```cpp
/*
 * This is the .cpp file for the Si7051 sensor
 * The Si7015 is being used as the Globe Thermometer Sensor
 * The bulk of this library was retrieved on line:
 * https://github.com/closedcube/ClosedCube_Si7051_Arduino
 *
 * Part 1 of this library was retrieved on line,
 * while Part 2 was written by MECH 45X Team 26
 *
 * Team 26 does not fully understand how the on line
 * library works, so Part 1 is not commented
 *
 * Team 26 commented Part 2 as they wrote Part 2
 * and understand how the code in Part 2 works
 *
 * Please note that the Globe Thermometer does not
 * measure Mean Radiant Temperature (MRT), it
 * actually measures the globe temperature.
 * MRT is calculate later using air temperature and
 * globe temperature.
 */

#include <Wire.h>
#include "MRT.h"

ClosedCube_Si7051::ClosedCube_Si7051()
{
}

void ClosedCube_Si7051::begin(uint8_t address) {
    _address = address;
    Wire.begin();

    Wire.beginTransmission(_address);
    Wire.write(0xE6);
    Wire.write(0x0);
    Wire.endTransmission();

}

float ClosedCube_Si7051::readT() {
    return readTemperature();
}

float ClosedCube_Si7051::readTemperature() {
    Wire.beginTransmission(_address);
    Wire.write(0xF3);
    Wire.endTransmission();

    delay(15);

    Wire.requestFrom(_address, (uint8_t)2);
    delay(25);
    byte msb = Wire.read();
    byte lsb = Wire.read();

    uint16_t val = msb << 8 | lsb;

    return (175.72*val) / 65536 - 46.85;
}

//*******************************************************//
// Part 2: Si7051 MECH 45X Team 26 library                //
// The following code was written by MECH 45X Team 26     //
// It is properly commented                               //
//*******************************************************//


bool ClosedCube_Si7051::start_mrt(void) {
```

```
70      /*
71       * Start MRT sensor
72       *
73       * The code will read a value of 128 or greater
74       * if the sensor is broken or disconnected
75       *
76       * The start sequence returns false (sensor does not work)
77       * if a value of 128 is read
78       *
79       * If the value is less than 128, it returns true
80       * (sensor works)
81       *
82       * The code retrieved from the online library should be improved
83       * to fix this.
84       */
85      begin(ADDR_MRT);
86      delay(500);
87      return(run_mrt());
88  }
89
90  bool ClosedCube_Si7051::run_mrt(void) {
91      /*
92       * Takes MRT measurements until read_count is exceeded
93       * once read_count is exceeded, the average is taken
94       */
95      read_count = 1;
96      error_count = 1;
97
98      while(read_count <= MAX_READ_COUNT && error_count <= MAX_ERROR_COUNT) {
99          float current_T = readTemperature();
100
101         if(current_T >= DEFAULT_AVERAGE) {
102             Serial.println("-------------------------------------------------");
103             Serial.print("Error reading from Globe Thermometer, Tg: ");
104             Serial.println(current_T);
105             Serial.println("-------------------------------------------------");
106             error_count ++;
107             delay(1000);
108         } else{
109             T_buf[read_count - 1] = readTemperature();
110             Serial.print("Globe Thermometer Reading #");
111             Serial.print(read_count);
112             Serial.print(": Tg is: ");
113             Serial.println(T_buf[read_count - 1]);
114             read_count ++;
115             error_count = 1;
116             delay(250);
117         }
118     }
119
120     if(read_count > MAX_READ_COUNT) {
121         T_ave = 0;
122         for(int k = 0; k < MAX_READ_COUNT; k++) {
123             T_ave = T_ave + T_buf[k];
124         }
125         T_ave = T_ave / MAX_READ_COUNT;
126         Serial.println("--------------------");
127         Serial.print("Average Tg is: ");
128         Serial.println(T_ave);
129         Serial.println("--------------------");
130         return(true);
131     }
132     else if(error_count > MAX_ERROR_COUNT) {
133         T_ave = -1;
134         Serial.println("-------------------------------------------------------------");
135         Serial.println("Error reading from Globe Thermometer, no average Tg calculated");
136         Serial.println("-------------------------------------------------------------");
137         return(false);
138     }
```

```
    else{
        Serial.println("---------------------------");
        Serial.println("Failure for no known reason");
        Serial.println("---------------------------");
        return(false);}
}

// Getter function for Globe Thermometer average temperature
float ClosedCube_Si7051::get_MRT_ave(void) {
    return T_ave;
}
```