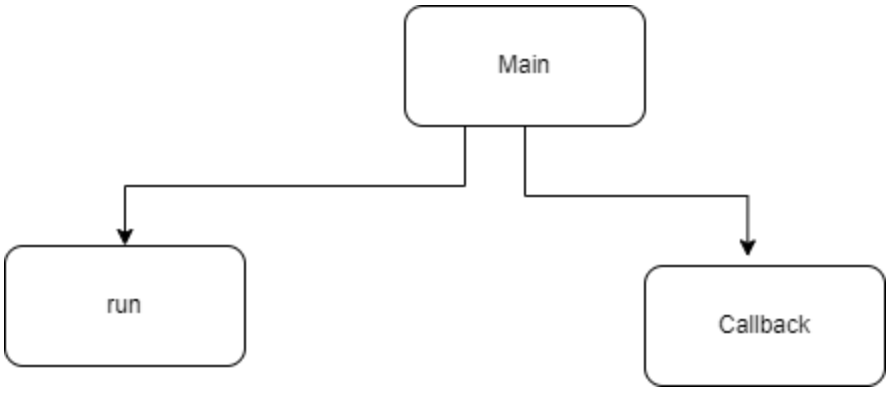
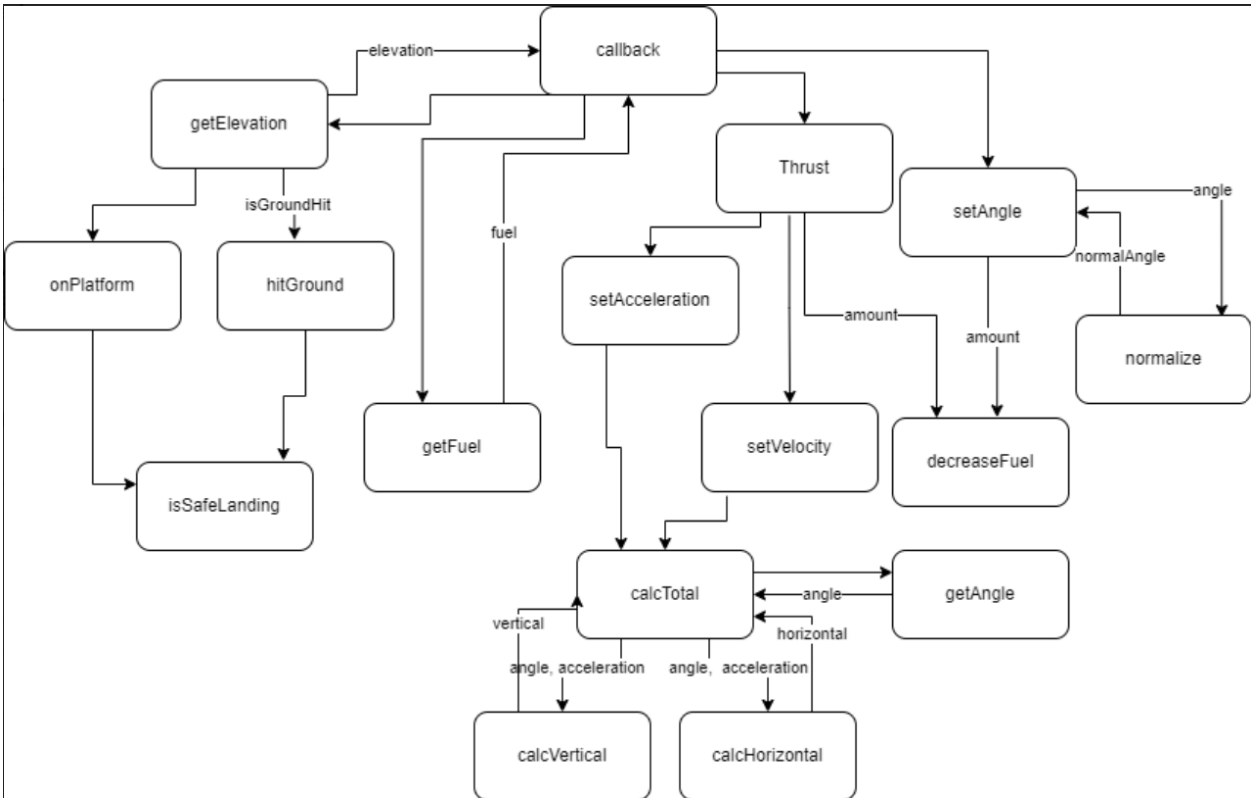
Lander
+ fuel : int + isThrust : bool + velocity : Velocity + position: Point + mass : double
+ decreaseFuel(amount : int) : void + isSafeLanding() : Boolean + thrust() : void

Velocity
+ acceleration : double + horizontal : double + vertical : double + totalVelocity : double + angle : Angle
- calcHorizontal(angle : double, acceleration : double) : double - calcVertical(angle: double, acceleration : double) : double + calcTotal(horizontal : double, vertical : double) : double

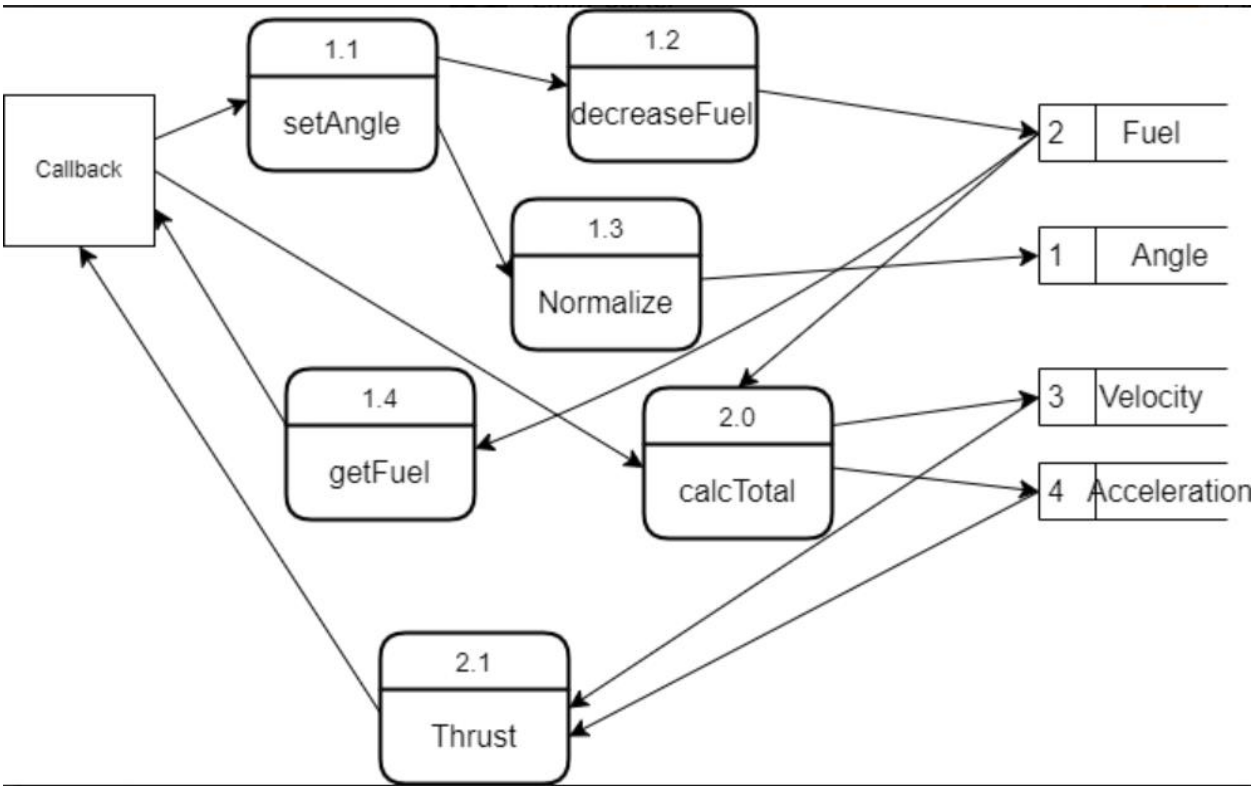
Angle
- angleRadians : double
- normalize(angle : double) : double + setAngle(isLeft : boolean) : void + getAngle() : double

Structure Charts





Data Flow Diagram



Pseudocode

```
onPlatform(position, landerWidth)
  IF getElevation(position) > 1.0
    RETURN false
  IF getElevation(position) < 0.0
    lander.isSafeLanding()
    RETURN false
  IF (position.getX() + landerWidth) / 2.0 < iLZ
    RETURN false
  IF (position.getX() – landerWidth) / 2.0 > (iLZ + LZ_SIZE)
    RETURN false
  IF lander.velocity.totalVelocity >= 4.0
     lander.isSafeLanding()
    RETURN false
```

(This next if statement is assuming we need to keep the lander angle close to being centered while allowing a little bit of leg room.)

```
  IF lander.angle > 1.7 OR lander.angle < 1.4
    lander.isSafeLanding()
    RETURN false

  RETURN true
```

(This is done with the assumption that lander will have access to what button is being pressed and that angle is being stored as radians.)

```
changeAngle()
  IF isLeftPress = true
    angle += 0.1
    decreaseFuel(1)
```

```
IF isRightPress = true
    angle -= 0.1
    decreaseFuel(1)
```

Test Cases

Test Case	Test Function(s)	Input	Output
Thrust Upward	thrust(), decreaseFuel()	isThrust = true, angle=0, fuel= 5000, elevation=100	fuel=4990, elevation=102.03, velocity=1.35
Thrust Downward	thrust(), decreaseFuel()	isThrust = true, angle=180, fuel= 5000, elevation=100	fuel=4990, elevation=93.09, velocity=-4.6
Thrust Left	thrust(), decreaseFuel()	isThrust = true, angle=90, fuel= 5000, elevation=100	fuel=4990, elevation=97.56 velocity=3.39
Thrust Right	thrust(), decreaseFuel()	isThrust = true, angle=270, fuel= 5000,elevation=100	fuel=4990, elevation=97.56, velocity=3.39
Impact Ground	getElevation(), hitGround(), land()	altitude=0, angle=45, velocity=4.7	Houston, we have a problem.
Impact Landing Pad (Bad)	getElevation(), onPlatform(), land()	altitude=0, angle=45, velocity=4.7	Houston, we have a problem.
Impact Landing Pad (Safe)	getElevation(), onPlatform(), land()	altitude=0, angle=0, velocity=3.9	The Eagle has landed!
Rotate Left (Clockwise)	changeAngle(), decreaseFuel()	angle=45.0, fuel = 3476	angle=44.9, fuel = 3475
Rotate Right (Counter-clockwise)	changeAngle(), decreaseFuel()	angle=45.0 fuel=3476	angle=45.1, fuel=3475