//WAP to safeguard pedestrian by deploying airbag using sample data from right, left and center pressure sensors.

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#include<stdio.h>
int *f_data (int *, int *, int *);          //declared a function for collecting final data from 3 sensors data to return final data array.

int air_bag (int *);                        //declared a function with address of final data array as argument and returns an integer value for decision making.

int main ()         //start main()
{

int i, airbag_deploy;   //declare i for index referencing and airbag_deploy to store the value returned by air_bag().

int *f_p;               //declare an integer pointer to assign the address of array returned by f_data().

/*Declare and initialize 3 arrays for right, left and center sensors of 50 elements each. */

int pr[50] =
   { 0x01, 0x20, 0x23, 0x34, 0x45, 0x56, 0x78, 0x89, 0x90, 0x64, 0x02, 0x01,
0x20, 0x34, 0x45, 0x56, 0x67, 0x78, 0x89, 0x90, 0x60, 0x02, 0x1A, 0xA1, 0x01, 0x20,
0x23, 0x34, 0x45, 0x56, 0x67, 0x78, 0x89, 0x90, 0x70, 0x02, 0x01, 0x20, 0x23, 0x34,
0x65, 0x56, 0x67, 0x78, 0x89, 0x90, 0x80, 0x02, 0x1A, 0xA1 };

int pc[50] =
   { 0xbf, 0x39, 0xae, 0x02, 0x67, 0x27, 0x25, 0x61, 0xe6, 0x18, 0x3e, 0x05,
0xa2, 56, 0xb3, 25, 0x4d, 0x23, 0xc1, 0x41, 0x65, 0x21, 0x7f, 0x06, 0xfb, 0xb4,
0xe3, 0x32, 0x3a, 0x4a, 0x84, 0xcf, 0xc5, 0x26, 0x0c, 0x59, 0xf8, 0xd2, 0x45, 0xdd,
0x57, 0x0f, 0xcd, 0x2a, 0x34, 0xd4, 0x00, 0xc9, 0xb5, 0x09 };

int pl[50] =
   { 0xdc, 0x4a, 0x62, 0xad, 0x77, 0xf2, 0x0e, 51, 0xb5, 0xa0, 0xa9, 0xb1,
0x58, 0x06, 0xbb, 0x19, 0x5d, 0xb1, 0x54, 0x24, 0xbb, 0xa7, 0x08, 0xd7, 0x84, 0x82,
0xd9, 0x04, 0x06, 0x19, 0x58, 0xd6, 0x87, 0x9e, 0xa1, 0x76, 0x73, 0x25, 0x8c, 0x0c,
0x9d, 0xd4, 0x9c, 0x82, 0x1c, 0x08, 0xcf, 0xd4, 0xe5, 0x41 };

printf ("The below are the sample data given as user input to right , left and center sensors:\n");

puts ("Right_Sensor                 Center_Sensor               Left_Sensor");

printf("-------------------------------------------------------------------------------\n");

   /*Define a for loop to print the sample data inputted by user with timestamp. */
   for (i = 0; i < 50; i++)
   {
printf ("Time_Stamp: %d pr[%d] =%02x       Time_Stamp: %d pc[%d] =%02x       Time_Stamp: %d pl[%d] =%02x\n",
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        i, i, pr[i], i, i, pc[i], i, i, pl[i]);
    }

f_p = f_data (pr, pc, pl);          //call the f_data() - final data function with 3 arrays as arguments and assign the return address of final_data array to a pointer variable - f_p.

airbag_deploy = air_bag (f_p);      //call air_bag() with final_data array as argument and assign the value returned into airbag_deploy variable.

printf
    ("--------------------------------------------------------------------------------\n");

if (airbag_deploy == 5)
    printf ("Status: Continuously 5 samples in f_data are having more threshold than 0x55 so Pedestrian Airbag is deployed successfully.\n");
}     //end main()

  /*1. f_data () function is defined with 3 sensor data arrays as arguments and final data array as return.
  2.This function is used to collect the final_data from 3 sensors right, left and Center_Sensor arrays 'pr', 'pc' & 'pl'.
  3.The collected data will be stored into an array 'fp'.
  4.Only the valid data sample from sensor array from any sensor will be collected by final data array 'fp'.
  */
int *f_data (int *pr, int *pc, int *pl)
{

    int i = 0, j = 0, k, m;       //Declare integer variables for referencing elements of sensor and final_data arrays.
    static int fp [20];           //Declare a static integer array to collect valid data by evaluating sample data of sensors

    while (i < 50)                //while () is used to execute the loop until it reaches maximum index value of 50.
    {
       /*1. Declare a for loop to evaluate data from Right senor array and assign it into final data fp array.
         2.Using index reference variable i validates the sample data from right sensor and valid data will
         be assigned to fp [] - final data array.
         3.Valid data will be allocated into fp [].
       */
    for (i; i < 50; i = i + 5)
          {
           if (pr[i] > 0x05 && pr[i] < 0xF5)
             {
               fp[j] = pr[i];
               j++;
               break;
             }
          }
       /*1. Declare a for loop to evaluate data from Center senor array and assign it into final data fp array.
         2.Using index reference variable i validates the sample data from center sensor and valid data will
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        be assigned to fp [] - final data array.
        3.Valid data will be allocated into fp [].
      */

   for (k = i + 5; k < 50; k = k + 5)
         {
         if (pc[k] > 0x05 && pc[k] < 0xF5)
            {
               fp[j] = pc[k];
               j++;
               break;
            }
         }
      /*1. Declare a for loop to evaluate data from Left senor array and assign it into final data fp array.
        2.Using index reference variable i validates the sample data from left sensor and valid data will
        be assigned to fp [] - final data array.
        3.Valid data will be allocated into fp [].
      */
   for (m = k + 5; m < 50; m = m + 5)
      {
         if (pl[m] > 0x05 && pl[m] < 0xF5)
         {
              fp[j] = pl[m];
              j++;
              break;
         }

      }
      i = m + 5;
   }
   return fp;       //returns the final_data array fp [] to main ()
}

   /* 1. The air_bag () is defined with final data array fp [] as argument from main () and integer type as return.
      2.This function checks the final_data fp [] and returns an integer value to the main () if final
      data reaches threshold value for 5 times continuously.
   */
int air_bag (int *px)
{
   int cnt = 0, xi = 0;          //declare integer variables xi-index referencing of fp [] and cnt variable.
   for (xi = 0; xi < sizeof(px); xi++)
   {
   if (px[xi] > 0x55)
      {
         cnt++;
         if (cnt == 5)
         {
            break;
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            }
        }
    else
        {
            cnt = 0;
        }
    }
    return cnt;
}
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