**01 Matlab Code**

1. **Scale Function**

설명 : 스케일 변환을 도와주는 함수

% Scaling transformation function

function y = Scale(x, max\_value, min\_value) %x is image matrix

y = (255/(max\_value-min\_value)\*(x-min\_value));

end

1. **Making LPF Mask Function**

설명 : 반지름 50의 LPF를 만드는 함수

function y = LPF\_Round(s,r) % Making LPF Mask function, s is size of image and r is radius

Sx = s(1);

Sy = s(2);

Mx = Sx/2;

My = Sy/2;

for i = 1:Sx

for j = 1:Sy

R = sqrt((i-Mx).^2 + (j-My).^2);

if R > r

y(i,j) = 0;

else

y(i,j) = 1;

end

end

end

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end

end

1. **Main Code**

%%% Robot Vision%%%

%%% Dept. of Electronic Engineering

%%% 201314651 Lee Wonjai

% read the targeted image

IM\_Rose = imread('C:\Users\user\OneDrive\¹ÙÅÁ È­¸é\2019 Æ¯º°, 4ÇÐ³â\4ÇÐ³â 2ÇÐ±â\·Îº¿ºñÀü\Original Images\dipum\_images\_ch02\Fig0206(a)(rose-original).tif');

% Size of Image

S\_Rose = size(IM\_Rose);

%LPF

% Visualizing Test

LFT\_Rose1 = fft2(IM\_Rose);

LFT\_Rose2 = abs(LFT\_Rose1);

LFT\_Rose3 = Scale(LFT\_Rose2, max(max(LFT\_Rose2)), min(min(LFT\_Rose2)));

LFTS\_Rose\_test = fftshift(LFT\_Rose3);

LR\_Mask = LPF\_Round(S\_Rose,50);

LF\_Rose\_test = LFTS\_Rose\_test.\*LR\_Mask;

% Real Mask Filtering in Frequency Domain

LFTS\_Rose = fftshift(LFT\_Rose1);

LF\_Rose = LFTS\_Rose.\*LR\_Mask;

LF\_Rose1 = ifftshift(LF\_Rose);

LPF\_Rose = uint8(ifft2(LF\_Rose1));

%HPF

% Visualizing Test

HFT\_Rose1 = fft2(IM\_Rose);

HFT\_Rose2 = abs(HFT\_Rose1);

HFT\_Rose3 = Scale(HFT\_Rose2, max(max(HFT\_Rose2)), min(min(HFT\_Rose2)));

HFTS\_Rose\_test = fftshift(HFT\_Rose3);

HR\_Mask = HPF\_Round(S\_Rose,50);

HF\_Rose\_test = HFTS\_Rose\_test.\*HR\_Mask;

% Real Mask Filtering in Frequency Domain

HFTS\_Rose = fftshift(HFT\_Rose1);

HF\_Rose = HFTS\_Rose.\*HR\_Mask;

HF\_Rose1 = ifftshift(HF\_Rose);

HPF\_Rose = uint8(ifft2(HF\_Rose1));

figure, imshow(LFTS\_Rose\_test)

figure, imshow(LF\_Rose\_test)

figure, imshow(LPF\_Rose)

figure, imshow(HF\_Rose\_test)

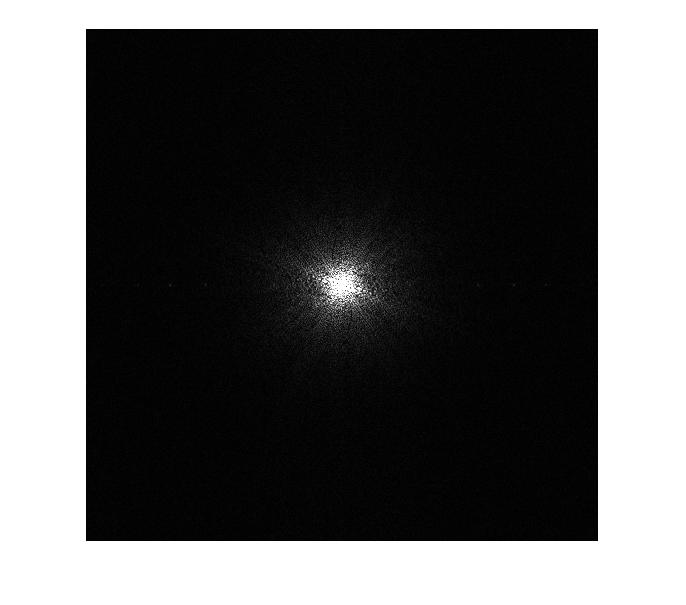
figure, imshow(HPF\_Rose)

**02 Result 1**

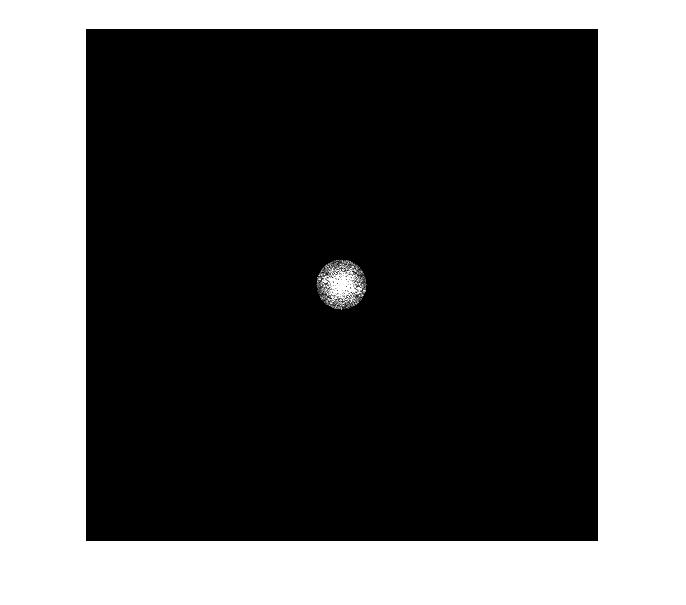
1. **Original Image**

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1. **Frequency Domain of Rose Image**



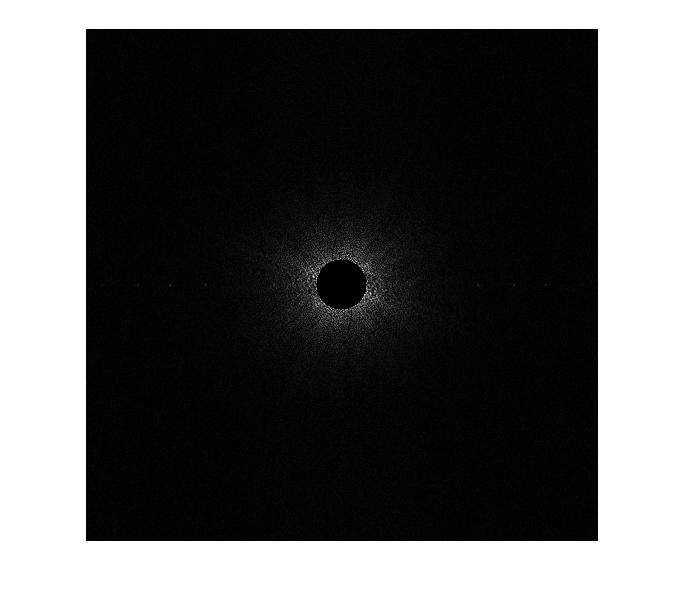
1. **LPF Filtered Rose Image in Frequency Domain**



1. **LPF Filtered Rose Image in Time Domain**



1. **HPF Filtered Rose Image in Frequency Domain**



1. **HPF Filtered Rose Image in Time Domain**



**Conclusion**

1. **Matlab**

* **LPF, HPF** – x2+y2 = r2의 공식을 이용하여 반지름 50의 LPF와 HPF를 구함
* 주의점

1. 이미지의 주파수 대역의 형태를 확인하기 위해서 절댓값을 씌우고, 스케일 변환을 한 후 fftshift 시킨다.
2. 그러나 LPF, HPF등 Mask 계산을 할 때에는 절댓값, 스케일 변환 없이 fftshift를 시킨 후 계산을 하고, 다시 ifftshift시켜 원상복귀를 해줘야 한다.
3. 따라서 코드 작성시 시각화 변수 따로, 실 계산 변수 따로 나눠 계산해야 한다.