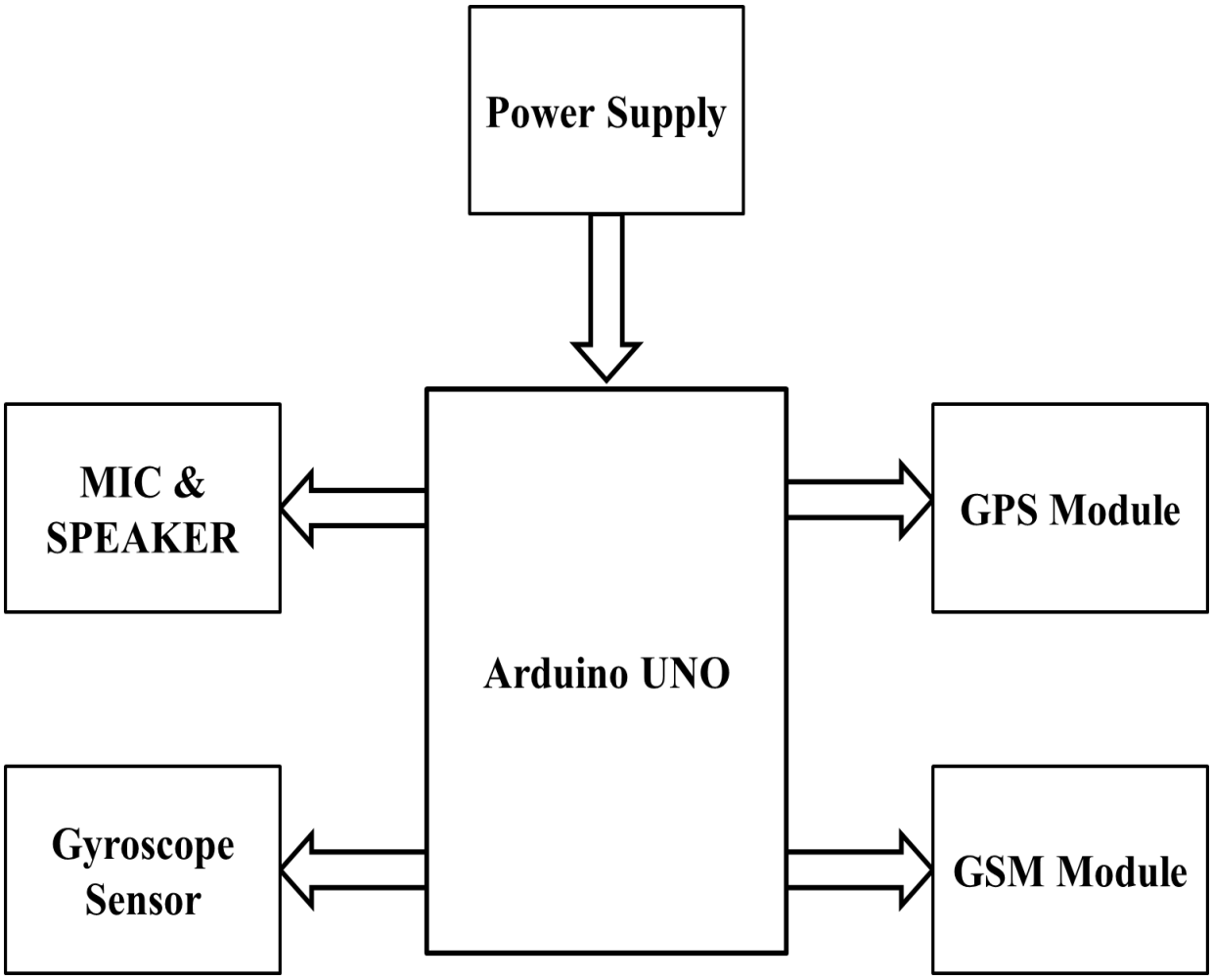
3. METHODS

3.1 BLOCK DIAGRAM



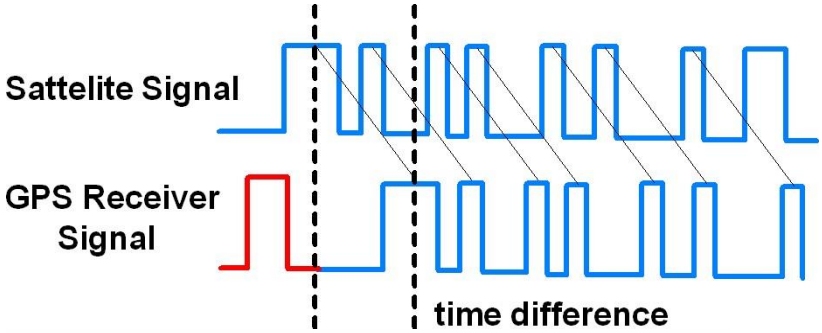
Block Diagram

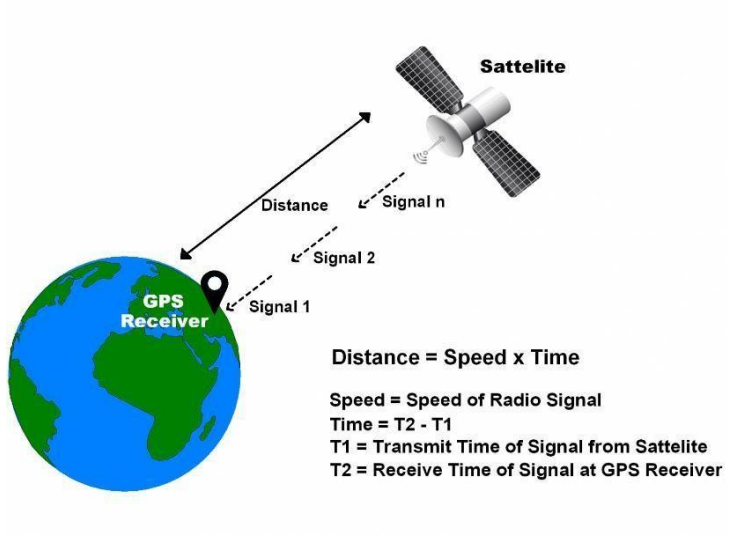
3.2 WORKING METHODOLOGY

Before delving into the operational procedure, let's gain a quick understanding of the project's flow. Consider an accident scenario where the gyroscopic sensor detects abnormalities promptly. Within seconds, the gyroscopic sensor sends signals to the microcontroller (Arduino in our case). The Arduino waits for the victim to deactivate the device manually, preventing false alarms in non-fatal accidents. This manual intervention window is time-bound. After detecting no user input, the Arduino initiates alerts to pre-programmed numbers. Emergency contacts then receive accurate geographical coordinates, enabling them to notify rescue teams promptly. This approach aims to significantly reduce casualties resulting from road accidents.

3.3 WORK FLOW

Upon an accident, the gyroscopic sensor becomes active. This sensor operates based on the conservation of angular momentum, utilizing a spinning rotor mounted on a gimbal system. Two gimbals are employed to provide the rotor with three degrees of freedom, ensuring it maintains its orientation. Following the gyroscope's input, the GPS sensor engages. GPS receivers, commonly used in smartphones, fleet management systems, and military applications, determine location by receiving signals from a constellation of satellites. Trilateration, involving signals from multiple satellites, calculates accurate user positions in three dimensions (latitude, longitude, and altitude).





Gps_Distance_Calculation

The GPS receiver generates NMEA (National Marine Electronics Association) string format output, including parameters like longitude, latitude, altitude, and time. This output, transmitted serially via the Tx pin, serves as valuable location data.

Once precise geographical coordinates are acquired, the GSM module becomes operational. GSM (Global System for Mobile communication) employs hexagonal cells divided across a geographical area. Base stations situated within cells consist of transceivers and antennas. GSM combines TDMA (Time Division Multiple Access), FDMA (Frequency Division Multiple Access), and frequency hopping. Security features ensure communication confidentiality and subscriber secrecy. The GSM modem, activated by an SMS command, relays data to the microcontroller. When the "STOP" command is executed, an output at the microcontroller is triggered, disabling the ignition switch. Alerts are sent via telephony servers, covering both voice calls and text messages across different carriers and service providers.

3.4 CONCEPTUAL DESIGN

Conceptual_Design