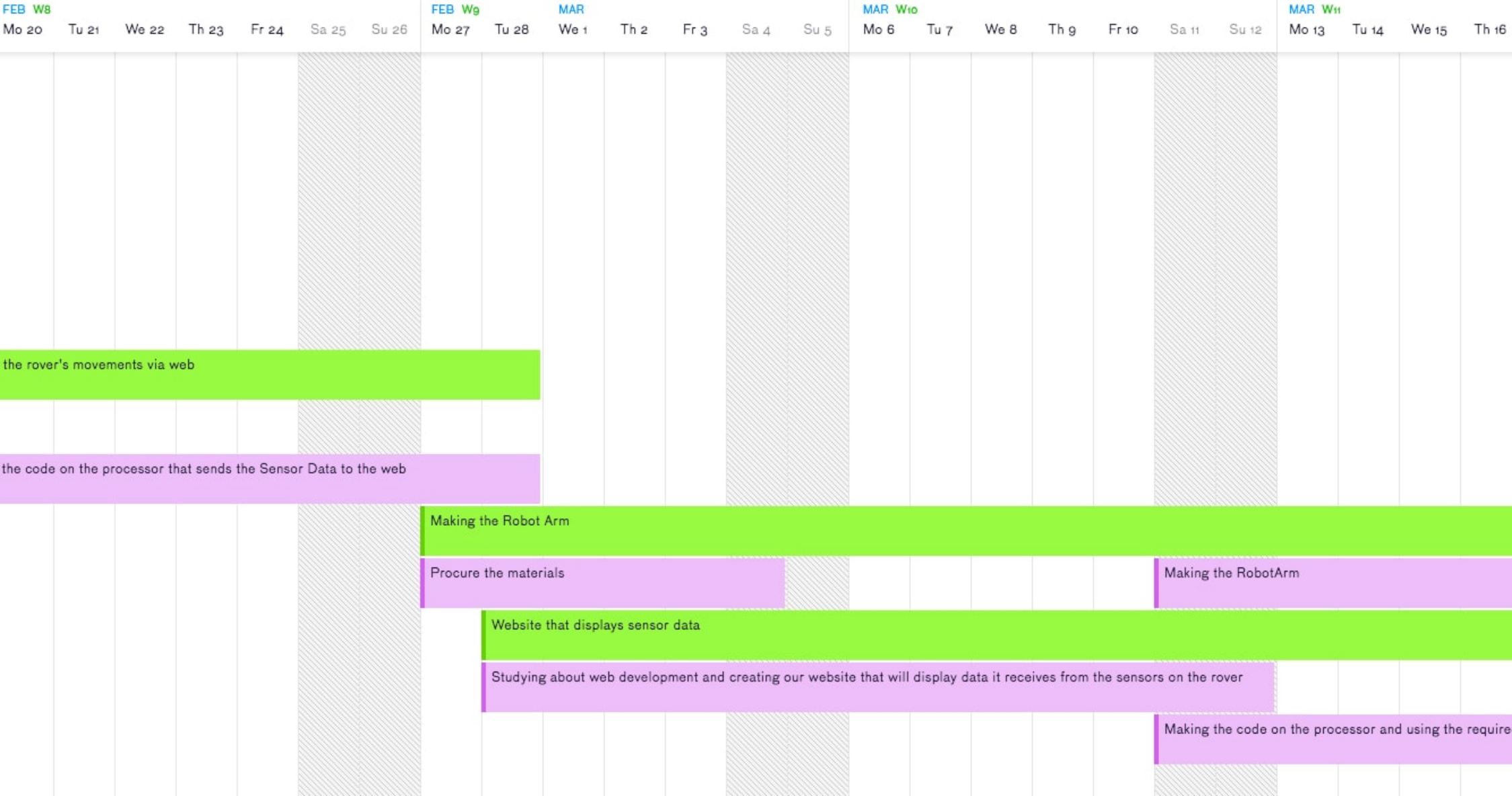
Robot arm for picking and dropping objects

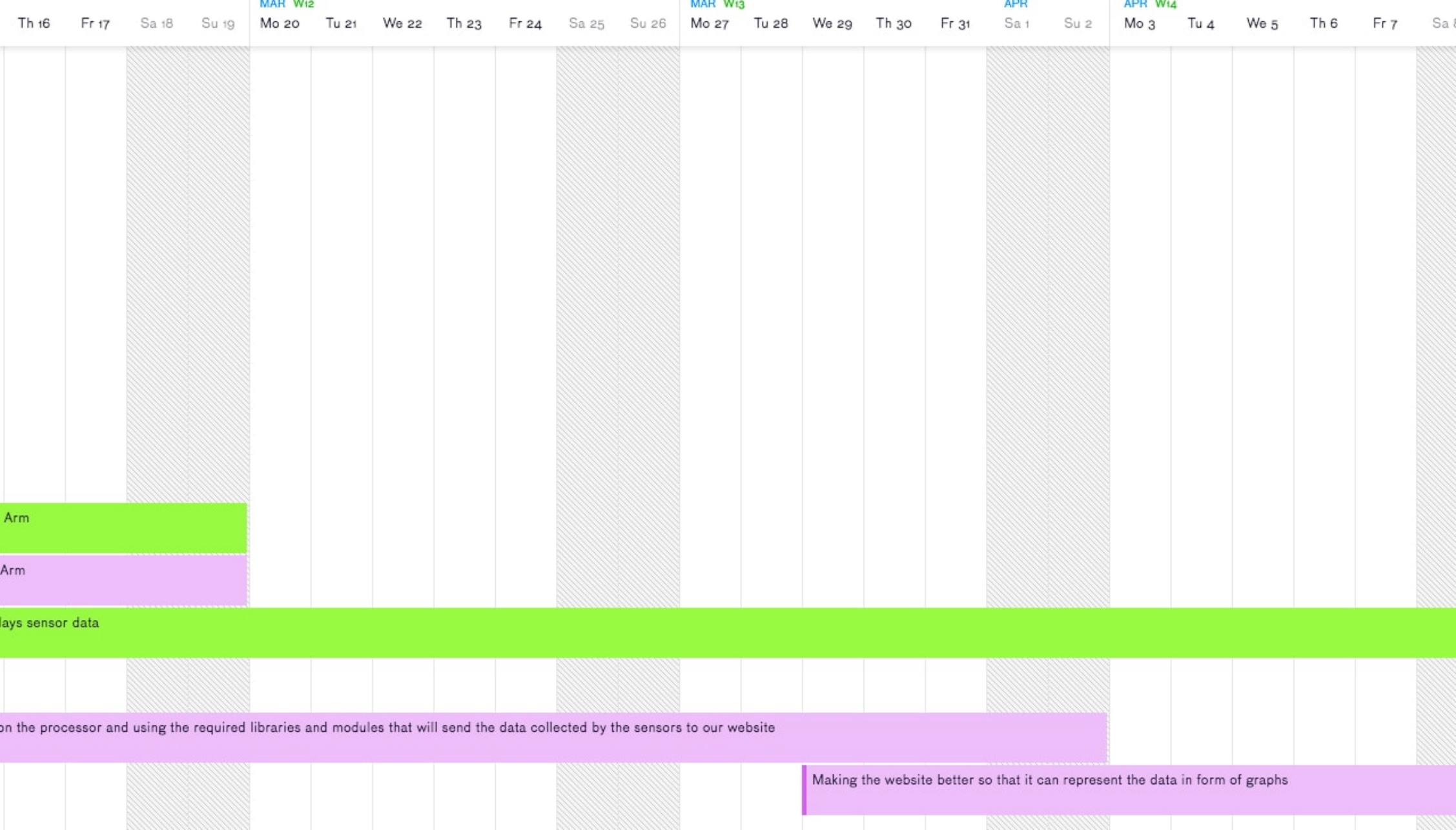- Procure all the hardware required for making roboarm
  - Setup the roboarm and include it in the circuit so that it can be controlled by us
    - Modifying the website so that it can even control the movement of the roboarm

Working Model of the Rover

Order the materials

Assembling the basic structure of the rover along with the sensors

Object Detecton

Setting of the camera

Procure the materials

Fixing the camera on rover and configuring it

Control the rover's movements via web

Procure the materials

Writing the code on the processor that sends

g of the camera

a on rover and configuring it

Control the rover's movements via web

Procure the materials

Writing the code on the processor that sends the Sensor Data to the web

FEB W8

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We 1   Th 2   Fr 3   Sa 4   Su 5   MAR W10

Mo 6   Tu 7   We 8   Th 9   Fr 10   Sa 11   Su 12   MAR W11

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the rover's movements via web

the code on the processor that sends the Sensor Data to the web

Making the Robot Arm

Procure the materials

Making the RobotArm

Website that displays sensor data

Studying about web development and creating our website that will display data it receives from the sensors on the rover

Making the code on the processor and using the require

Arm

Arm

lays sensor data

on the processor and using the required libraries and modules that will send the data collected by the sensors to our website

Making the website better so that it can represent the data in form of graphs

...ules that will send the data collected by the sensors to our website

Making the website better so that it can represent the data in form of graphs

We intend to use 3 main components for our project- MULTIPURPOSE ROVER

1) Arduino 1 that help use to control our rover using the Wi-Fi using an ethernet shield that will be mounted above the Arduino. This consists of DC motors for the wheels and servos motors for the robot arm, which will be controlled by us using the internet capability. We use an H-Bridge here that helps us to effectively use DC motors in the circuit ensuring they do not get spolit. We also have a ultrasonic sensoe that could help us introduce the concept of obstacle avoidance in our rover .Here, we also have a bluetooth module that can also be used for receiving instructions in case the area doesn't have a Wi-fi connection.
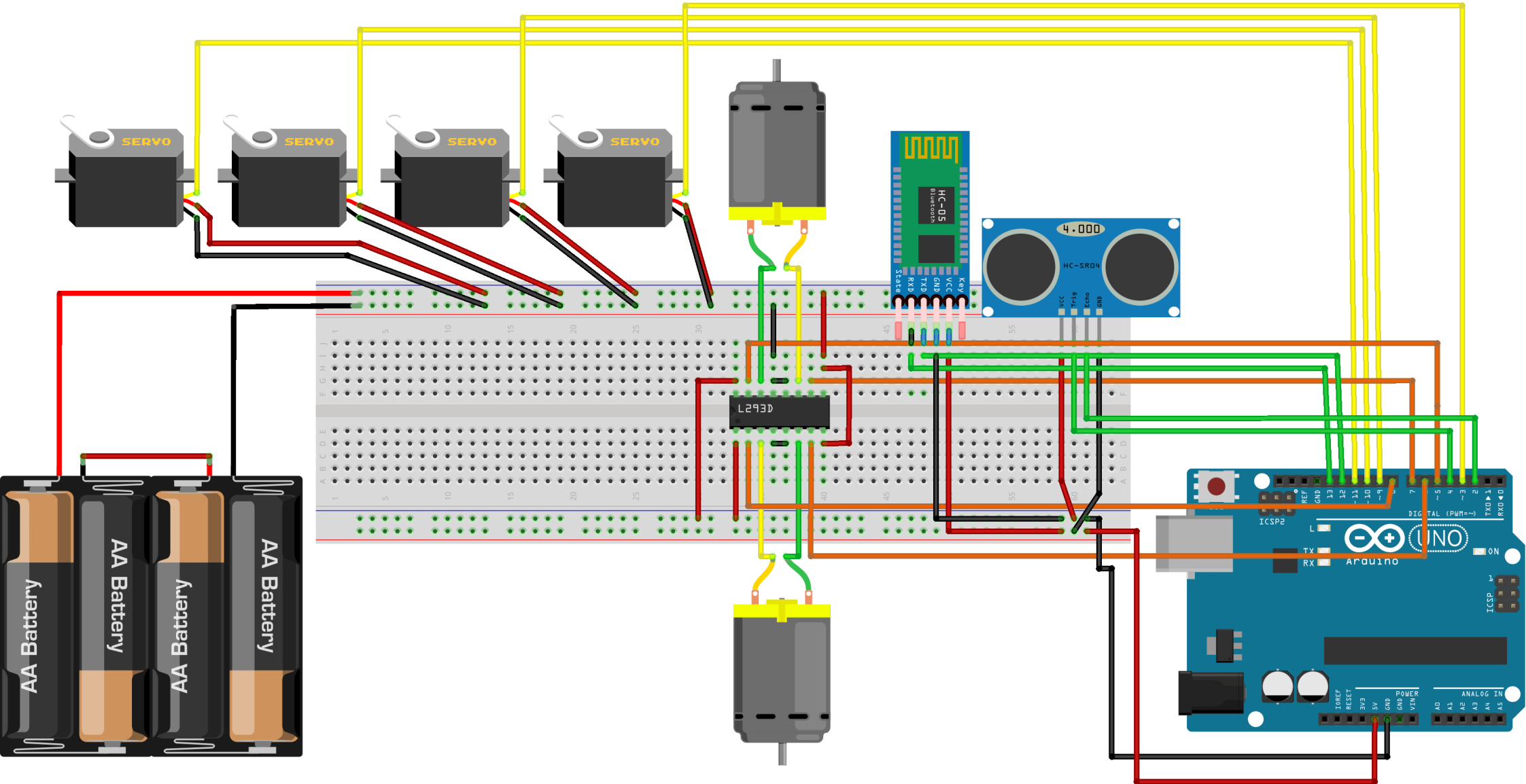
2) Arduino 2 that helps us receive sensor data that includes temperature, humidity, air quality monitoring of different gases etc. This Arduino also includes the Wi-Fi module that helps use send sensor data to website using the internet.

Even though the sensor and the Wi-Fi module will included in the same Arduino circuit but for better clarification we have showed them in different circuit diagrams.
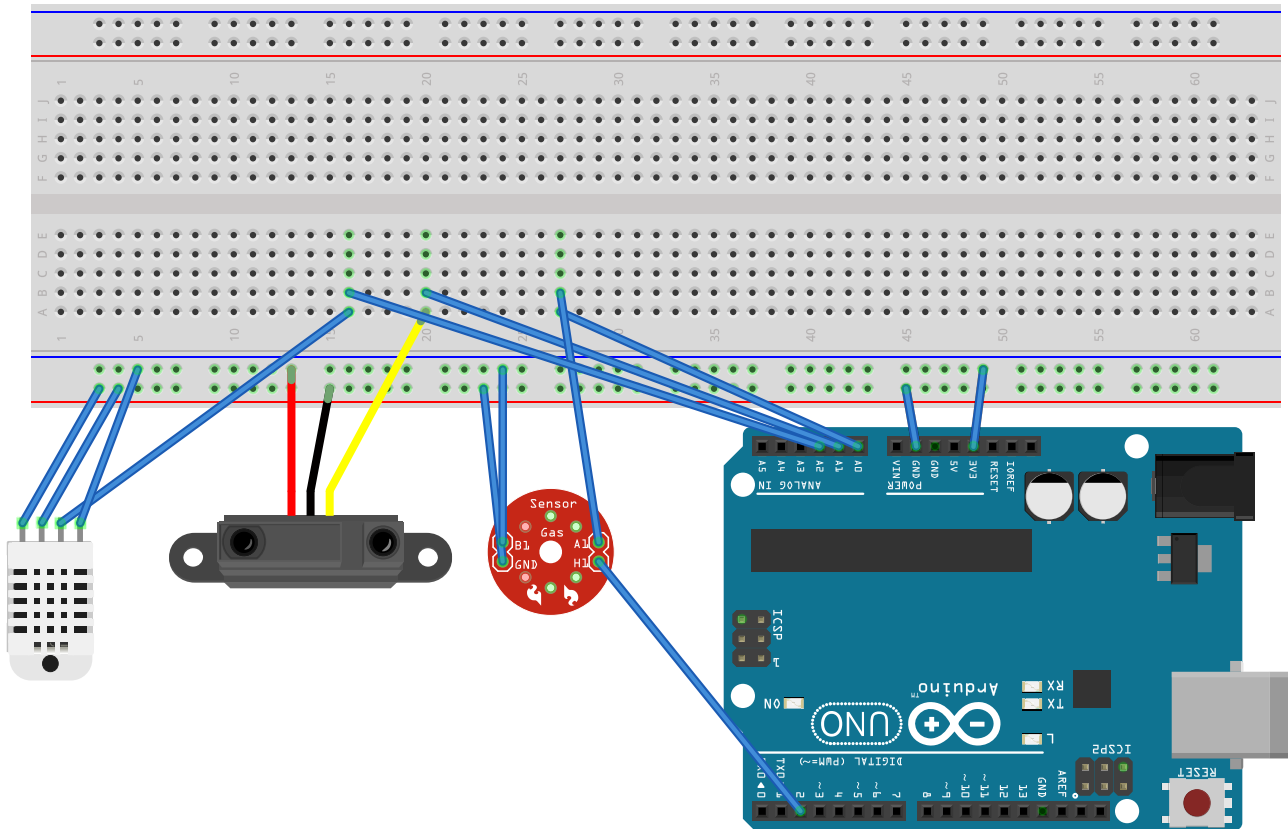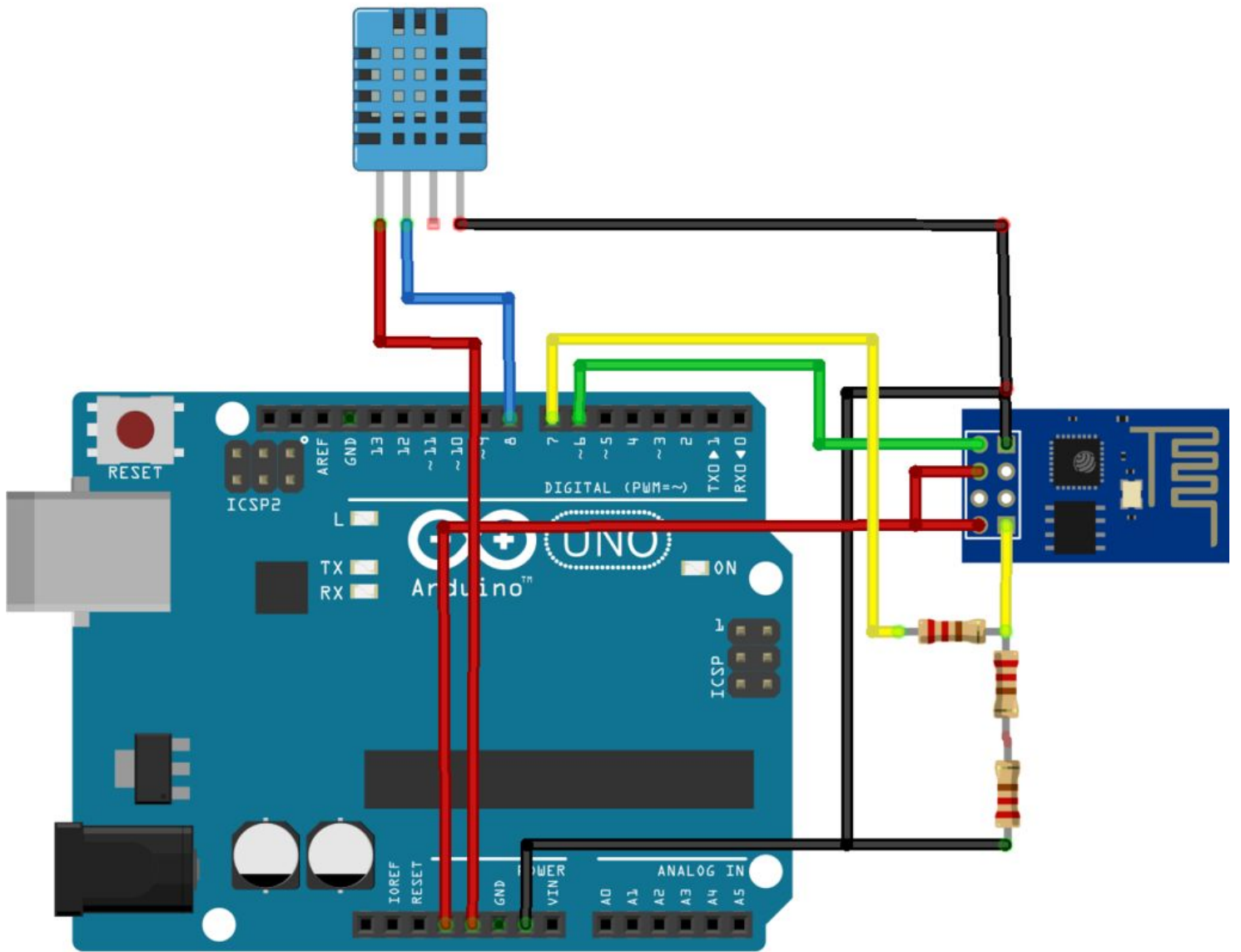
3) A Raspberry pi that will enable us to stream live video using a Raspberry pi camera (5 MP) and also click images that will help us monitor and study the environment and control the rover.

Pendrive (for storing images clicked by camera)

RPI Camera
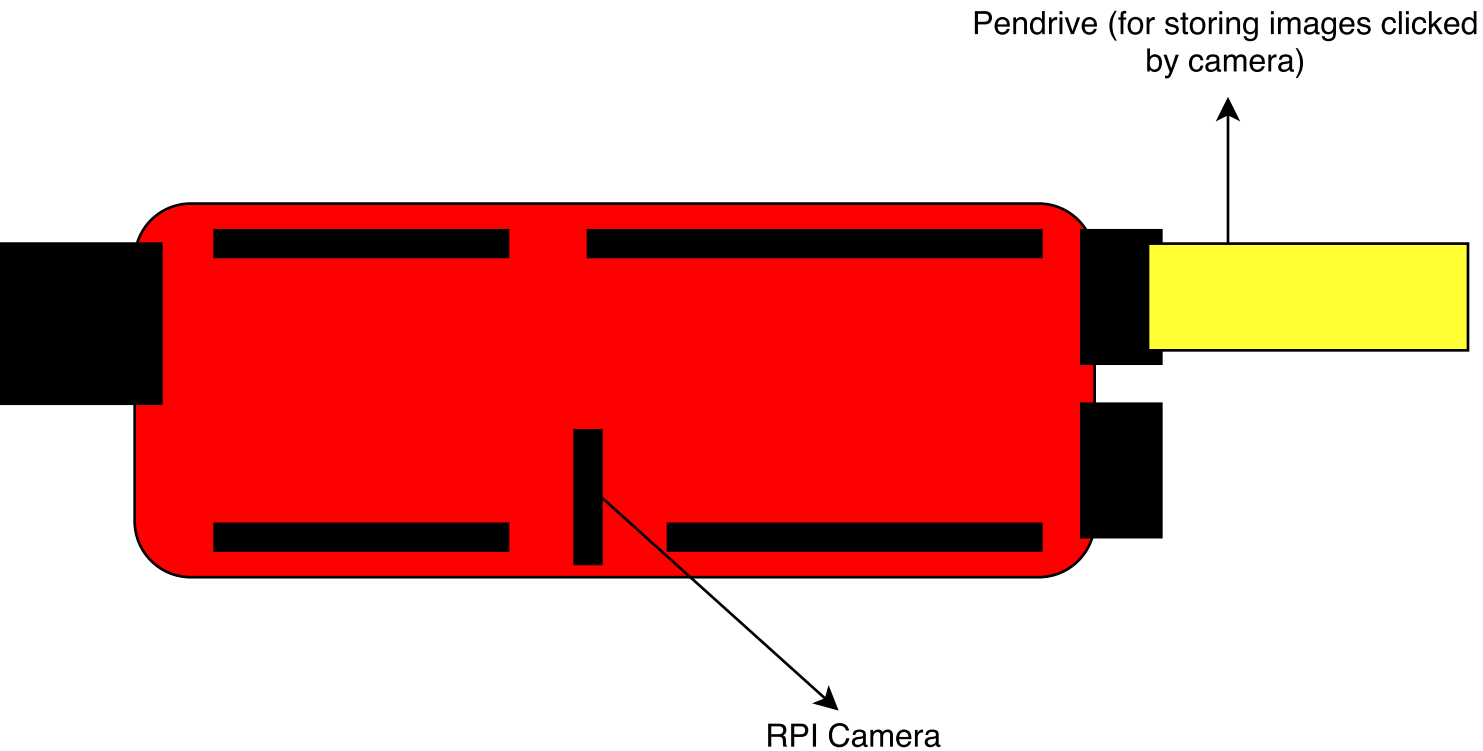
Microprocessors used:

1) Raspberry Pie 3 Model B

2) Arduino Uno (*2)

Specifications of Equipment to be used:

1) Sensors:

   a) Temperature and Humidity Sensor: DHT11 (3-5.5V DC)
   b) Pressure Sensor: BMP180 (5V, I2C Device)
   c) Gas Sensor: MQ135 (5V DC/AC)
   d) Infrared Sensor: GP2Y0A21YK0F Proximity Sensor
   e) Ultrasonic Sensor: HC-SR04 (5V DC, Working current: 15mA, Range: 2cm-4m)
   f) Water Level Sensor: RKI-2350 (5V DC)

2) Bluetooth Module: HC-05 (80 dBm)

3) Wi-Fi Module: ESP8266 (5 V)

4) Ethernet Shield: W5100 Shield Network Extension Board

5) DC Motors: Gear motor – Helical gear

Specifications of the motors:

- 150RPM 12V DC motors with Gearbox

- 4mm shaft diameter with internal hole
- 125gm weight
- 2kgcm torque
- No-load current = 60 mA(Max), Load current = 300 mA(Max)

6) H-Bridge: L293D (4.5 to 36V, provides bidirectional open currents up to 600mA)

7) Servo Motors: SG90 Mini Servo

Specifications of the servo motor:

- Weight: 9 g
- Dimension: 22.2 x 11.8 x 31 mm approx.
- Stall torque: 1.8 kgf·cm
- Operating speed: 0.1 s/60 degree
- Operating voltage: 4.8 V (~5V)
- Dead band width: 10 μs
- Temperature range: 0 ºC – 55 ºC