

## # 2. MATERIALS AND COMPONENTS

### ## 2.1 ARDUINO UNO

Arduino is a versatile open-source platform with specially designed boards that can be programmed using the Arduino programming language (APL). Its popularity extends beyond hobbyists and has found its place in industries, serving as a tool for experts to prototype commercial products. Arduino Uno is a microcontroller board based on the ATmega328P. It features 14 digital input/output pins (with 6 PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, USB connection, power jack, ICSP header, and a reset button. The board encompasses everything necessary to support the microcontroller. Connecting it to a computer via USB cable or powering it with an AC-to-DC adapter or battery initiates operation. Arduino Uno encourages experimentation without fear of mistakes, as the microcontroller can be replaced if needed. "Uno" denotes one in Italian, signifying the release of Arduino Software (IDE) 1.0. It remains a reference model for the Arduino platform and a pioneer in the series of USB Arduino boards.

### ## 2.2 GPS MODULE

Global Positioning System (GPS), also referred to as NAVSTAR, operates globally and under all weather conditions, facilitating tracking of locations, objects, and individuals. Utilizing a GPS receiver enables users to interact with GPS technology. Orbiting the Earth twice daily, GPS satellites transmit signal information that is received by GPS receivers. By comparing the transmitted and received signal times, the receiver calculates satellite distances. Utilizing signals from multiple satellites enables the GPS unit to determine 3D positions (latitude, longitude, and altitude). This information can be displayed on an electronic map, allowing for accurate navigation and additional features such as speed measurement, trip distance, bearing, distance to destination, sunrise, and sunset times.

### ## 2.3 GSM MODULE

Global System for Mobile communication (GSM) is a widespread mobile communication system, often complemented by the Global Packet Radio Service (GPRS) for enhanced data transmission rates. GSM/GPRS modules establish communication between computers and GSM-GPRS systems. Consisting of a modem, power supply circuit, and communication interfaces, these modules utilize the modem as the core component. GSM technology utilizes time division multiple access (TDMA) for digital communication. It digitizes and compresses data before transmitting it through a channel with separate time slots for distinct data streams.

### ## 2.4 GYROSCOPE SENSOR

A gyroscope sensor operates by utilizing Earth's gravity to determine orientation. Commonly found in Inertial Measurement Units (IMUs), gyroscope sensors measure rotation along specific axes. The device consists of a rotor mounted on a spinning axis within a larger wheel. This configuration allows the gyroscope sensor to detect rotational movement accurately.