// This code works and gives degrees!!! UNO A4/A5 - 2560 A20/21 connections photo below

// SDA A4 , SCL A5

// Heading - Desired Direction to Steer

// Bearing - Current Course

#include <Wire.h>

#define Addr 0x1E // 7-bit address of HMC5883 compass

float error;

int debug = 1;

int communicate = 1;

int forwardReverse = 1; // 1 Forward 2 Reverse

float targetHeadingA = 170.0;

float targetHeadingB = 350.0; // A + 180 degrees

float currenttargetHeading;

float currentbearing;

void setup() {

Serial.begin(9600);

Serial.println();

Wire.begin();

// Set operating mode to continuous

Wire.beginTransmission(Addr);

Wire.write(byte(0x02));

Wire.write(byte(0x00));

Wire.endTransmission();

}

void loop() {

selectforwardreverse();

getbearing();

controldirection();

}

//---------------------------------------------

void selectforwardreverse(){

if (forwardReverse == 1){

currenttargetHeading = targetHeadingA;

}

if (forwardReverse != 1){

currenttargetHeading = targetHeadingB;

}

}

//--------------------------------------------

void getbearing() {

int x, y, z;

// Initiate communications with compass

Wire.beginTransmission(Addr);

Wire.write(byte(0x03)); // Send request to X MSB register

Wire.endTransmission();

Wire.requestFrom(Addr, 6); // Request 6 bytes; 2 bytes per axis

if(Wire.available() <=6) { // If 6 bytes available

x = Wire.read() << 8 | Wire.read();

z = Wire.read() << 8 | Wire.read();

y = Wire.read() << 8 | Wire.read();

}

// If compass module lies flat on the ground with no tilt,

// just x and y are needed for calculation

float bearing=atan2(x, y)/0.0174532925;

if(bearing < 0) bearing+=360;

bearing=360-bearing; // N=0/360, E=90, S=180, W=270

currentbearing = bearing;

//Serial.println(currentbearing);

delay(500);

}

void controldirection() {

// digitalWrite(2, LOW); //

// digitalWrite(3, LOW); //

// digitalWrite(4, LOW); //

// digitalWrite(5, LOW); //

// digitalWrite(6, LOW); //

// digitalWrite(7, LOW); //

// digitalWrite(8, LOW); //

if (communicate == 1) {

Serial.println(" ");

// Serial.print("------------------------------------------ ");

Serial.print(" Heading>>> ");

Serial.print(currenttargetHeading);

Serial.print(" <<< "); // 0-360

Serial.print(" Bearing> ");

Serial.print(currentbearing);

Serial.print(" < "); // 0-360

}

error = currenttargetHeading - currentbearing;

// mapping to -179 .. 180

if (error <= -180.0) {error = 360.0 - error;}

if (error > 180.0) {error = -360.0 + error ; }

if (error <= 0.0) // (Turn LEFT)

{

left();

if (communicate == 1) {

Serial.print(" Right Error: ");

Serial.print(error);

Serial.print(" "); //

}

}

if (error > 0.0) // RIGHT (TURN RIGHT)

{

right();

if (communicate == 1) {

Serial.print(" Left Error: ");

Serial.print(error);

Serial.print(" "); // 640------------------0----------------1360

}

}

if (communicate == 1) {

/// Serial.print(" Servo: ");

/// Serial.print(pos);

/// Serial.print(" "); //

}

//// myservo.write(pos); // tell servo to go to position in variable 'pos'

delay(150);

}

void right() //rrrrrrrr

{

if (communicate == 1) {

Serial.print(" >>>>>>>>>> Turn RIGHT ");

Serial.print(" "); //

}

//// myservo.write(pos); // tell servo to go to position in variable 'pos'

}

void left() //rrrrrrrr

{

if (communicate == 1) {

Serial.print(" <<<<<<<<<< Turn LEFT ");

Serial.print(" "); //

}

//// myservo.write(pos); // tell servo to go to position in variable 'pos'

}