ANGEL EYE

ROADWAY GUARDIAN

Angel Eye makes road intersections safer for all road users by spotlighting danger areas.

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The Massachusetts Institute of Technology
Integrated Design & Management

Making roadway intersections safer with dynamic alerts

Problem

Given real-time detection of road entities and collision forecasts, how do I generate awareness among road users?

Solution

Light, Sound, Radio

2-axis gimball ‘turret’

Arduino Uno board	(C++)
Tessel 2 board	(JS)
Servo board	(JS)
Paper.js	(JS)

DSRC[1] broadcast

Particle board	(C++)
DSRC dict set	(JSON)

[1] DSRC = Dedicated Short Range Communications

5.8 Message: MSG_PersonalSafetyMessage (PSM)

Use: The Personal Safety Message (PSM) is used to broadcast safety data regarding the kinematic state of various types of Vulnerable Road Users (VRU), such as pedestrians, cyclists or road workers. Data items which are optional are included in a PSM as needed according to policies that are beyond the scope of this standard.

This message is under development, and is included in this standard to support field trials. Changes in the specification of the message and/or its constituent elements may occur in the future.

ASN.1 Representation:

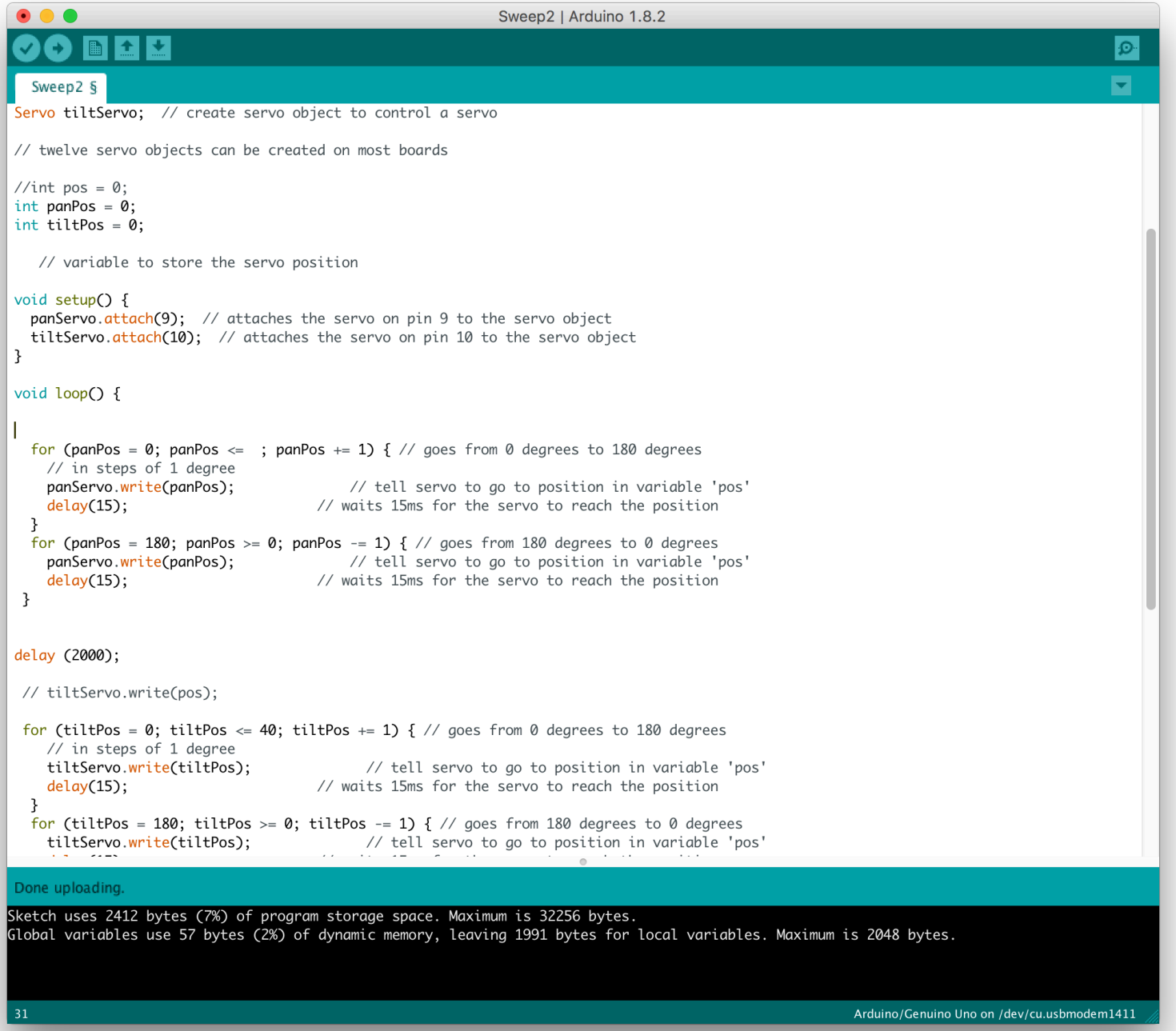
```
PersonalSafetyMessage ::= SEQUENCE {
   basicType                PersonalDeviceUserType,
   secMark                  DSecond,
   msgCnt                   MsgCount,
   id                       TemporaryID,
   position                 Position3D, --  Lat, Long, Elevation
   accuracy                 PositionalAccuracy,
   speed                    Velocity,
   heading                  Heading,
   accelSet                 AccelerationSet4Way          OPTIONAL,
   pathHistory              PathHistory                  OPTIONAL,
   pathPrediction           PathPrediction               OPTIONAL,
   propulsion               PropelledInformation         OPTIONAL,
   useState                 PersonalDeviceUsageState     OPTIONAL,
   crossRequest             PersonalCrossingRequest      OPTIONAL,
   crossState               PersonalCrossingInProgress   OPTIONAL,
   clusterSize              NumberOfParticipantsInCluster          OPTIONAL,
   clusterRadius            PersonalClusterRadius        OPTIONAL,
   eventResponderType       PublicSafetyEventResponderWorkerType OPTIONAL,
   activityType             PublicSafetyAndRoadWorkerActivity    OPTIONAL,
   activitySubType          PublicSafetyDirectingTrafficSubType  OPTIONAL,
   assistType               PersonalAssistive            OPTIONAL,
   sizing                   UserSizeAndBehaviour         OPTIONAL,
   attachment               Attachment                   OPTIONAL,
   attachmentRadius         AttachmentRadius             OPTIONAL,
   animalType               AnimalType                   OPTIONAL,

   regional SEQUENCE (SIZE(1..4)) OF
            RegionalExtension {{REGION.Reg-PersonalSafetyMessage}} OPTIONAL,

   ...
   }
```

...standard, a MSG called MSG_MessageFrame

Dedicated Short-Range Communications (DSRC) dictionary set


Sweep2 | Arduino 1.8.2
Sweep2 §
Servo tiltServo; // create servo object to control a servo
// twelve servo objects can be created on most boards
//int pos = 0;
int panPos = 0;
int tiltPos = 0;
// variable to store the servo position
void setup() {
panServo.attach(9); // attaches the servo on pin 9 to the servo object
tiltServo.attach(10); // attaches the servo on pin 10 to the servo object
}
void loop() {
for (panPos = 0; panPos <= ; panPos += 1) { // goes from 0 degrees to 180 degrees
// in steps of 1 degree
panServo.write(panPos); // tell servo to go to position in variable 'pos'
delay(15); // waits 15ms for the servo to reach the position
}
for (panPos = 180; panPos >= 0; panPos -= 1) { // goes from 180 degrees to 0 degrees
panServo.write(panPos); // tell servo to go to position in variable 'pos'
delay(15); // waits 15ms for the servo to reach the position
}
delay (2000);
// tiltServo.write(pos);
for (tiltPos = 0; tiltPos <= 40; tiltPos += 1) { // goes from 0 degrees to 180 degrees
// in steps of 1 degree
tiltServo.write(tiltPos); // tell servo to go to position in variable 'pos'
delay(15); // waits 15ms for the servo to reach the position
}
for (tiltPos = 180; tiltPos >= 0; tiltPos -= 1) { // goes from 180 degrees to 0 degrees
tiltServo.write(tiltPos); // tell servo to go to position in variable 'pos'
Done uploading.
Sketch uses 2412 bytes (7%) of program storage space. Maximum is 32256 bytes.
Global variables use 57 bytes (2%) of dynamic memory, leaving 1991 bytes for local variables. Maximum is 2048 bytes.
31
Arduino/Genuino Uno on /dev/cu.usbmodem1411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