

LAMPIRAN

Lampiran 1 Program Arduino

```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd(0x27,20,4);
#define s0 4
#define s1 5
#define s2 6
#define s3 7
#define out 8
#define START_BUTTON 3
int redFrequency = 0;
int greenFrequency = 0;
int blueFrequency = 0;
bool blinkingFlag;
uint32_t prevMillisData=0, prevMillisBlinking=0;
int turbValue, odorValue;
int isButttonPressed[2] = {1,1};
int buttonState[2];
int lastButtonState[2]={0,0};
unsigned long lastDebounceTime[2]={0,0};

void setup()
{
  lcd.init();
  Serial.begin(9600);
  lcd.backlight();
  pinMode(s0, OUTPUT);
  pinMode(s1, OUTPUT);
  pinMode(s2, OUTPUT);
  pinMode(s3, OUTPUT);
  pinMode(out, INPUT);
  pinMode(START_BUTTON,INPUT_PULLUP);
  pinMode(A0,INPUT);
  pinMode(A1,INPUT);
  digitalWrite(s0,HIGH);
  digitalWrite(s1,LOW);
```

```

Serial.println("CLEARDATA");
Serial.println("LABEL, Time, Red, Green, Blue, Turb, Bau");
Serial.println("RESETTIMER");
}
void loop()
{
  if(blinkingFlag){
    GetColors();
    turbValue = analogRead(A0);
    odorValue = analogRead(A1);
  }
  displayColor();
  displayOdor();
  displayTurbidity();
  cursorBlinking(1000);

  readButton(START_BUTTON,10,0);
  if(isButttonPressed[0] == true){
    sendDataToExcelOnce();
    isButttonPressed[0]=false;
  }
}
void readButton(uint8_t buttonPin, uint8_t debounceDelay, bool buttonIndex){
  int reading = digitalRead(buttonPin);
  if (reading != lastButtonState[buttonIndex]) {
    lastDebounceTime[buttonIndex] = millis();
  }
  if ((millis() - lastDebounceTime[buttonIndex]) > debounceDelay) {
    if (reading != buttonState[buttonIndex]) {
      buttonState[buttonIndex] = reading;

      if (buttonState[buttonIndex] == HIGH) {
        isButttonPressed[buttonIndex] = true;
        Serial.println(isButttonPressed[buttonIndex]);
      }
    }
  }
  lastButtonState[buttonIndex] = reading;
}

```

```

}

void cursorBlinking(uint16_t time){
if(millis() - prevMillisBlinking >= time){
    blinkingFlag=!blinkingFlag;
    (blinkingFlag)? printLCD(19,0, "*") : printLCD(19,0, " ");
    prevMillisBlinking=millis();
}
}

void sendDataToExcelOnce(){
    Serial.print("DATA, TIME,");
    Serial.print(redFrequency);
    Serial.print(" ,");
    Serial.print(greenFrequency);
    Serial.print(" ,");
    Serial.print(blueFrequency);
    Serial.print(" ,");
    Serial.print(turbValue);
    Serial.print(" ,");
    Serial.print(odorValue);
    Serial.println(" ,");
}

void displayColor(){
    printLCD(0,0,"COLOR");
    printLCD(0,1,"R=");
    printLCD(2,1,String(redFrequency));
    if(redFrequency>0 && redFrequency <10)printLCD(3,1," ");
    else if(redFrequency>10 && redFrequency <100)printLCD(4,1," ");
    else if(redFrequency>100 && redFrequency <1000)printLCD(5,1," ");

    printLCD(0,2,"G=");
    printLCD(2,2,String(greenFrequency));
    if(greenFrequency>0 && greenFrequency <10)printLCD(3,2," ");
    else if(greenFrequency>10 && greenFrequency <100)printLCD(4,2," ");
    else if(greenFrequency>100 && greenFrequency <1000)printLCD(5,2," ");
    printLCD(0,3,"B=");
    printLCD(2,3,String(blueFrequency));
    if(blueFrequency>0 && blueFrequency <10)printLCD(3,3," ");

```

```

    else if(blueFrequency>10 && blueFrequency <100)printLCD(4,3," ");
    else if(blueFrequency>100 && blueFrequency <1000)printLCD(5,3," ");
}
void displayTurbidity(){
    printLCD(10,2,"TRB=");
    printLCD(14,2,String(turbValue));
    if(turbValue>0 && turbValue <10)printLCD(15,2," ");
    else if(turbValue>10 && turbValue <100)printLCD(16,2," ");
}

void displayOdor(){
    printLCD(10,1,"BAU=");
    printLCD(14,1,String(odorValue));
    if(odorValue>0 && odorValue <10)printLCD(15,1," ");
    else if(odorValue>10 && odorValue <100)printLCD(16,1," ");
}
void GetColors()
{
    digitalWrite(s2,LOW);
    digitalWrite(s3,LOW);
    redFrequency = pulseIn(out, LOW);
    //Serial.print("R = ");
    //Serial.print(redFrequency);
    //delay(100);
    digitalWrite(s2,HIGH);
    digitalWrite(s3,HIGH);
    greenFrequency = pulseIn(out, LOW);
    //Serial.print(" G = ");
    //Serial.print(greenFrequency);
    //delay(100);
    digitalWrite(s2,LOW);
    digitalWrite(s3,HIGH);
    blueFrequency = pulseIn(out, LOW);
    //Serial.print(" B = ");
    //Serial.println(blueFrequency);
    //delay(100);
}

```

```
static void printLCD(uint8_t column, uint8_t line, String text){  
    lcd.setCursor(column,line);  
    lcd.print(text);  
}
```

Lampiran 2 Program GUI MATLAB

```
function varargout = GUIFUZZY_FIX(varargin)
% GUIFUZZY_FIX MATLAB code for GUIFUZZY_FIX.fig
%   GUIFUZZY_FIX, by itself, creates a new GUIFUZZY_FIX or raises the
existing
%   singleton*.
%
%   H = GUIFUZZY_FIX returns the handle to a new GUIFUZZY_FIX or the
handle to
%   the existing singleton*.
%
%   GUIFUZZY_FIX('CALLBACK',hObject,eventData,handles,...) calls the local
%   function named CALLBACK in GUIFUZZY_FIX.M with the given input
arguments.
%
%   GUIFUZZY_FIX('Property','Value',...) creates a new GUIFUZZY_FIX or
raises the
%   existing singleton*. Starting from the left, property value pairs are
%   applied to the GUI before GUIFUZZY_FIX_OpeningFcn gets called. An
%   unrecognized property name or invalid value makes property application
%   stop. All inputs are passed to GUIFUZZY_FIX_OpeningFcn via varargin.
%
%   *See GUI Options on GUIDE's Tools menu. Choose "GUI allows only one
%   instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help GUIFUZZY_FIX

% Last Modified by GUIDE v2.5 30-Nov-2024 13:13:26

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',    mfilename, ...
    'gui_Singleton', gui_Singleton, ...
    'gui_OpeningFcn', @GUIFUZZY_FIX_OpeningFcn, ...
    'gui_OutputFcn', @GUIFUZZY_FIX_OutputFcn, ...
```

```

        'gui_LayoutFcn', [] , ...
        'gui_Callback', []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargin
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT


% --- Executes just before GUIFUZZY_FIX is made visible.
function GUIFUZZY_FIX_OpeningFcn(hObject, eventdata, handles, varargin)
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to GUIFUZZY_FIX (see VARARGIN)


% Choose default command line output for GUIFUZZY_FIX
handles.output = hObject;


% Update handles structure
guidata(hObject, handles);


% UIWAIT makes GUIFUZZY_FIX wait for user response (see UIRESUME)
% uiwait(handles.figure1);


% --- Outputs from this function are returned to the command line.
function varargout = GUIFUZZY_FIX_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

```

```

% Get default command line output from handles structure
varargout{1} = handles.output;

function edit2_Callback(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit2 as text
%        str2double(get(hObject,'String')) returns contents of edit2 as a double

% --- Executes during object creation, after setting all properties.
function edit2_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

function edit3_Callback(hObject, eventdata, handles)
% hObject    handle to edit3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit3 as text
%        str2double(get(hObject,'String')) returns contents of edit3 as a double

```

```
% --- Executes during object creation, after setting all properties.
function edit3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%    See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```
function edit4_Callback(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of edit4 as text
%    str2double(get(hObject,'String')) returns contents of edit4 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%    See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```

function edit5_Callback(hObject, eventdata, handles)
% hObject    handle to edit5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit5 as text
%        str2double(get(hObject,'String')) returns contents of edit5 as a double

% --- Executes during object creation, after setting all properties.
function edit5_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit5 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

function edit6_Callback(hObject, eventdata, handles)
% hObject    handle to edit6 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit6 as text
%        str2double(get(hObject,'String')) returns contents of edit6 as a double

% --- Executes during object creation, after setting all properties.
function edit6_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit6 (see GCBO)

```

```

% eventdata reserved - to be defined in a future version of MATLAB
% handles empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
% See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject handle to pushbutton1 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

merah=str2num(get(handles.edit15,'string'));
hijau=str2num(get(handles.edit16,'string'));
biru=str2num(get(handles.edit17,'string'));
kejernihan=str2num(get(handles.edit18,'string'));
bau=str2num(get(handles.edit19,'string'));

fis= readfis('fuzzy_warna22');
result=evalfis([merah hijau biru kejernihan bau],fis);
set(handles.edit24,'string',result)

if result < 5.5 {
    msgbox('LAYAK DIGUNAKAN');
}
else if result >= 6 && result < 7.5 {
    msgbox('CUKUP LAYAK');
}
else {
    msgbox('TIDAK LAYAK');
}
end
end

```

```

% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
close

% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)


function edit24_Callback(hObject, eventdata, handles)
% hObject    handle to edit24 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit24 as text
%        str2double(get(hObject,'String')) returns contents of edit24 as a double


% --- Executes during object creation, after setting all properties.
function edit24_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit24 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

end

```
function edit7_Callback(hObject, eventdata, handles)
% hObject    handle to edit7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit7 as text
%        str2double(get(hObject,'String')) returns contents of edit7 as a double

% --- Executes during object creation, after setting all properties.
function edit7_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit7 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```
function edit8_Callback(hObject, eventdata, handles)
% hObject    handle to edit8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit8 as text
%        str2double(get(hObject,'String')) returns contents of edit8 as a double

% --- Executes during object creation, after setting all properties.
```

```

function edit8_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit8 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit9_Callback(hObject, eventdata, handles)
% hObject    handle to edit9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit9 as text
%       str2double(get(hObject,'String')) returns contents of edit9 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit9_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit9 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit15_Callback(hObject, eventdata, handles)
% hObject    handle to edit15 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit15 as text
%        str2double(get(hObject,'String')) returns contents of edit15 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit15_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit15 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
% Hint: edit controls usually have a white background on Windows.
%        See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit16_Callback(hObject, eventdata, handles)
% hObject    handle to edit16 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit16 as text
%        str2double(get(hObject,'String')) returns contents of edit16 as a double

```

```

% --- Executes during object creation, after setting all properties.
function edit16_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit16 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

```

```
% Hint: edit controls usually have a white background on Windows.
% See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```
function edit17_Callback(hObject, eventdata, handles)
% hObject handle to edit17 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit17 as text
% str2double(get(hObject,'String')) returns contents of edit17 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit17_CreateFcn(hObject, eventdata, handles)
% hObject handle to edit17 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
% See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```
function edit18_Callback(hObject, eventdata, handles)
% hObject handle to edit18 (see GCBO)
% eventdata reserved - to be defined in a future version of MATLAB
% handles structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of edit18 as text
%      str2double(get(hObject,'String')) returns contents of edit18 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit18_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit18 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%      See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```
function edit19_Callback(hObject, eventdata, handles)
% hObject    handle to edit19 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of edit19 as text
%      str2double(get(hObject,'String')) returns contents of edit19 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit19_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit19 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%      See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
```

```

    set(hObject,'BackgroundColor','white');
end

```

```

function edit10_Callback(hObject, eventdata, handles)
% hObject    handle to edit10 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit10 as text
%        str2double(get(hObject,'String')) returns contents of edit10 as a double

% --- Executes during object creation, after setting all properties.
function edit10_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit10 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

```

```

function edit11_Callback(hObject, eventdata, handles)
% hObject    handle to edit11 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit11 as text
%        str2double(get(hObject,'String')) returns contents of edit11 as a double

```

```
% --- Executes during object creation, after setting all properties.
function edit11_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit11 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%    See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```
function edit12_Callback(hObject, eventdata, handles)
% hObject    handle to edit12 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: get(hObject,'String') returns contents of edit12 as text
%    str2double(get(hObject,'String')) returns contents of edit12 as a double
```

```
% --- Executes during object creation, after setting all properties.
function edit12_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit12 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
%    See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end
```

```

function edit13_Callback(hObject, eventdata, handles)
% hObject    handle to edit13 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit13 as text
%        str2double(get(hObject,'String')) returns contents of edit13 as a double

% --- Executes during object creation, after setting all properties.
function edit13_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit13 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    empty - handles not created until after all CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end

function edit14_Callback(hObject, eventdata, handles)
% hObject    handle to edit14 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit14 as text
%        str2double(get(hObject,'String')) returns contents of edit14 as a double

% --- Executes during object creation, after setting all properties.
function edit14_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit14 (see GCBO)
% eventdata  reserved - to be defined in a future version of MATLAB

```

```
% handles    empty - handles not created until after all CreateFcns called
```

```
% Hint: edit controls usually have a white background on Windows.
```

```
%    See ISPC and COMPUTER.
```

```
if ispc && isequal(get(hObject,'BackgroundColor'),  
get(0,'defaultUicontrolBackgroundColor'))
```

```
    set(hObject,'BackgroundColor','white');
```

```
end
```

```
% --- Executes during object creation, after setting all properties.
```

```
function text13_CreateFcn(hObject, eventdata, handles)
```

```
% hObject    handle to text13 (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called
```

```
% --- Executes during object creation, after setting all properties.
```

```
function text15_CreateFcn(hObject, eventdata, handles)
```

```
% hObject    handle to text15 (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of MATLAB
```

```
% handles    empty - handles not created until after all CreateFcns called
```

Lampiran 3 Hasil Pengujian Sample

a. Minyak Goreng Sawit Kondisi Baru

Red	Green	Blue	Turb	Bau
0	0	0	0	0
21	24	23	662	153
20	22	21	651	148
20	22	21	649	145
21	23	23	620	145
20	23	23	625	142
20	23	22	633	146
20	23	22	634	143
20	23	22	634	141
20	23	22	634	140
20	22	21	645	141
20	23	22	631	142
20	23	22	638	142
19	22	21	645	143
20	23	22	623	143
20	23	22	623	144
20	22	22	643	145
20	22	21	642	147
21	24	23	615	146
21	24	22	618	147
20	22	22	638	149
15	23	22	619	146
21	23	23	611	145
22	24	23	599	145
21	24	23	603	148
21	23	23	609	149
21	24	23	602	149
22	24	23	599	150
21	24	23	602	151
21	23	22	613	151
21	24	23	607	150
21	24	23	594	148

b. Minyak Goreng Sawit 1x setelah digunakan menggoreng ayam

Red	Green	Blue	Turb	Bau
0	0	0	0	0
64	72	65	833	196
63	72	65	805	190
62	71	64	819	192
61	70	62	793	192
57	70	62	793	194
61	69	62	799	193
61	63	62	796	193
61	69	62	808	192
61	69	62	812	192
63	72	65	812	187
63	70	62	798	193
63	70	62	811	193
64	73	64	798	193
63	71	58	796	187
63	71	58	813	187
61	69	62	814	190
65	73	65	797	190
63	72	65	803	186
63	72	65	800	186
61	69	63	800	189
64	73	65	814	189
64	73	65	814	189
64	73	65	796	190
61	70	63	813	188
61	70	63	805	189
61	70	63	811	189
61	70	57	797	188
64	72	65	815	185
64	72	65	815	185
64	73	58	811	190
62	71	64	810	186
62	71	64	808	186

c. Minyak Goreng Sawit 2x setelah digunakan menggoreng ayam

Red	Green	Blue	Turb	Bau
0	0	0	0	0
99	107	86	900	192
93	101	92	901	201
94	104	94	910	199
94	103	93	919	201
94	103	93	922	200
98	105	92	925	203
95	104	95	924	198
95	104	95	925	198
96	106	96	925	194
96	99	95	903	194
96	99	95	923	194
94	99	93	923	194
95	104	95	905	192
95	104	95	904	192
94	103	88	904	193
99	109	97	923	193
97	103	93	905	194
97	103	93	903	194
94	103	93	903	192
98	108	98	919	187
98	108	98	903	187
95	105	95	903	189
92	108	98	900	186
89	105	94	917	189
89	105	94	919	189
96	103	93	919	190
92	108	98	917	185
96	103	93	901	190
96	103	93	901	190
98	104	93	905	189
99	109	97	907	190

d. Minyak Goreng Sawit 3x setelah digunakan menggoreng ayam

Red	Green	Blue	Turb	Bau
0	0	0	0	0
125	139	122	937	221
123	141	128	926	201
120	137	131	917	206
127	138	138	922	198
127	138	138	924	198
128	146	138	937	201
127	145	132	928	198
122	139	127	928	198
129	144	133	921	200
123	138	128	922	199
126	143	137	922	195
124	139	133	927	198
125	136	136	919	194
127	145	138	919	196
128	144	134	927	199
127	142	132	910	198
127	144	138	933	196
123	141	135	933	194
124	141	135	931	194
128	145	138	907	195
125	139	132	907	196
128	141	126	922	197
126	144	138	906	193
128	137	133	923	197
123	140	135	923	194
116	139	132	930	195
126	144	138	904	192
127	140	131	931	196
128	144	132	931	197
117	139	132	930	193
122	139	132	915	193
115	139	126	916	192

e. Minyak Goreng Sawit 1x setelah digunakan menggoreng ikan

Red	Green	Blue	Turb	Bau
0	0	0	0	0
64	74	69	864	176
63	71	65	875	178
61	63	64	875	177
60	69	64	864	178
64	73	67	863	179
63	73	68	873	175
63	72	66	857	178
60	68	63	858	179
63	71	66	860	173
63	72	68	868	174
62	71	66	871	175
61	70	66	868	175
63	71	67	854	173
55	69	64	854	175
62	71	67	857	171
63	72	67	858	169
63	72	67	858	169
61	70	66	858	171
60	62	63	867	176
60	69	64	860	175
62	71	67	861	172
61	69	64	861	176
61	69	65	857	174
62	71	66	881	170
62	71	66	881	170
63	72	68	883	170
60	69	64	882	172
62	64	66	871	169
62	66	67	871	168
62	71	67	871	169
62	71	66	862	168
62	71	66	862	167

f. Minyak Goreng Sawit 2x setelah digunakan menggoreng ikan

Red	Green	Blue	Turb	Bau
0	0	0	0	0
99	112	102	886	186
95	109	100	901	183
94	102	99	897	183
99	114	105	898	180
88	111	102	876	180
89	109	100	876	182
96	111	101	885	183
92	105	96	906	178
92	105	96	881	179
97	104	98	876	180
92	105	97	884	177
93	106	92	888	177
93	106	92	880	179
92	106	97	899	179
98	110	98	881	178
93	107	98	877	175
93	107	98	877	175
92	106	97	889	175
94	102	99	908	177
92	105	91	901	179
92	105	91	881	175
90	111	101	903	175
87	107	98	895	174
94	109	100	883	179
92	105	96	883	179
92	106	97	873	179
92	106	97	898	180
93	107	98	886	177
97	111	94	880	177
85	105	96	883	177
85	105	96	882	179

g. Minyak Goreng Sawit 3x setelah digunakan menggoreng ikan

Red	Green	Blue	Turb	Bau
0	0	0	0	0
119	127	110	833	178
118	126	115	884	191
118	126	115	891	192
120	129	117	864	191
120	130	117	876	191
118	127	115	888	193
122	132	119	883	195
121	124	118	908	197
121	130	112	908	197
119	128	116	897	200
114	123	111	905	199
115	123	105	901	198
118	127	115	901	198
118	127	115	903	199
119	128	108	900	202
117	119	114	897	198
117	119	114	897	198
117	119	114	902	199
115	123	112	892	197
119	128	114	905	200
116	125	113	905	200
116	125	113	881	197
117	125	108	893	198
115	121	109	886	196
115	121	109	904	200
116	120	108	899	199
120	124	108	899	199
114	122	108	895	197
114	123	111	890	200
114	123	111	906	200
119	128	114	906	200

h. Minyak Goreng Sawit 1x setelah digunakan menggoreng tahu

Red	Green	Blue	Turb	Bau
0	0	0	0	0
74	83	76	806	153
70	76	69	798	148
68	76	71	815	145
69	77	72	815	145
71	73	73	802	142
68	70	71	814	146
71	79	72	813	143
69	77	72	799	140
71	79	73	795	140
68	75	70	798	140
68	76	70	807	144
64	79	73	807	144
71	77	70	804	143
68	76	70	813	143
68	76	70	829	147
68	75	70	818	145
69	75	69	828	147
67	75	69	828	147
62	75	69	828	147
71	79	73	831	149
69	71	71	805	146
69	71	71	807	145
69	77	71	807	145
67	75	70	831	149
70	76	71	811	149
71	77	70	811	149
67	75	69	830	150
72	78	70	832	151
72	78	70	817	151
70	78	72	817	151
69	70	69	820	148

i. Minyak Goreng Sawit 2x setelah digunakan menggoreng tahu

Red	Green	Blue	Turb	Bau
0	0	0	0	0
100	114	111	673	263
101	115	112	901	263
97	111	108	889	255
97	111	108	878	251
94	115	112	873	251
101	115	103	886	248
98	112	109	872	252
100	114	112	869	243
101	116	113	861	244
100	115	112	884	247
102	116	110	877	244
102	116	110	858	244
100	115	109	882	247
108	125	125	880	243
95	111	105	875	242
97	111	102	881	244
94	108	105	878	245
94	108	105	874	243
94	108	105	874	243
98	102	104	850	243
100	114	111	862	239
99	113	111	862	239
99	113	111	863	238
95	108	105	876	241
100	114	110	862	237
100	114	110	876	241
94	108	105	881	240
100	105	104	875	242
101	115	109	875	242
101	115	109	862	234
97	110	108	882	241

j. Minyak Goreng Sawit 3x setelah digunakan menggoreng tahu

Red	Green	Blue	Turb	Bau
0	0	0	0	0
107	116	110	917	169
103	110	112	894	198
103	113	106	916	205
103	112	106	914	209
100	113	107	903	204
100	113	107	903	204
98	105	107	907	202
98	111	106	908	202
100	107	108	898	199
100	107	108	898	199
102	109	110	892	197
100	114	109	894	195
100	113	108	896	195
97	109	105	912	198
98	111	106	907	195
102	116	109	894	193
102	116	109	894	193
96	116	111	894	189
102	116	110	893	188
102	116	110	893	188
100	114	109	908	188
103	117	111	898	186
103	117	111	898	186
104	113	113	900	185
107	117	116	894	186
102	118	111	912	187
102	118	111	912	187
102	118	111	912	187
110	122	113	914	188
107	122	111	901	182
110	125	117	901	186

k. Minyak Goreng Sawit 1x setelah digunakan menggoreng telur

Red	Green	Blue	Turb	Bau
87	94	82	894	216
81	89	80	898	214
81	89	80	898	214
84	93	84	884	205
83	92	77	888	197
83	91	82	892	208
83	91	77	890	207
83	91	77	890	207
83	91	77	890	207
83	92	83	887	207
82	85	82	895	209
84	94	85	880	199
84	94	85	880	199
84	94	85	880	199
84	94	85	880	199
82	91	82	894	210
84	93	78	885	207
78	94	84	882	207
83	90	81	899	203
82	91	82	892	209
86	96	86	875	208
86	96	86	875	208
86	96	86	875	208
85	88	85	880	206
85	94	85	882	207
79	95	86	875	206
83	91	82	892	201
83	91	82	892	201
83	91	82	892	201
87	96	86	874	209
84	93	83	887	199
87	95	83	892	202

1. Minyak Goreng Sawit 2x setelah digunakan menggoreng telur

Red	Green	Blue	Turb	Bau
0	0	0	898	216
88	102	93	898	214
89	102	94	898	214
87	100	92	884	205
89	102	94	888	197
91	105	96	892	208
86	104	94	891	207
87	100	92	890	207
87	100	92	896	207
90	101	91	887	207
90	101	91	898	209
91	105	96	880	199
86	100	92	881	199
83	104	96	881	199
83	104	96	884	199
92	105	95	894	210
87	99	91	885	207
82	103	95	886	207
82	103	95	899	203
91	102	91	892	209
90	104	96	880	208
85	99	91	879	208
89	103	95	880	208
86	104	95	881	206
92	103	92	882	207
86	104	96	875	206
86	104	96	892	201
86	104	96	892	201
91	105	95	892	201
91	103	92	899	209
88	100	91	887	199
83	104	96	892	202
83	104	96	892	202

m. Minyak Goreng Sawit 3x setelah digunakan menggoreng telur

Red	Green	Blue	Turb	Bau
0	0	0	0	0
88	103	98	946	220
89	102	94	941	203
88	105	92	958	207
89	103	94	942	203
91	105	96	932	202
86	106	94	948	207
89	104	96	954	205
90	100	92	955	205
90	105	99	960	206
91	105	99	960	206
91	106	96	935	203
86	107	92	956	204
83	106	99	932	200
91	104	96	932	200
92	106	99	939	204
90	106	94	959	204
90	104	95	938	199
89	107	99	938	199
91	105	94	959	204
90	106	96	933	198
88	107	91	959	204
89	103	95	939	199
88	104	97	934	197
92	103	98	954	203
89	104	96	936	197
88	104	97	936	197
89	105	99	936	197
91	106	95	938	205
91	103	94	955	204
93	104	94	959	202
96	106	96	932	198
99	107	99	932	198

n. Minyak Goreng Sawit 1x setelah digunakan menggoreng tempe

Red	Green	Blue	Turb	Bau
0	0	0	681	155
74	83	77	786	157
77	87	79	862	156
77	87	79	864	156
75	84	78	881	160
75	84	78	864	156
75	83	76	854	157
71	85	76	877	159
71	87	80	878	159
71	87	80	880	159
77	85	76	869	157
74	84	78	869	157
74	83	76	854	157
74	84	77	866	157
77	86	77	863	157
77	87	80	863	157
77	85	77	848	158
76	85	78	848	158
76	85	78	854	156
73	83	76	874	160
73	83	76	874	160
73	83	76	874	160
77	87	74	873	160
74	78	78	852	155
74	84	77	875	160
74	84	77	868	159
77	87	80	868	159
74	83	71	868	159
74	83	71	852	156
76	86	79	852	155
74	83	76	847	155
76	86	80	852	156

o. Minyak Goreng Sawit 2x setelah digunakan menggoreng tempe

Red	Green	Blue	Turb	Bau
80	91	87	887	162
79	89	85	887	162
81	92	88	888	166
81	92	87	890	163
80	89	84	878	163
81	91	88	895	164
83	94	90	895	164
78	89	85	898	164
79	89	85	890	163
79	89	84	884	161
80	91	87	884	161
80	91	87	905	165
83	94	89	895	164
80	91	87	880	161
81	92	88	905	165
81	92	88	905	165
83	95	90	887	162
83	95	90	877	160
81	92	88	905	165
82	84	85	905	165
82	90	85	897	163
82	90	85	883	163
82	91	85	881	161
82	86	89	881	161
80	88	84	888	161
73	89	85	903	163
73	89	85	880	159
73	89	85	880	159
82	93	89	880	159
82	91	88	899	165
82	93	89	900	162
82	92	88	903	163
82	92	89	903	163

p. Minyak Goreng Sawit 3x setelah digunakan menggoreng tempe

Red	Green	Blue	Turb	Bau
84	97	85	0	0
84	97	85	954	210
86	99	91	928	212
83	96	90	932	210
85	92	92	939	207
82	95	90	939	207
82	95	90	953	209
82	94	89	950	209
83	96	91	926	204
85	97	92	926	204
85	97	92	950	207
82	94	88	940	202
83	89	90	953	204
85	99	93	944	201
82	93	88	944	204
82	93	88	928	199
84	97	92	950	203
86	100	94	936	197
74	94	83	936	197
74	94	83	952	200
83	96	90	950	199
87	100	93	950	199
85	99	94	927	193
85	99	94	941	196
84	97	92	945	197
82	95	84	945	197
86	99	94	926	192
86	99	94	947	195
86	99	94	947	195
87	99	90	932	192
83	96	90	949	195
84	96	90	932	191

q. Minyak Goreng Sawit 1x setelah digunakan menggoreng terong

Red	Green	Blue	Turb	Bau
0	0	0	0	0
78	88	81	908	162
75	83	77	903	156
76	85	79	904	159
74	83	77	898	155
73	82	75	904	158
74	83	76	890	153
74	83	76	911	155
68	82	76	920	157
73	81	75	909	157
73	81	75	902	156
73	81	75	900	158
75	81	74	923	162
76	85	78	926	162
75	84	78	921	160
75	84	78	924	160
77	84	76	914	159
76	85	78	923	160
76	85	78	909	158
77	85	71	928	161
74	83	70	901	157
74	82	76	901	157
74	82	76	927	161
76	84	76	902	156
74	82	76	902	156
73	82	75	893	158
73	82	75	919	157
74	83	76	919	157
74	82	76	894	153
76	85	79	908	154
76	85	79	917	156
72	81	75	929	159

r. Minyak Goreng Sawit 2x setelah digunakan menggoreng terong

Red	Green	Blue	Turb	Bau
0	0	0	0	0
85	98	95	889	207
83	96	93	882	233
78	98	94	874	230
78	97	95	874	226
86	99	94	881	225
86	100	96	878	222
82	89	92	878	222
80	93	90	883	219
82	95	92	880	221
83	97	94	880	219
77	97	94	883	219
84	90	91	864	218
85	96	90	864	211
80	93	90	878	211
74	92	90	883	211
81	94	91	872	214
80	87	90	872	207
82	95	92	872	207
82	93	89	882	211
83	97	94	867	207
84	97	94	867	207
83	94	89	867	207
83	97	93	883	209
83	97	93	873	205
79	99	96	883	205
84	96	91	883	205
84	96	91	883	202
85	98	96	874	203
83	95	92	862	199
81	94	91	868	199
83	94	89	868	202
80	92	89	868	202

s. Minyak Goreng 3x setelah digunakan menggoreng terong

Red	Green	Blue	Turb	Bau
0	0	0	0	0
114	130	117	925	236
102	116	111	938	251
102	112	113	924	249
102	112	113	931	249
101	116	112	944	250
101	116	112	936	254
101	116	112	936	254
104	117	111	938	254
99	116	112	949	251
99	116	112	944	251
102	116	111	944	249
98	120	116	950	242
98	120	116	923	242
101	116	106	928	250
103	116	111	928	252
102	112	113	945	246
102	112	113	922	246
96	118	114	922	236
95	115	112	933	240
103	119	115	938	235
103	119	115	941	235
103	119	115	941	235
103	116	111	943	241
106	115	114	940	241
101	115	111	944	240
101	115	111	944	240
101	115	111	934	240
102	117	113	942	237
105	114	117	923	236
103	118	115	923	235
103	118	115	948	235
103	118	115	948	235