

# 단기 교육과정

Matlab Toolbox■ 이용한 Simulink 시뮬레이션

Simulink 블록 설계 및 Toolbox 적용 시뮬레이션

Knowledge-Intelligent Mechatronics Lab.

신승태

일시: 2023년 1월 5~6일

---

# Content

## ■ (1월 ~ 1학기) Mathworks<sup>®</sup> Matlab/Simulink 소개

1. 교육 내용 소개
2. Mathworks 온라인 도움말
3. 자기 주도형 온라인 교육과정 - MATLAB & Simulink

# R2O22b 30일 평가판

The screenshot shows the MathWorks website for the R2022b release. At the top, there's a navigation bar with the MathWorks logo, a search icon, and a user profile icon. Below the navigation bar, a blue header bar says "다운로드". Underneath, there are links for "FAQ", "설치 및 라이선싱 도움말", and "지원 문의". On the left, a "릴리스 선택" sidebar shows "R2022b" is selected. The main content area is titled "R2022b" and "MATLAB 및 Simulink 제품 받기". It states that the evaluation version is valid until January 14, 2023. It advises new users to refer to mathworks.com for documentation. A blue button labeled "Windows용 다운로드 (228 MB)" is prominently displayed. Below it, it says "다음 포함: R2022b Update 2" and "출시 일자: 2022년 11월 11일". In the bottom right corner of the main content area, there are social media icons for YouTube, Facebook, Twitter, LinkedIn, and RSS, along with a link "대화에 참여하기". The footer of the page includes a language selection button for "한국", copyright information for "© 1994-2022 The MathWorks, Inc.", and a footer bar with various links like 신뢰 센터, 등록 상표, 정보 취급 방침, 불법 복제 방지, 애플리케이션 상태, and company details.

차시별 지도계획				
일	차시	교육내용	시간	비고
1 일 차	1 ↳	<ul style="list-style-type: none"> <li>▪ Mathworks사 Matlab/Simulink 소개 ↳           <ul style="list-style-type: none"> <li>- 교육 내용 소개 ↳</li> <li>- Mathworks사 온라인 도움말 ↳</li> <li>- 자기 주도형 온라인 교육과정 - MATLAB &amp; Simulink ↳</li> </ul> </li> </ul>	09:00~09:50 ↳	↳
	2 ↳	<ul style="list-style-type: none"> <li>▪ Matlab 기초 강좌 및 실습 ↳           <ul style="list-style-type: none"> <li>- Matlab 사용법 및 언어 기초 ↳</li> </ul> </li> </ul>	10:00~10:50 ↳	↳
	3 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 시작하기 ↳           <ul style="list-style-type: none"> <li>- Simulink 기초 예제 ↳</li> </ul> </li> </ul>	11:00~11:50 ↳	↳
	점심시간 & 휴식시간			12:00~13:00 ↳
	4 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 시작하기 ↳           <ul style="list-style-type: none"> <li>- Simulink 블록 소개 ↳</li> <li>- PID 제어기 실습 ↳</li> </ul> </li> </ul>	13:00~13:50 ↳	↳
	5 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 기초 실습 - 모델링 #1 ↳           <ul style="list-style-type: none"> <li>- 예제 (Model a System Algorithm) ↳</li> <li>- 예제 (Create Model Components) ↳</li> <li>- 예제 (Manage Signal Lines) ↳</li> </ul> </li> </ul>	14:00~14:50 ↳	↳
	6 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 기초 실습 - 모델링 #2 ↳           <ul style="list-style-type: none"> <li>- 예제 (Manage Model Data) ↳</li> <li>- 예제 (Reuse Model Components from Files) ↳</li> <li>- 예제 (Create Interchangeable Variations of Model Components) ↳</li> </ul> </li> </ul>	15:00~15:50 ↳	↳
	7 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 중급 실습 #1 ↳           <ul style="list-style-type: none"> <li>- Use Control Flow Logic ↳</li> <li>- 사용자 지정 블록 사용 (S-Function, C/C++, Python 연동) ↳</li> </ul> </li> </ul>	16:00~16:50 ↳	↳
	8 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 중급 실습 #2 ↳           <ul style="list-style-type: none"> <li>- 사용자 지정 블록셋 만들기, 구성 및 게시하기 ↳</li> </ul> </li> </ul>	17:00~17:50 ↳	↳
	1 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 중급 실습 #3 ↳           <ul style="list-style-type: none"> <li>- 예제 (투어 오르는 공 시뮬레이션) ↳</li> </ul> </li> </ul>	09:00~09:50 ↳	↳
2 일 차	2 ↳	<ul style="list-style-type: none"> <li>▪ 딥러닝과 강화학습 기초 및 Toolbox 소개 ↳           <ul style="list-style-type: none"> <li>- 딥러닝 소개 ↳</li> <li>- 강화학습 소개 ↳</li> </ul> </li> </ul>	10:00~10:50 ↳	↳
	3 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 고급 실습 #2-1 ↳           <ul style="list-style-type: none"> <li>- 딥러닝 Toolbox와 Simulink를 이용한 이미지 분류 예제 ↳</li> </ul> </li> </ul>	11:00~11:50 ↳	↳
	점심시간 & 휴식시간			12:00~13:00 ↳
	4 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 고급 실습 #2-2 ↳           <ul style="list-style-type: none"> <li>- 딥러닝 Toolbox와 Simulink를 이용한 이미지 분류 예제 ↳</li> </ul> </li> </ul>	13:00~13:50 ↳	↳
	5 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 고급 실습 #2-3 ↳           <ul style="list-style-type: none"> <li>- 딥러닝 Toolbox와 Simulink를 이용한 이미지 분류 예제 ↳</li> </ul> </li> </ul>	14:00~14:50 ↳	↳
	6 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 고급 실습 #3-1 ↳           <ul style="list-style-type: none"> <li>- 강화학습 Toolbox와 Simulink를 이용한 강화학습 예제 ↳</li> </ul> </li> </ul>	15:00~15:50 ↳	↳
	7 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 고급 실습 #3-2 ↳           <ul style="list-style-type: none"> <li>- 강화학습 Toolbox와 Simulink를 이용한 강화학습 예제 ↳</li> </ul> </li> </ul>	16:00~16:50 ↳	↳
	8 ↳	<ul style="list-style-type: none"> <li>▪ Simulink 고급 실습 #3-3 ↳           <ul style="list-style-type: none"> <li>- 강화학습 Toolbox와 Simulink를 이용한 강화학습 예제 ↳</li> </ul> </li> </ul>	17:00~17:50 ↳	↳

# Mathworks 온라인 도움말

The screenshot shows the MathWorks Online Help Center for Simulink. The top navigation bar includes links for 제품 (Products), 솔루션 (Solutions), 아카데미아 (Academia), 지원 (Support) (which is highlighted in blue), 커뮤니티 (Community), and 이벤트 (Events). There are also MATLAB and SS buttons, and a search bar.

The main content area is titled "도움말 센터" (Help Center) and shows the "Simulink" page. The page title is "Simulink" with the "R2022b" badge. It features a brief introduction to Simulink, mentioning its use for model-based design, simulation, and code generation. Below the introduction are several sections: "Simulink 시작하기" (Getting Started), "Simulink 환경 기본 사항" (Basic Environment), "모델링" (Modeling), "시뮬레이션" (Simulation), "프로젝트 관리" (Project Management), "블록 작성 및 시뮬레이션 통합" (Block Creation and Integration), "Simulink에서 지원되는 하드웨어" (Supported Hardware), "물리 모델링" (Physical Modeling), "이벤트 기반 모델링" (Event-Based Modeling), and "실시간 시뮬레이션 및 테스트" (Real-Time Simulation and Testing).

On the right side, there are links for "릴리스 정보" (Release Information) and "PDF 문서" (PDF Document). At the bottom, there is a rating section with five stars and a question "이 페이지가 얼마나 도움이 되었습니까?" (How useful was this page?).

<https://kr.mathworks.com/help/index.html>

# Simulink 모델링에서 지원되는 바로 가기 키 및 마우스 동작

- 링크

[https://kr.mathworks.com/help/simulink/ug/summary-of-mouse-and-keyboard-actions\\_ko\\_KR.html](https://kr.mathworks.com/help/simulink/ug/summary-of-mouse-and-keyboard-actions_ko_KR.html)

The screenshot shows the MathWorks Help Center for Simulink. The left sidebar has a tree view with categories like '문서 홈', 'Simulink', 'Blöcke', 'Simulink', 'Simulink', 'Simulink', 'Simulink 모델링에서 지원되는 바로 가기 키 및 마우스 동작' (highlighted in orange), '이 페이지 내용', '상황별 힌트 패널을 사용하여 바로 가기 키 찾기', '파일 및 클립보드 작업 수행하기', '확대/축소 및 패닝하기', '모델 탐색하기', and '블록 다이어그램 내용 수정하기'. The main content area has tabs for '문서' (selected), '예제', '함수', '블록', '앱', '비디오', and 'Answers'. The title is 'Simulink 모델링에서 지원되는 바로 가기 키 및 마우스 동작'. It includes a note for R2022b: '바로 가기 키와 마우스 동작은 Simulink®에서 시스템을 효율적으로 모델링할 수 있게 해 줍니다. 모델에서 이 페이지를 열려면 Shift+?를 누르거나 탐색 표시줄에서 바로 가기 키 버튼 을 클릭합니다.' A '참고' section notes that on Mac, pressing the Command key instead of Shift+? is required. Below is a table titled '상황별 힌트 패널을 사용하여 바로 가기 키 찾기'.

모드	정의	모드 진입 방법	힌트 패널 보는 방법
선택	화살표 키를 사용하여 다른 블록을 선택합니다.	모델에서 블록을 선택합니다. M 키를 눌러 이동 모드(디폴트)에서 선택 모드로 전환합니다.	선택 모드로 진입하면 이 패널이 표시됩니다.
이동	화살표 키를 사용하여 선택한 블록을 이동합니다.	Simulink를 열면 기본적으로 이동 모드로 설정됩니다. 선택 모드에서 이동 모드로 전환하려면 M 키를 누르십시오.	선택 모드에서 이동 모드로 전환하면 이 패널이 표시됩니다. 이 패널을 숨기려면 캔버스를 클릭합니다.
신호 강조 표시	선택된 블록과 신호 소스 또는 대상 사이의 신호 선을 강조 표시합니다. 포트 값을 표시합니다.	모델에서 신호를 클릭합니다. 줄임표가 나타나면 커서를 올려 놓습니다. 확장되는 둘째 메뉴에서 신호를 소스까지 강조 표시 또는 신호를 대상까지 강조 표시 를 클릭합니다.	신호 강조 표시 모드로 진입하면 이 패널이 표시됩니다.
패닝 및 확대/축소	패닝하면 모델 위에서 뷰가 움직입니다. 확대/축소하면 모델이 가깝게 보이는 정도가 변경됩니다.	Simulink를 열면 기본적으로 패닝 및 확대/축소 모드로 설정됩니다.	스페이스바를 길게 누르면 힌트 패널이 확장됩니다. 패널이 최소화되어 있으면 ? 버튼 이 표시될 때까지 스페이스바를 길게 누릅니다.

# 실습: MathWorks 계정 만들기

The screenshot shows the MathWorks account creation process. At the top, there's a header with the MathWorks logo and the text "MathWorks 계정". Below it, a message says "MathWorks 계정에 로그인하거나 계정을 새로 만드십시오.". The main form is titled "이메일" and contains a "이메일 주소" input field, which is highlighted with a blue border. Below the input field, there are two links: "계정이 없으신가요? 지금 만드세요!" and "로그인하면 개인 정보 취급 방침에 동의하는 것으로 간주됩니다.". A "다음" button is located at the bottom right of the form. In the footer, there are links for "로그인하는 데 문제가 있으신가요?", "자주 묻는 질문(FAQ)", and "궁금한 사항이나 의견이 있는 경우 MathWorks에 사용자 의견을 보내 주십시오.". The footer also includes links for "신뢰 센터", "등록 상표", "정보 취급 방침", "불법 복제 방지", "애플리케이션 상태", "매스웍스코리아 유한회사", "주소", "전화번호", "대표자", "사업자 등록번호", and "연락처". On the right side of the footer, there are social media icons for LinkedIn, Facebook, Twitter, YouTube, and RSS, along with a link "대화에 참여하기".

MathWorks®

MathWorks 계정

MathWorks 계정에 로그인하거나 계정을 새로 만드십시오.

이메일

이메일 주소

계정이 없으신가요? [지금 만드세요!](#)

로그인하면 개인 정보 취급 방침에 동의하는 것으로 간주됩니다.

다음

<https://kr.mathworks.com/login>

로그인하는 데 문제가 있으신가요?

자주 묻는 질문(FAQ)

궁금한 사항이나 의견이 있는 경우 MathWorks에 사용자 의견을 보내 주십시오.

신뢰 센터 | 등록 상표 | 정보 취급 방침 | 불법 복제 방지 | 애플리케이션 상태  
매스웍스코리아 유한회사 | 주소: 서울시 강남구 삼성동 테헤란로 521 파르나스타워 14층 | 전화번호: 02-6006-5100 | 대표자 : 이종민  
| 사업자 등록번호 : 120-86-60062

© 1984-2023 The MathWorks, Inc.

[LinkedIn](#) [Facebook](#) [Twitter](#) [YouTube](#) [LinkedIn](#) [RSS](#)

대화에 참여하기

# 자기 주도형 온라인 교육과정 (부분 무료 강의)

The screenshot shows the MathWorks MATLAB Academy website interface. At the top, there is a header with the MathWorks logo and a navigation bar with links for 'Home' and 'My Courses'. Below the header, a section titled 'Recent Activity' displays a thumbnail for the 'MATLAB Onramp' course, which is currently at 2% completion. A link to 'View all my courses' is also present. To the right of this section, there are links for 'Course sharing | License'.

**내 최근 활동**

**MATLAB Onramp**  
2%

최근 모듈:  
✓ 교육과정 개요 5분 | 100%

» 내 교육과정 모두 보기

**교육과정 공유 | 수료증**

**자기 주도형 온라인 교육과정 살펴보기**

**시작하기 (15)**

- MATLAB (5)
- Simulink (7)
- AI, 머신러닝 및 딥러닝 (5)
- 수학 및 최적화 (6)
- 영상 처리 및 신호 처리 (5)

50여 개의 가상 및 대면 강의실 교육  
과정 살펴보기

**시작하기**

**MATLAB Onramp**  
2%

15개 모듈 | 2시간 | 언어  
MATLAB 프로그래밍 언어의 개요를 무료로 배워보세요.

**Simulink Onramp**  
2%

14개 모듈 | 2시간 | 언어  
Simulink의 기본 사용법을 빠르게 학습합니다.

**Circuit Simulation Onramp**  
2%

7개 모듈 | 2시간 | 언어  
Simscape에서의 전기 회로 시뮬레이션에 대한 기본 사항을 학습합니다.

**Machine Learning Onramp**  
2%

6개 모듈 | 2시간 | 언어

<https://matlabacademy.mathworks.com/kr>

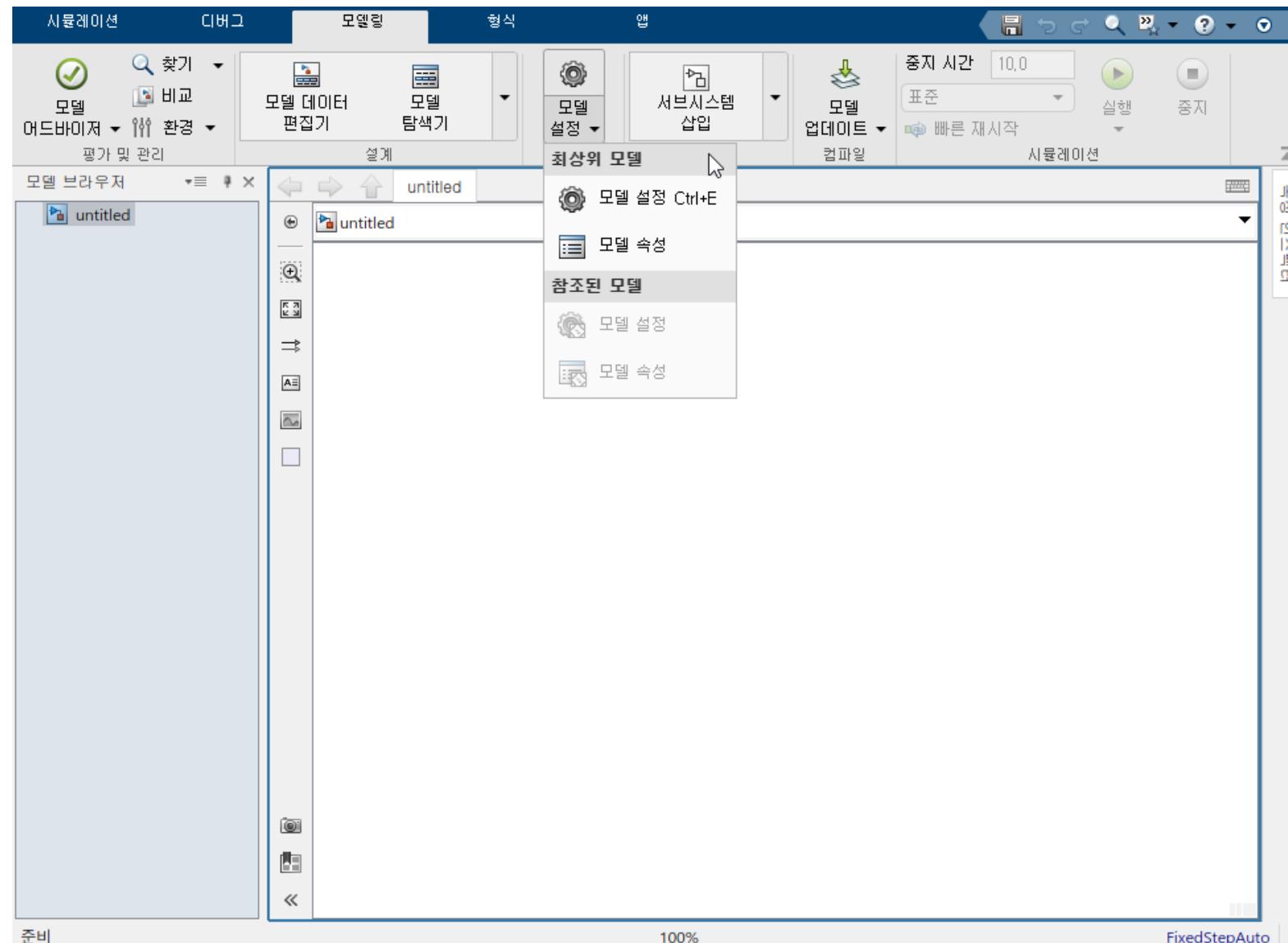
---

# Content

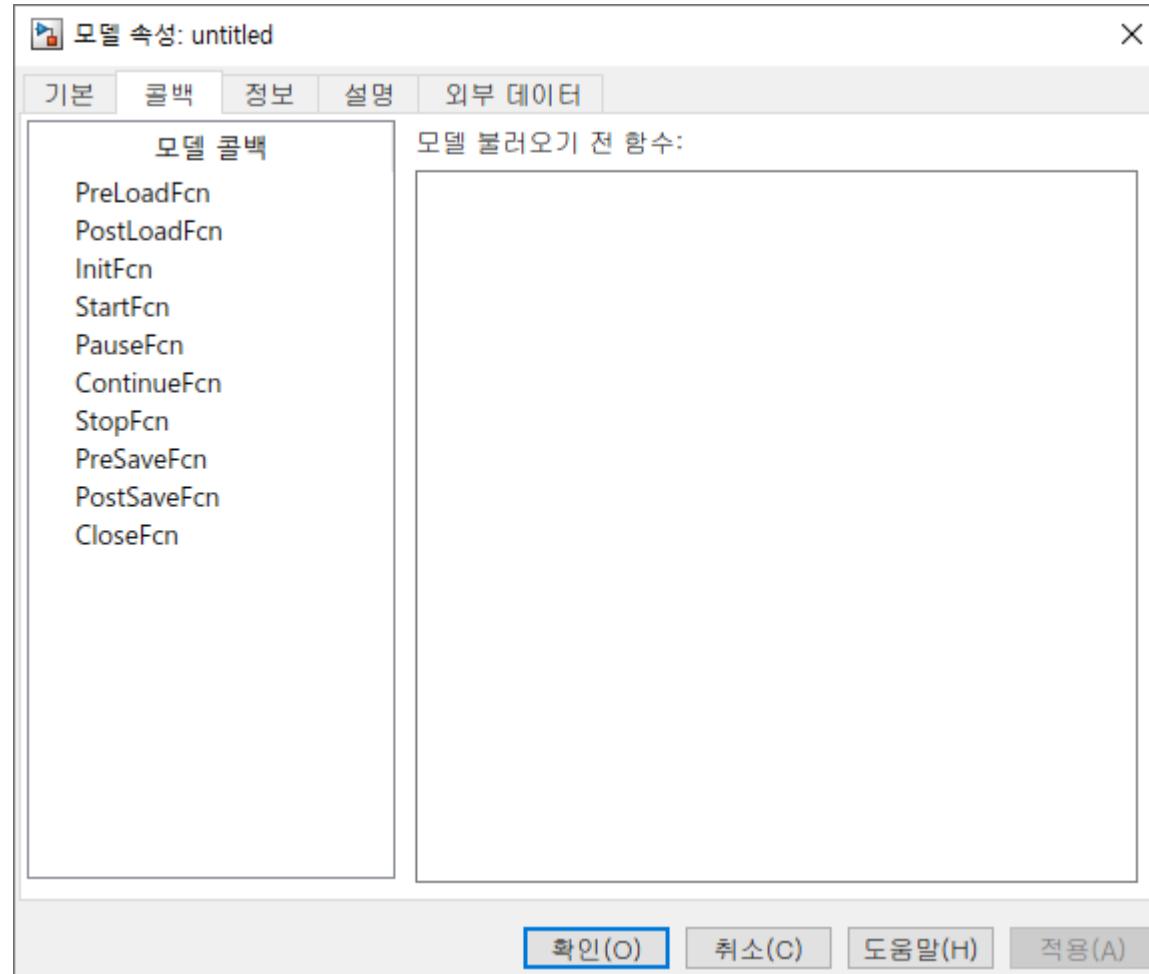
## ■ (1월 - 4차시) Simulink 환경 기본 사용

1. Simulink 개념
2. Simulink 블록 라이브러리 소개

# Simulink 화면

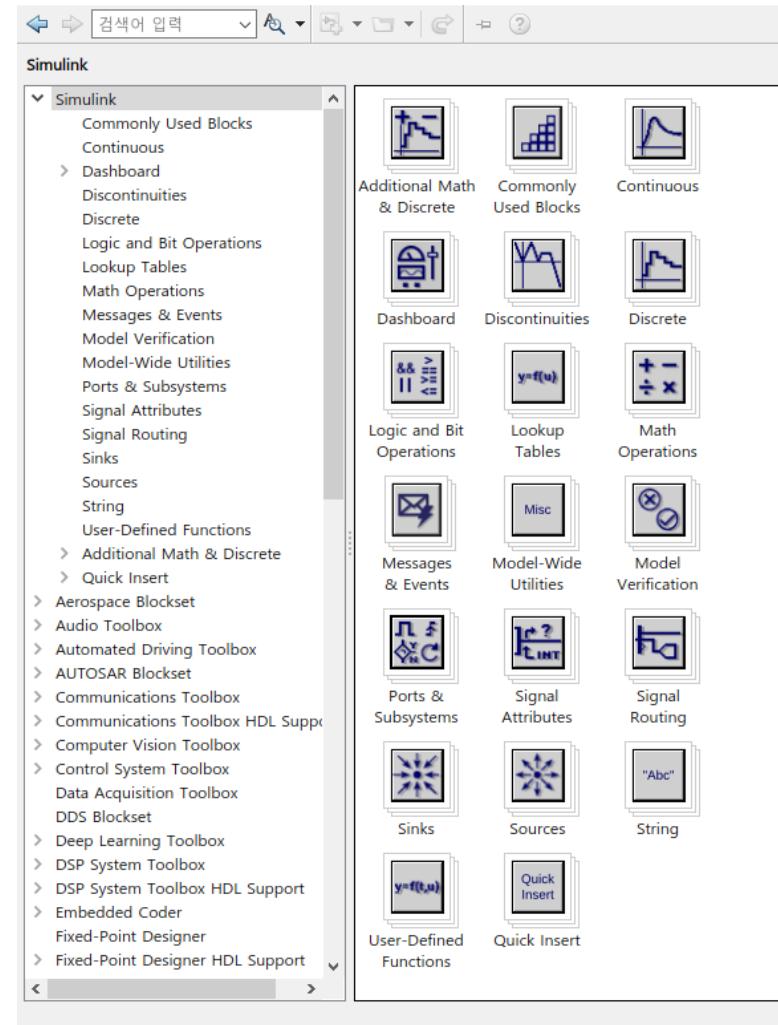


# Simulink 화면 - 속성 (콜백)

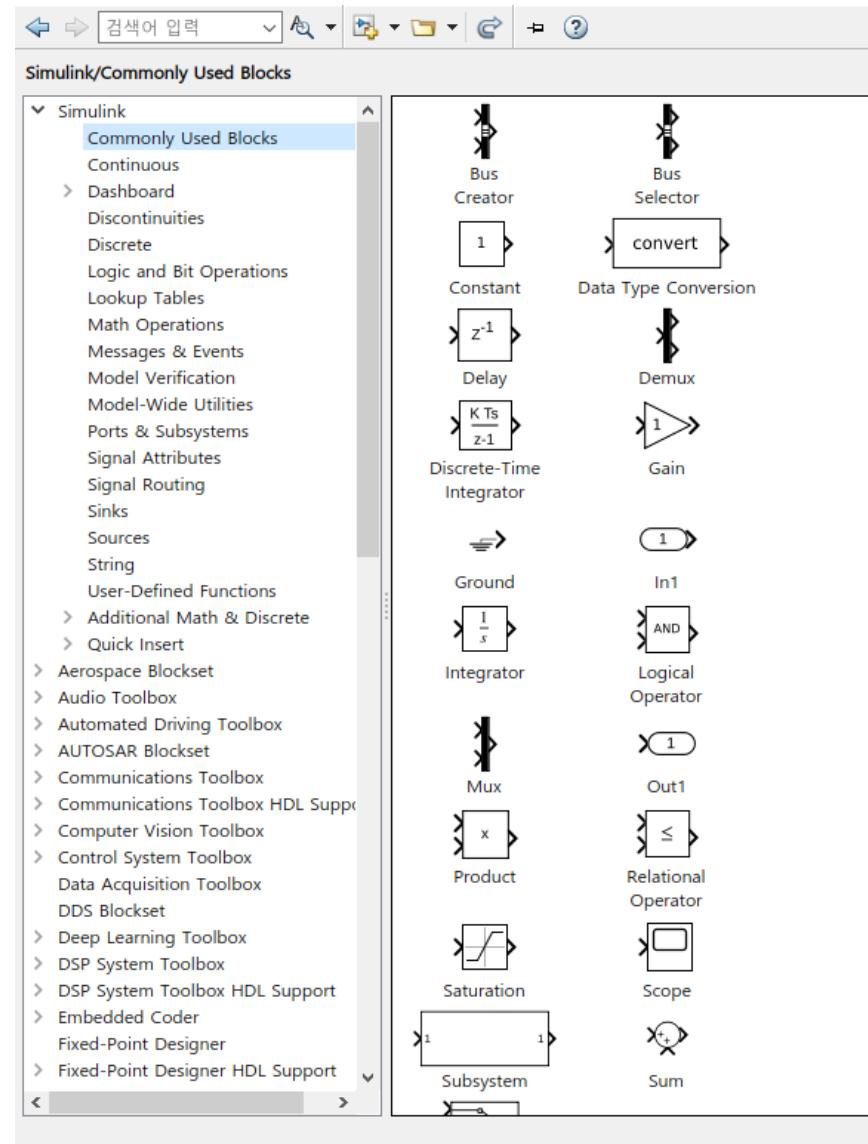


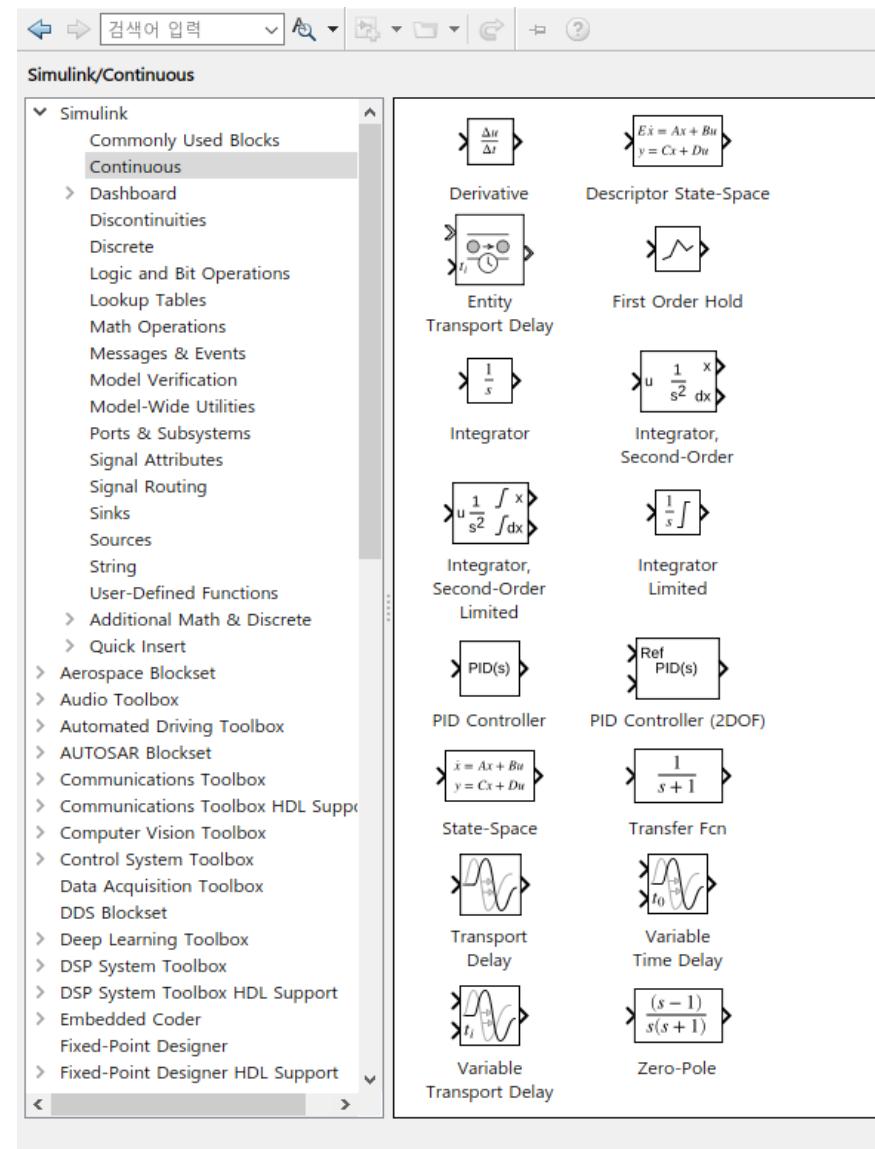
# Simulink 블록 라이브러리 소개

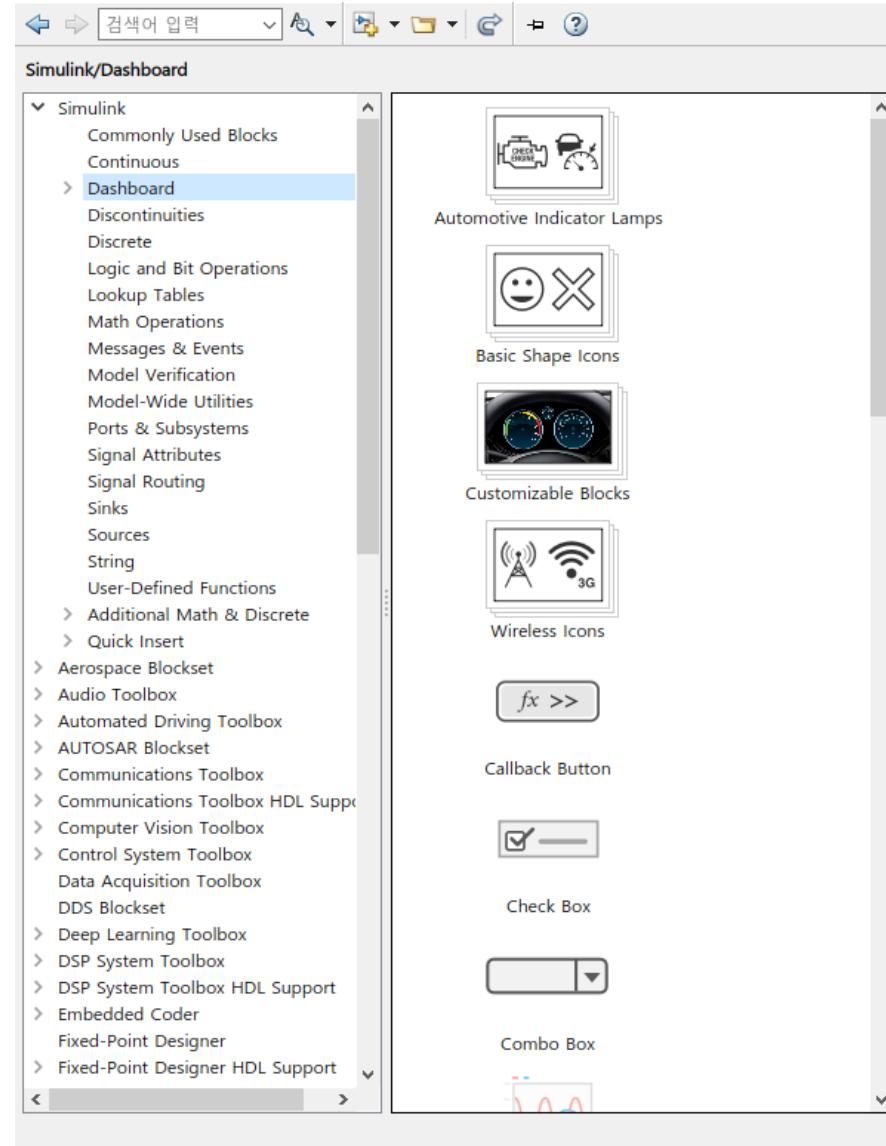
## Simulink 블록 라이브러리

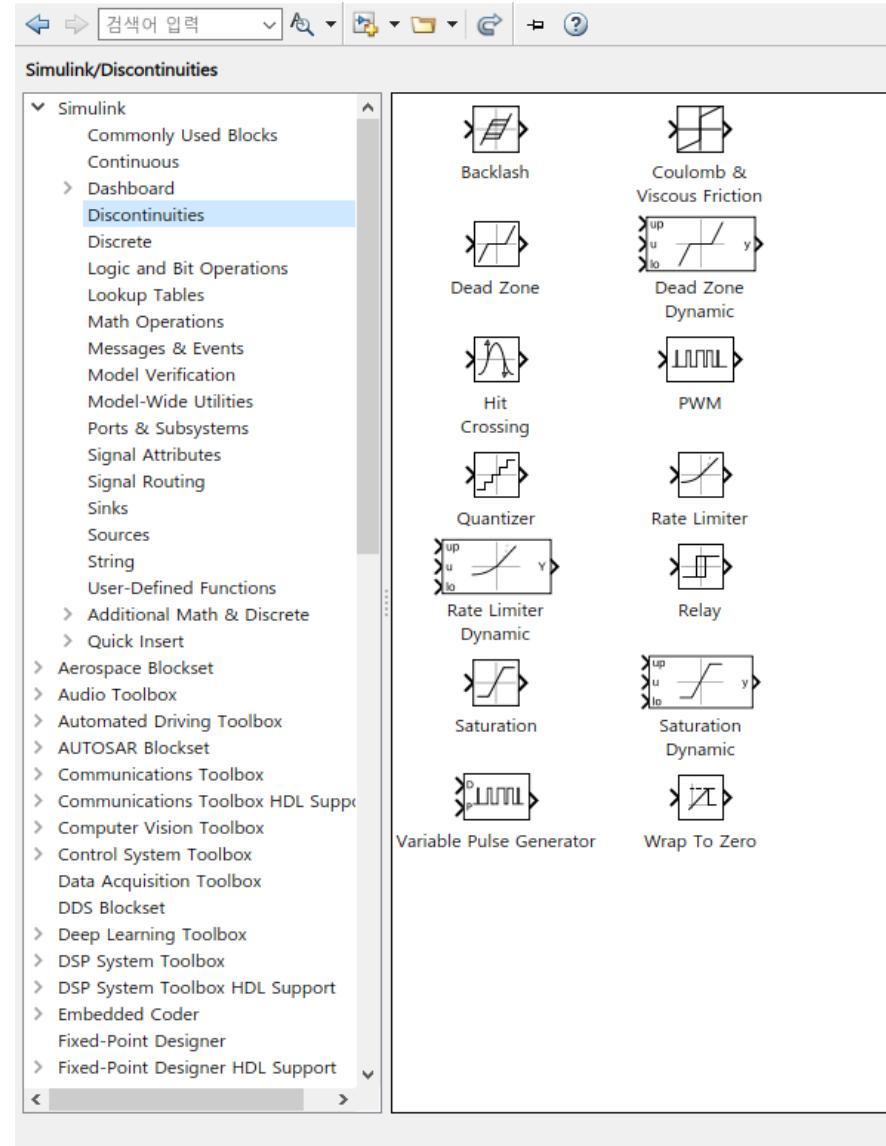


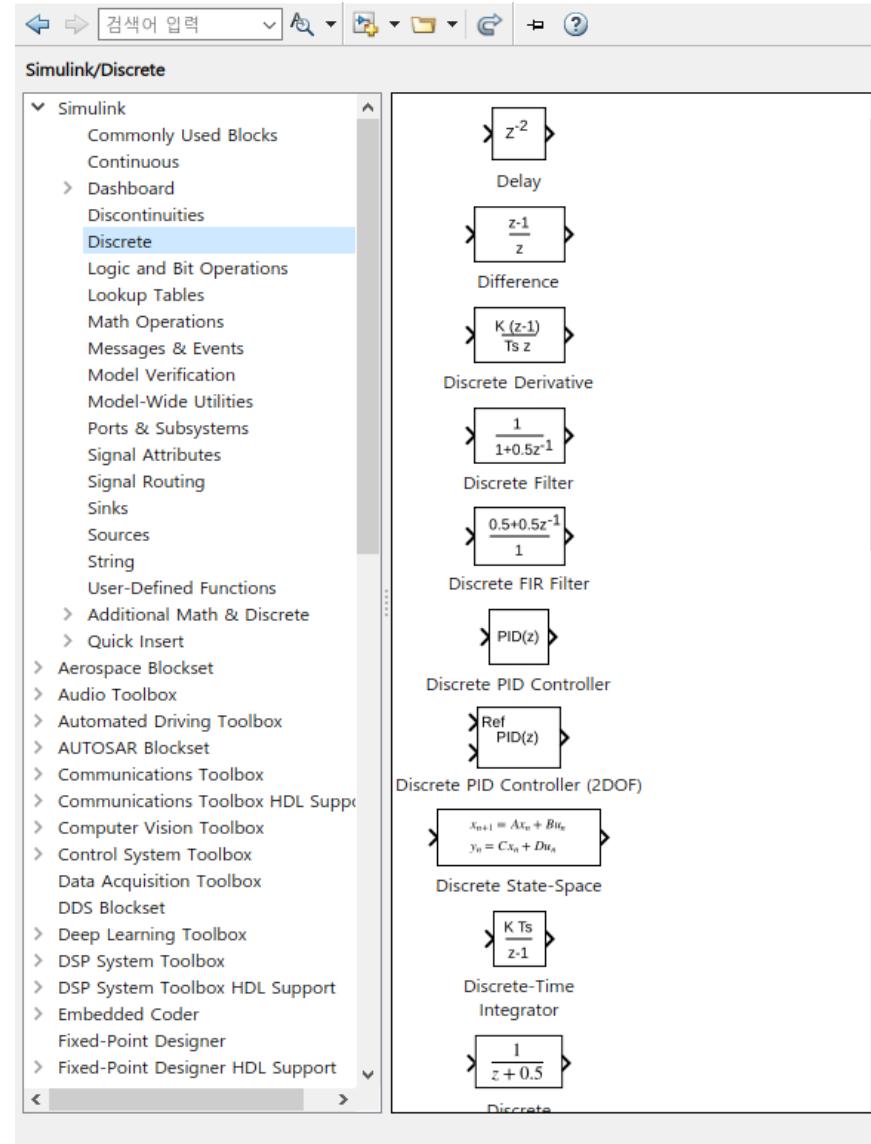
# Simulink 기본 블록

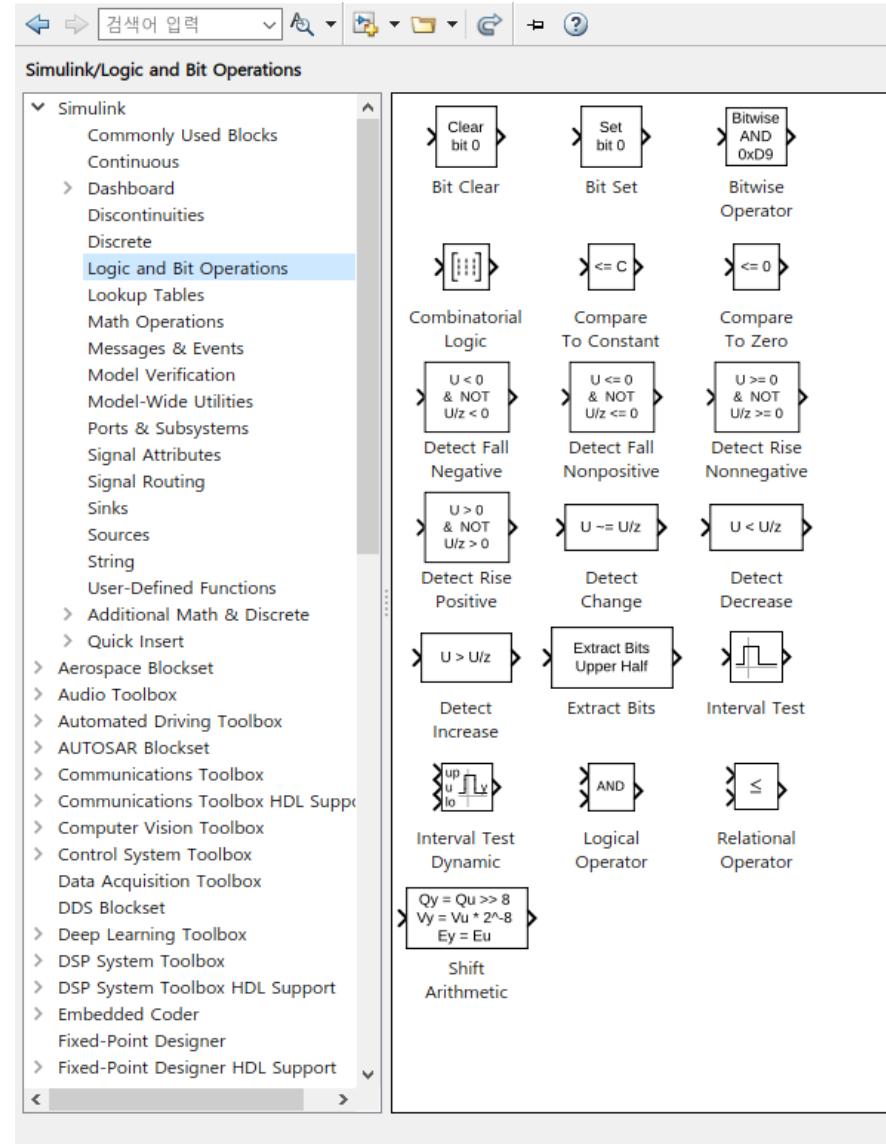


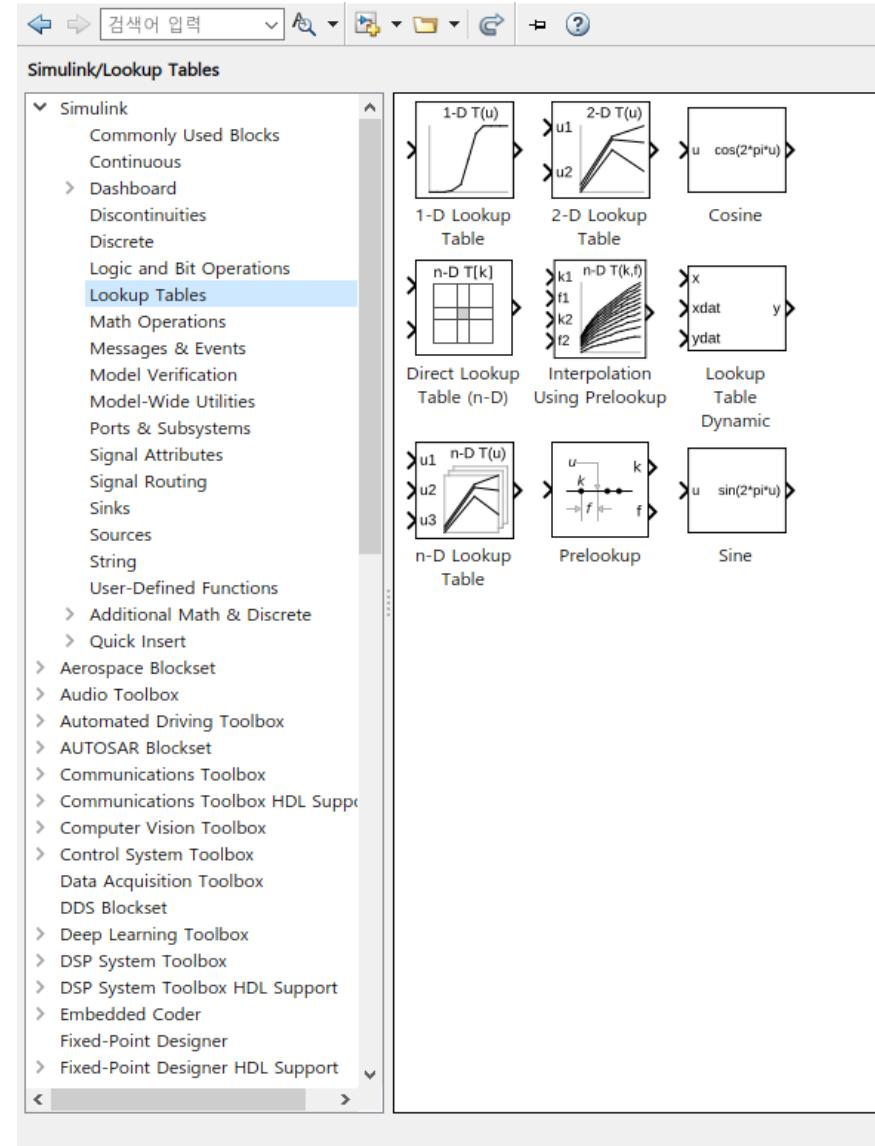


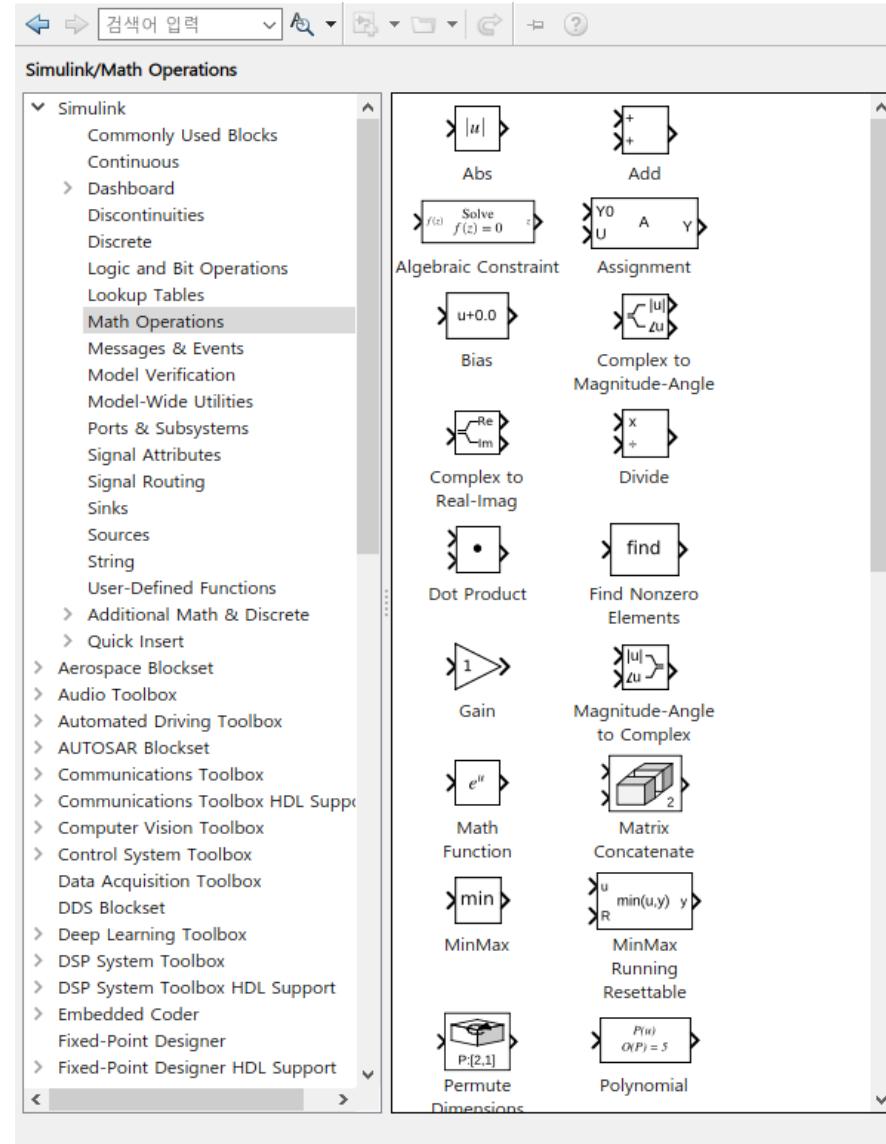


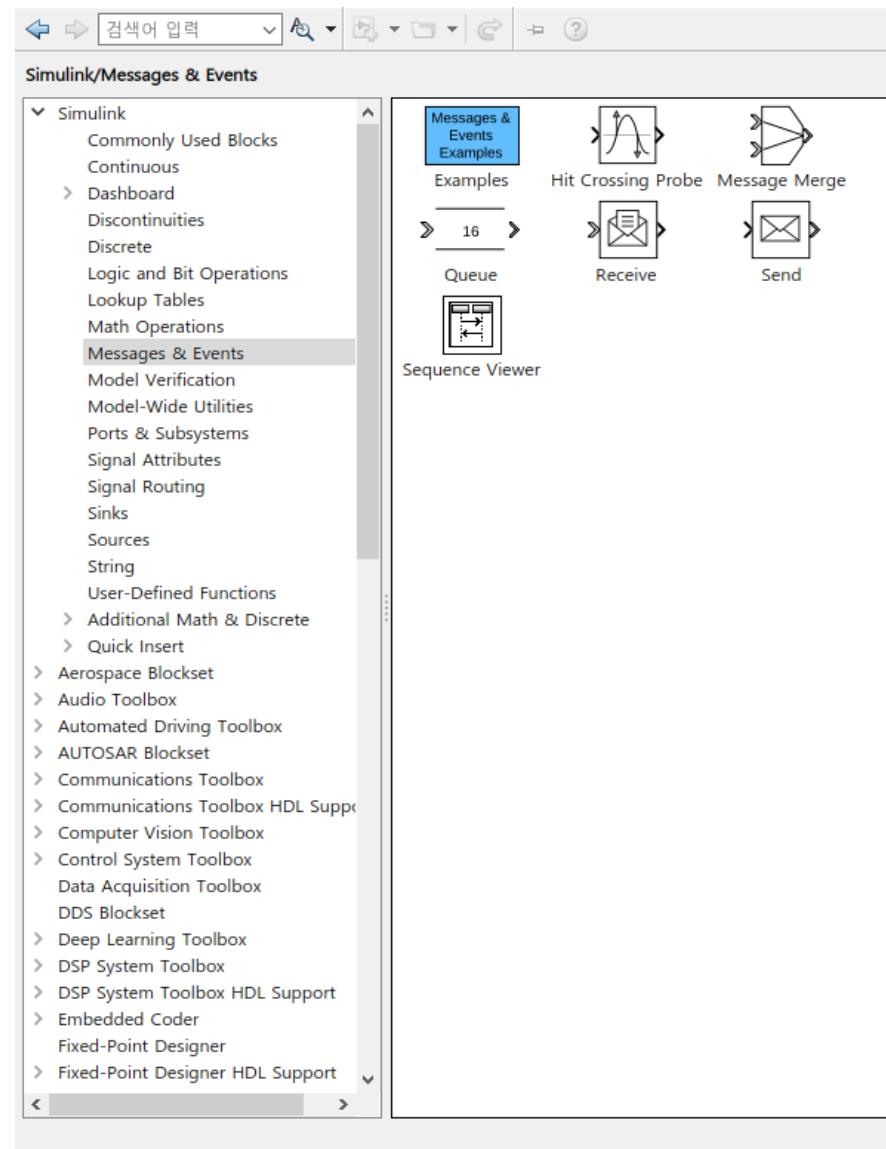


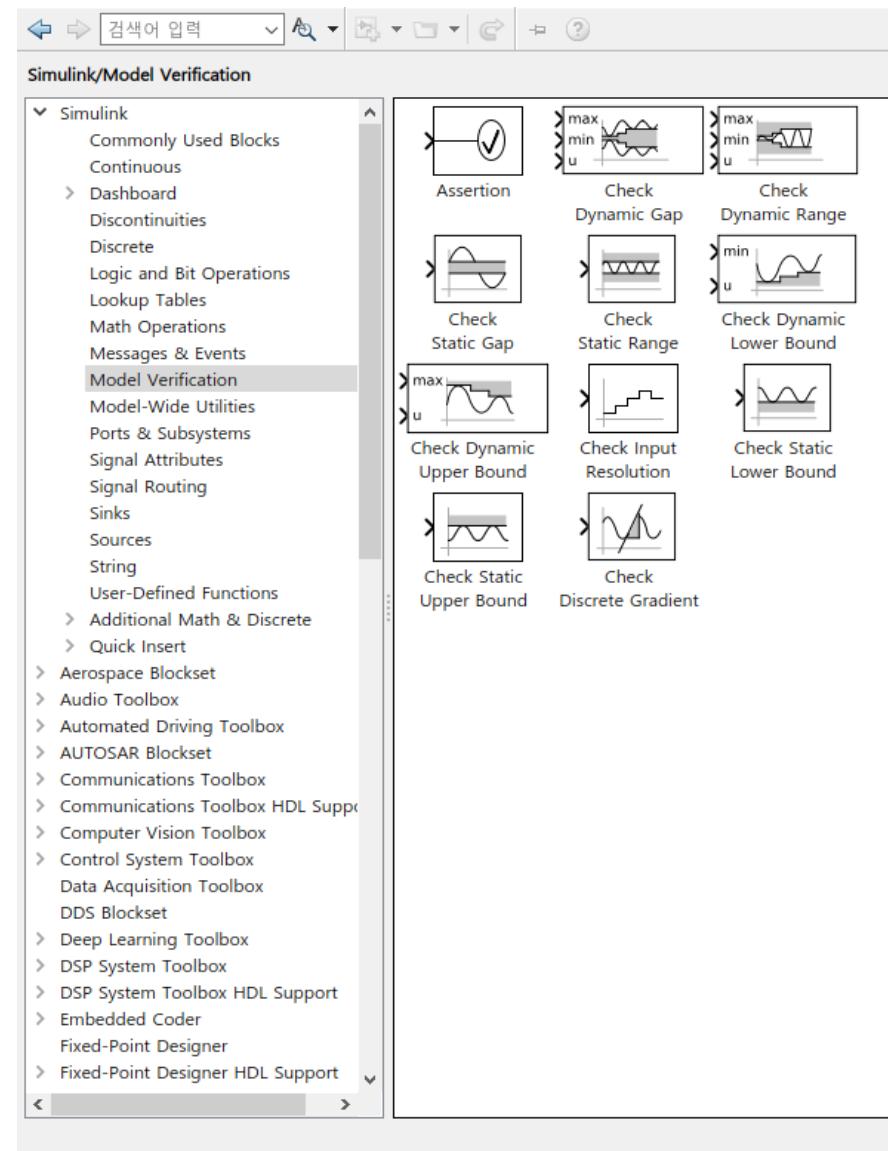


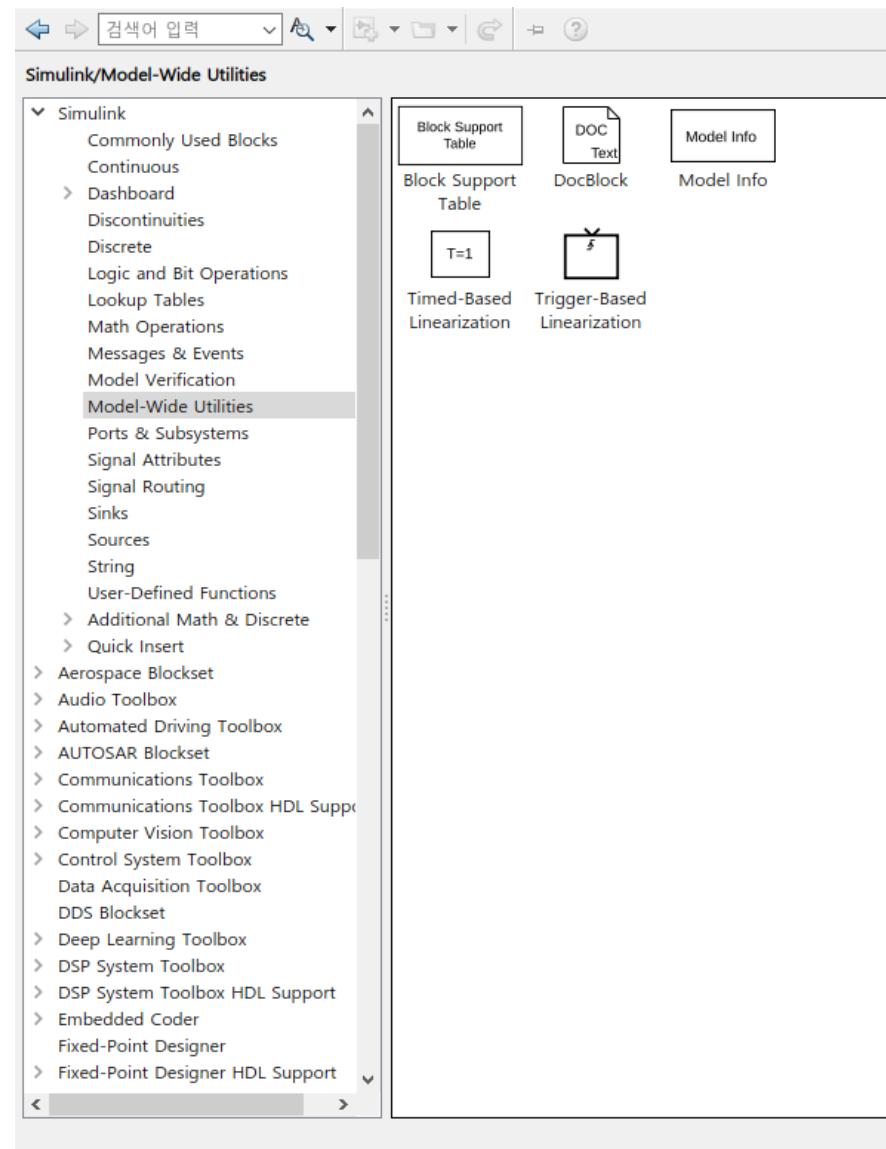


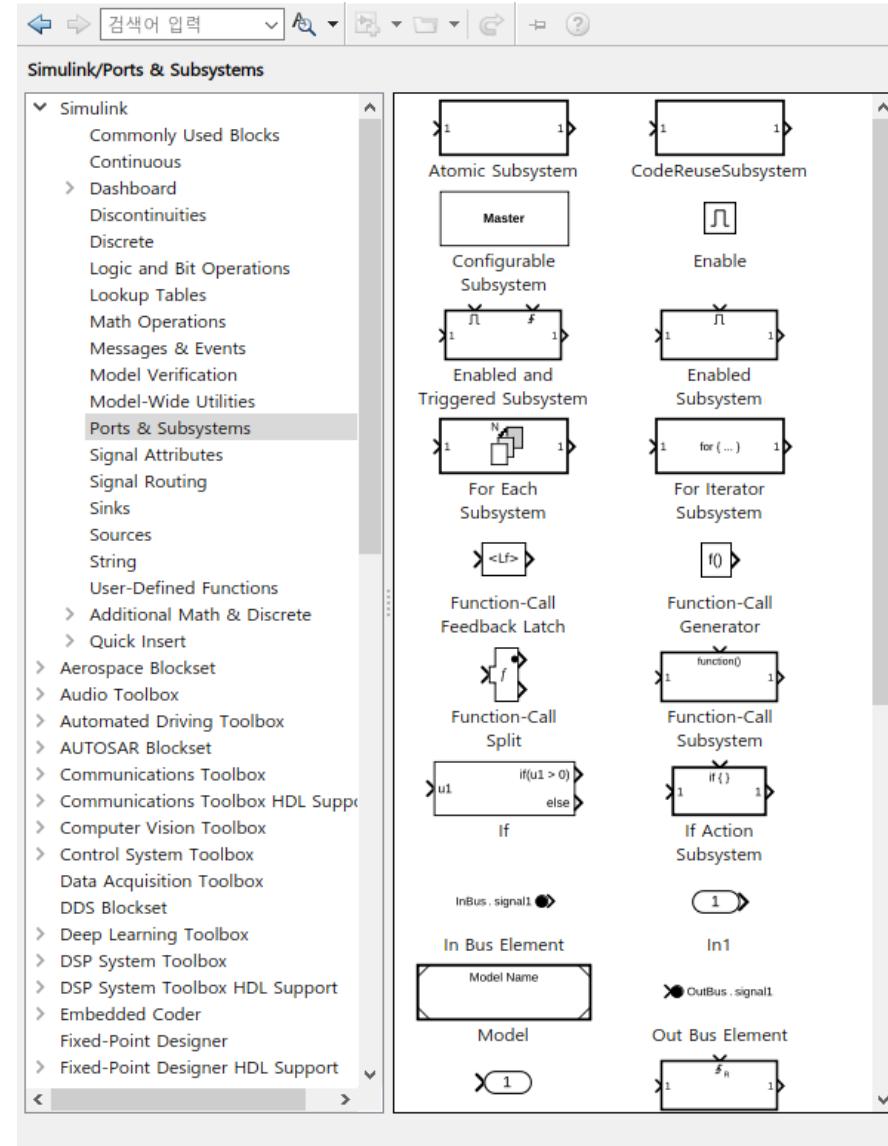


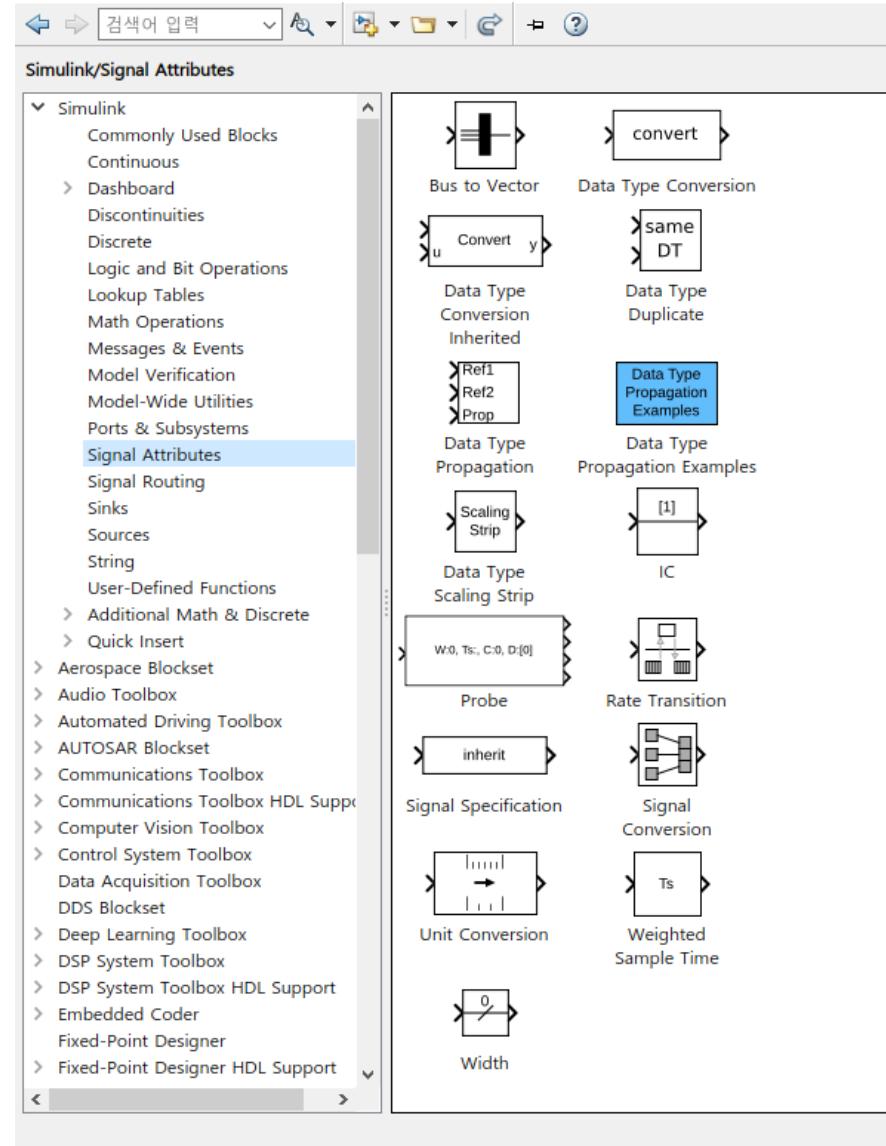


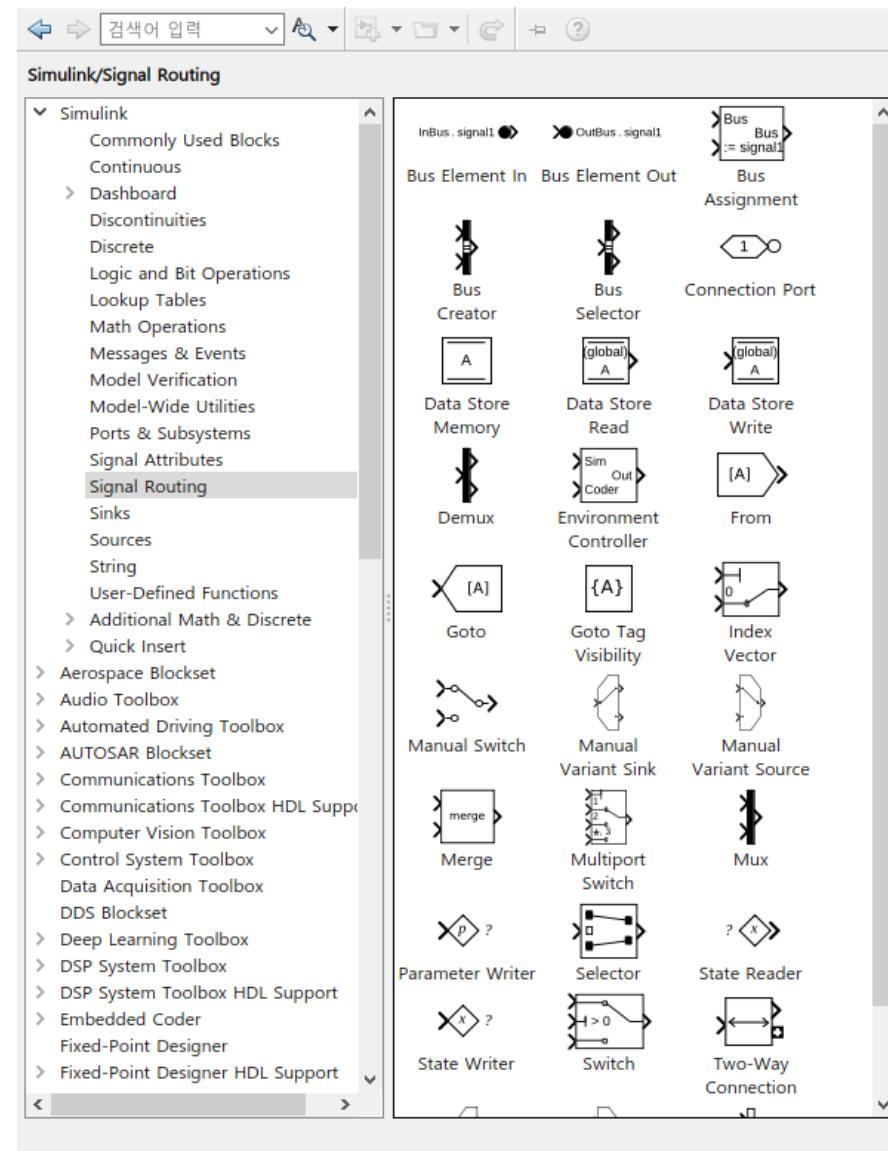


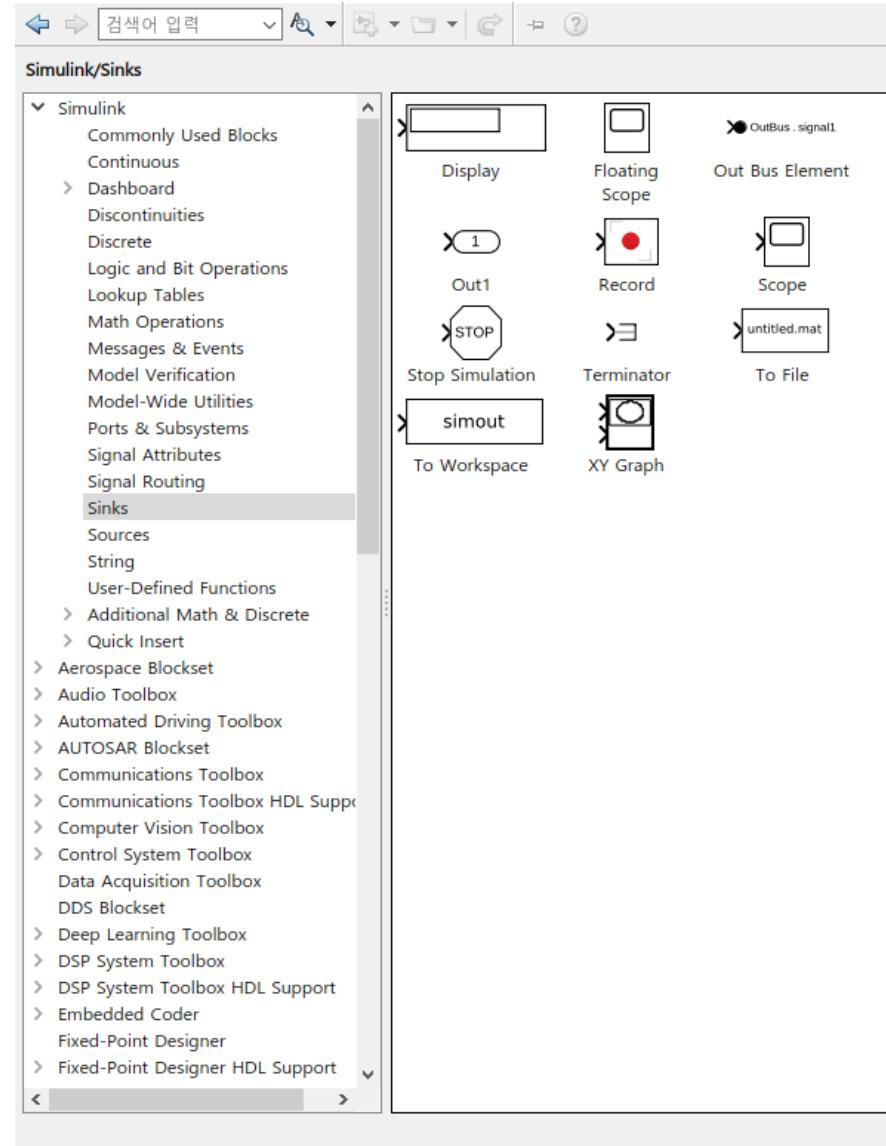


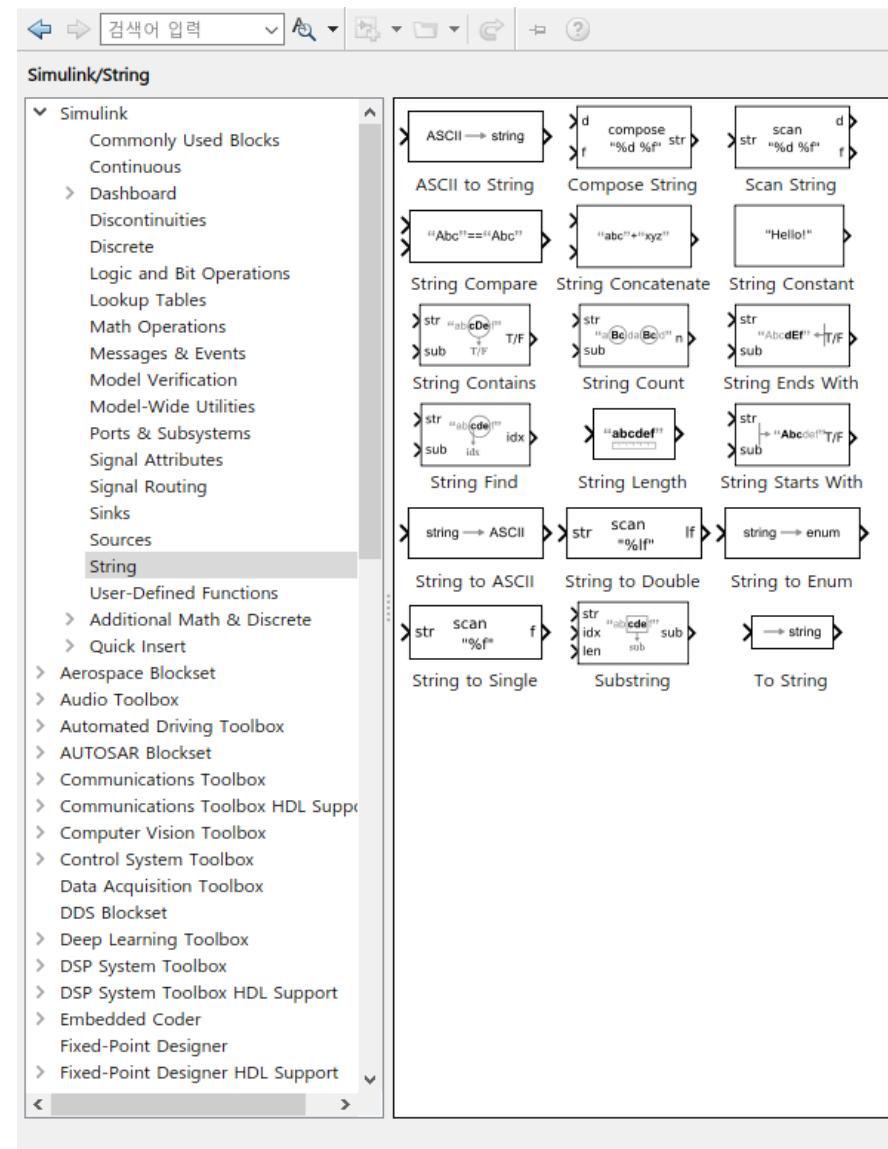


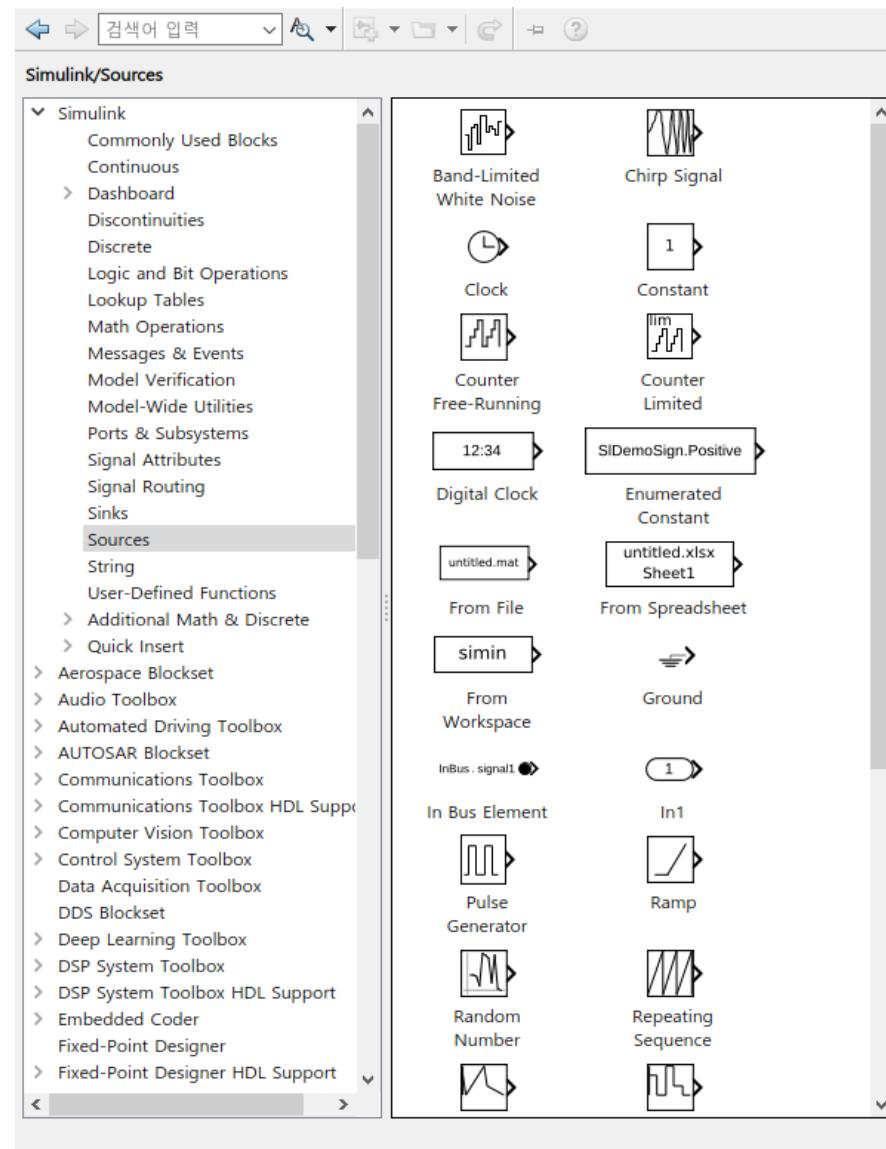


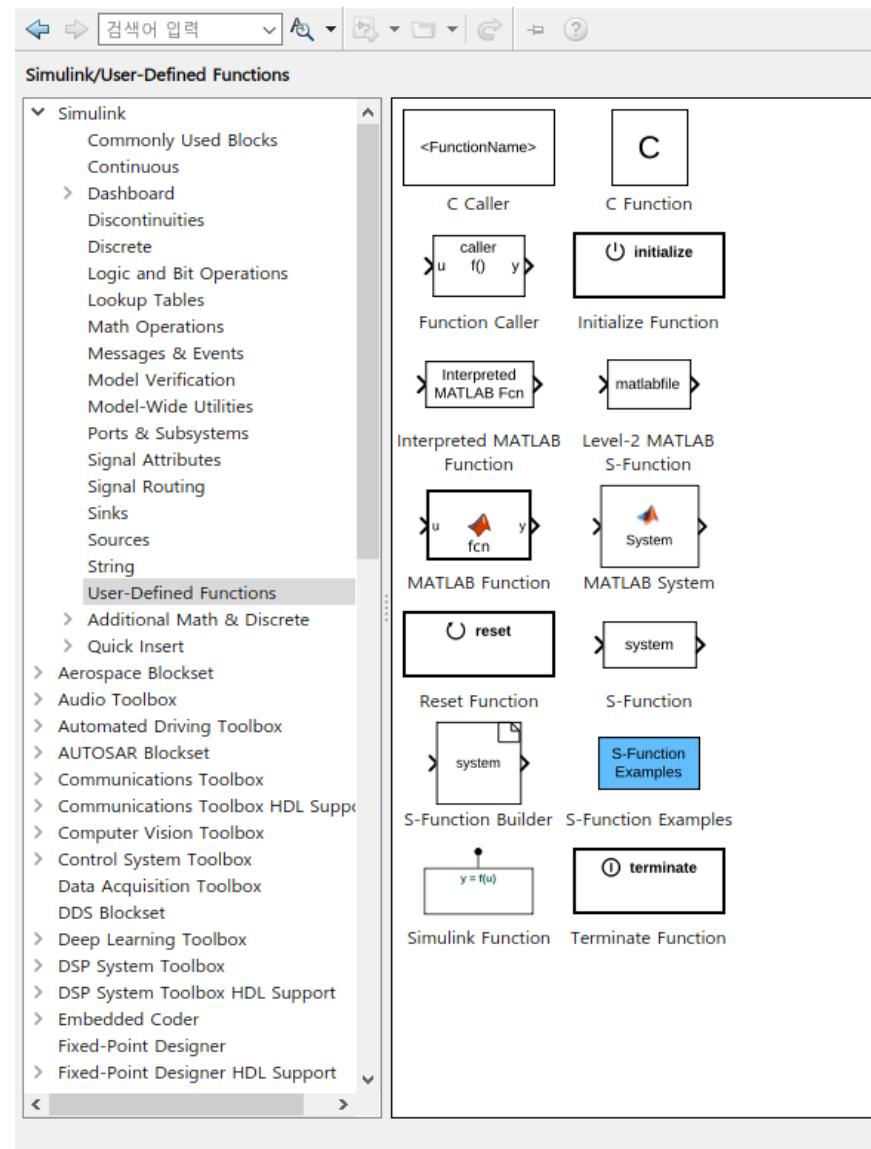






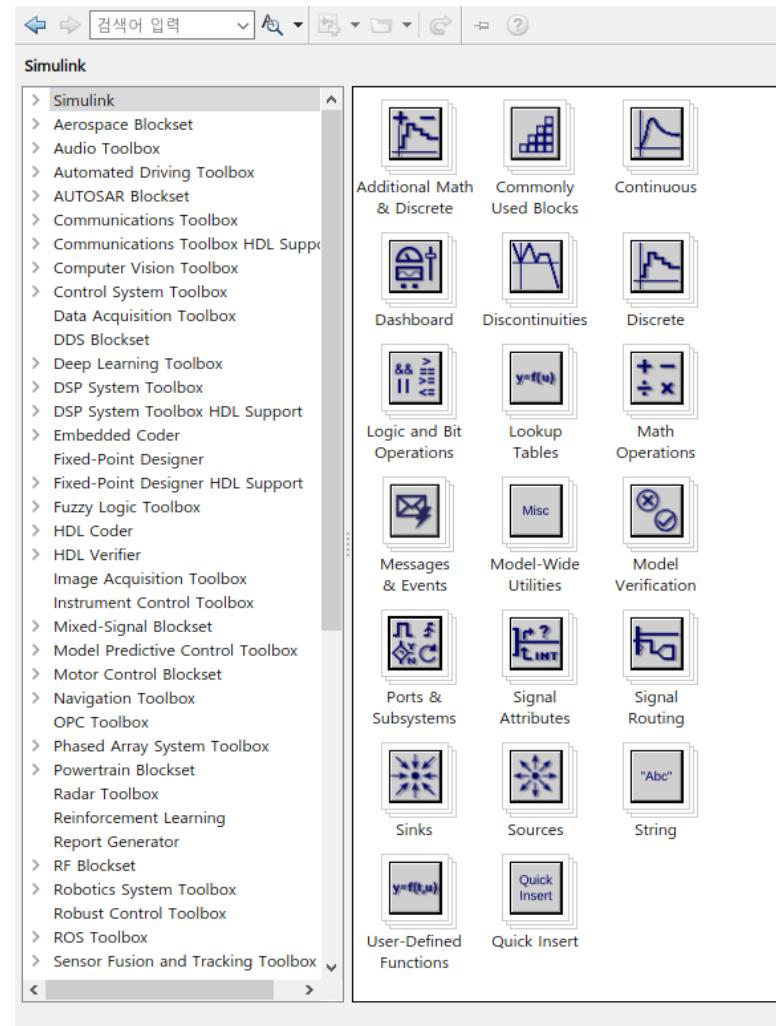




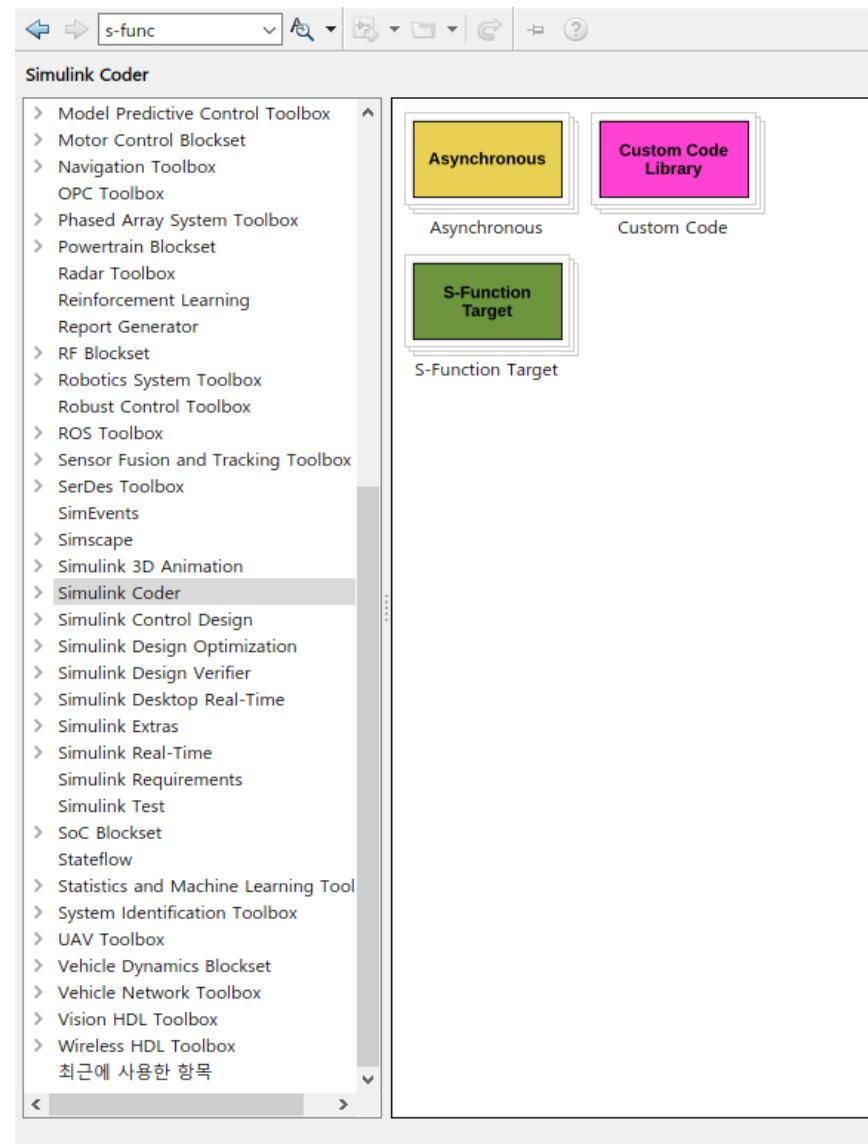


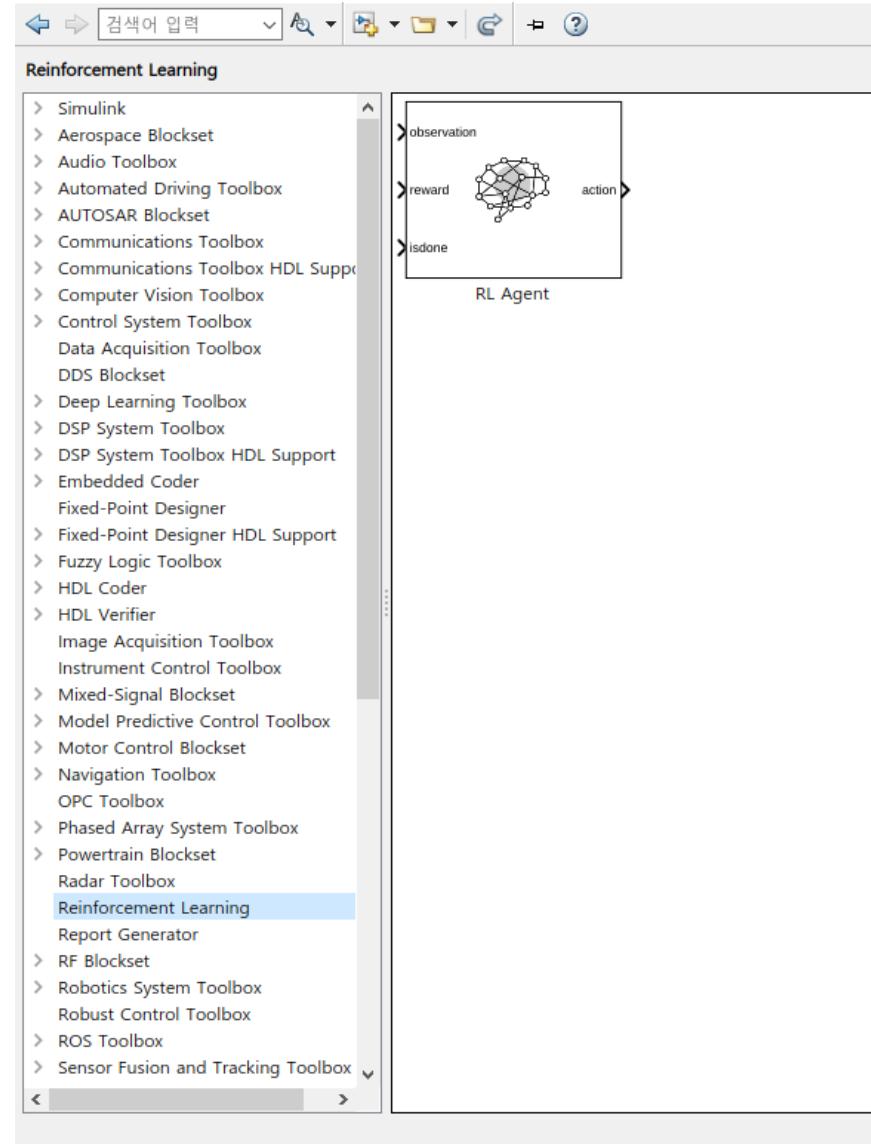
# Simulink 블록 라이브러리 소개

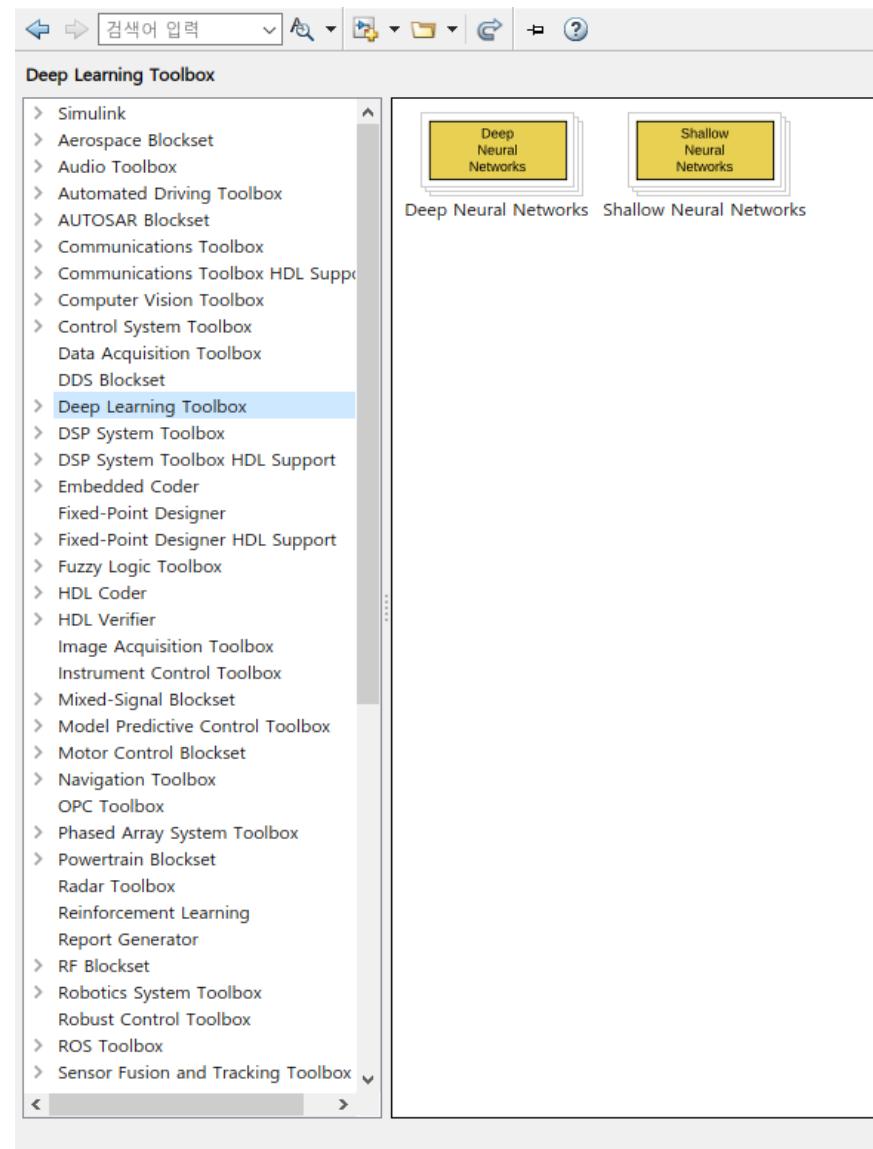
## Simulink 용용 블록

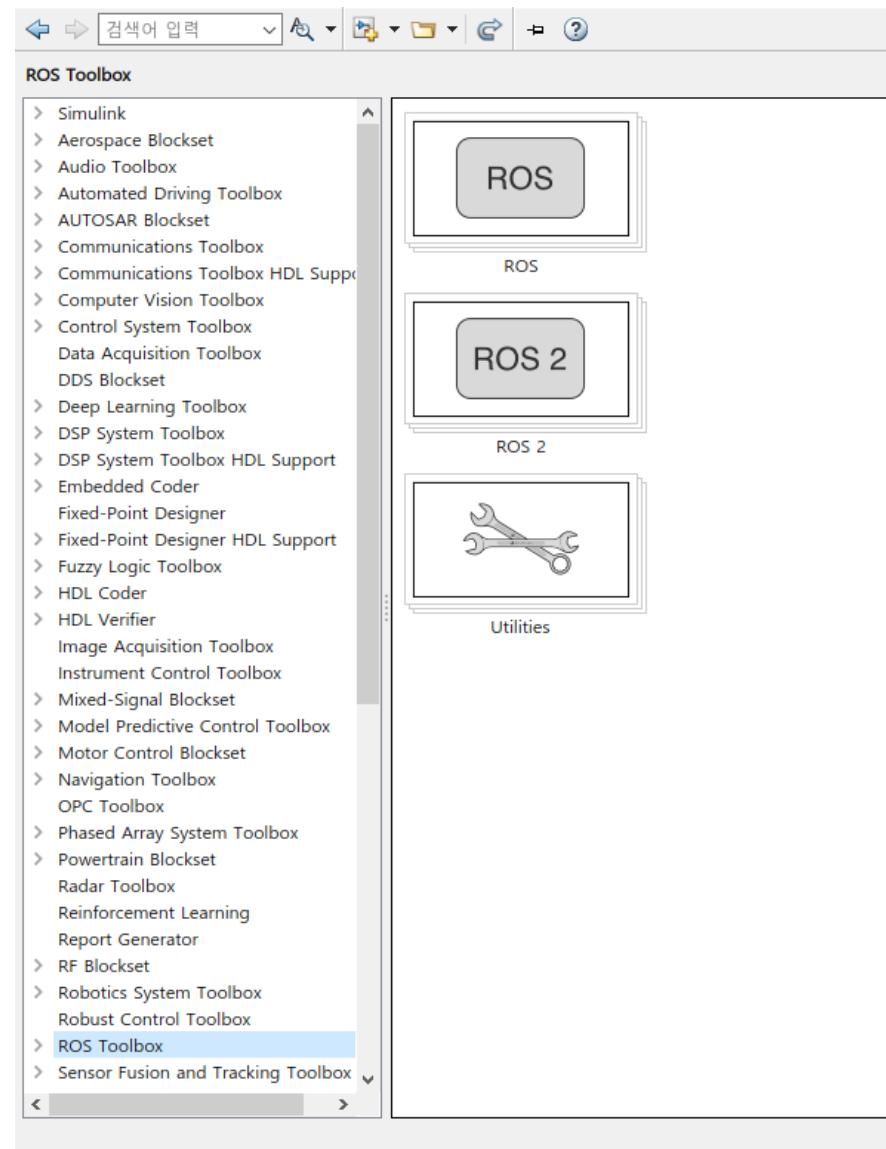


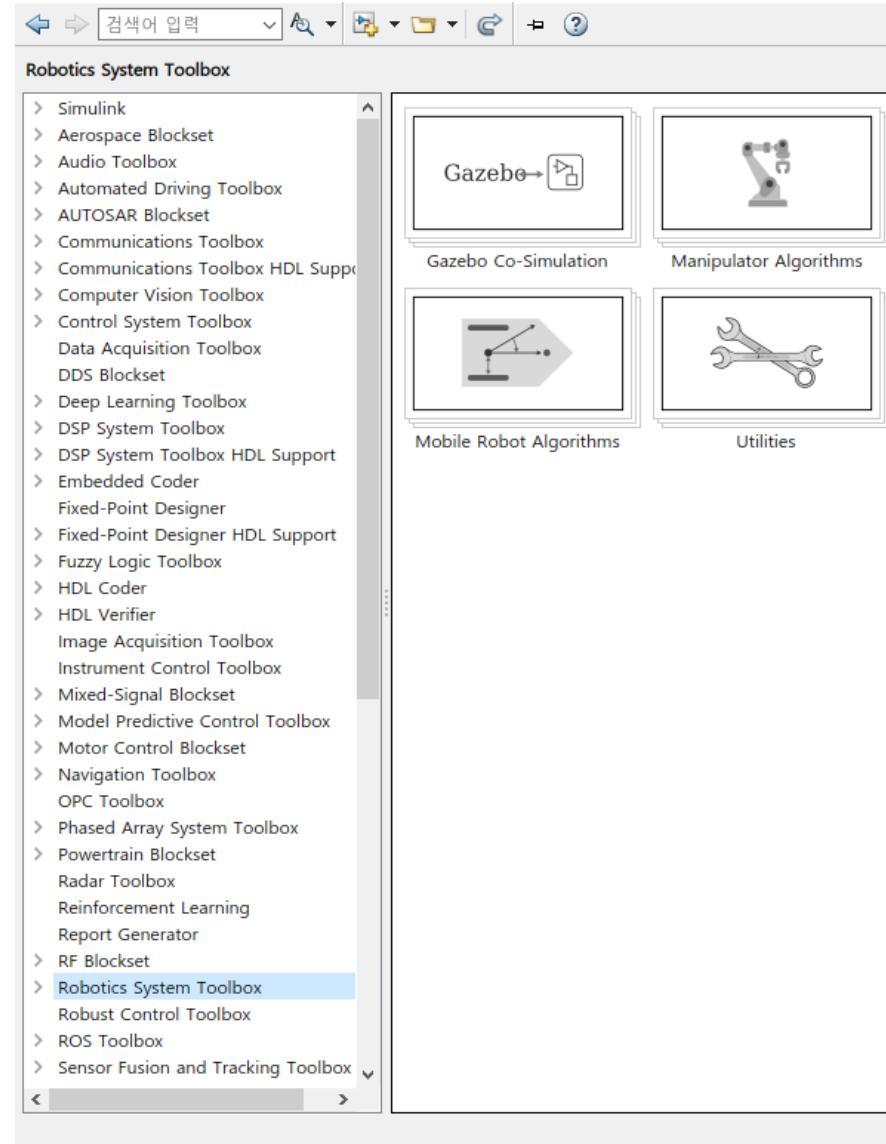
# Simulink 옹용 블록











# 블록 라이브러리 도움말

## • 링크 -

[https://kr.mathworks.com/help/simulink/block-libraries.html?s\\_tid=CRUX\\_lftnav](https://kr.mathworks.com/help/simulink/block-libraries.html?s_tid=CRUX_lftnav)

The screenshot shows the MathWorks Help Center interface for Simulink. The top navigation bar includes links for 제품 (Products), 솔루션 (Solutions), 아카데미아 (Academia), 지원 (Support), 커뮤니티 (Community), and 이벤트 (Events). A MATLAB 버전 (MATLAB Version) indicator shows R2022b. The main header is '도움말 센터' (Help Center). The left sidebar contains a '목차' (Table of Contents) with sections like 문서 홈, Simulink, Simulink 환경 기본 사항, 범주, Simulink 개념, 대화형 방식의 모델 편집, 프로그래밍 방식의 모델 편집, Simulink 환경 사용자 지정, 모델 업그레이드, and 블록 라이브러리. The '블록 라이브러리' section is expanded, showing categories such as Continuous, Dashboard, Discontinuities, Discrete, Logic and Bit Operations, Lookup Tables, Math Operations, Matrix Operations, Messages & Events, Model Verification, Model-Wide Utilities, Ports and Subsystems, Signal Attributes, Signal Routing, Sinks, and Sources. To the right of the sidebar, there is a search bar with '도움말 센터 검색' (Search Help Center) and a '지원' (Support) dropdown menu. Below the sidebar, the main content area displays the '블록 라이브러리' page, which provides an overview of what block libraries are and how they are used in Simulink models. It also lists several specific block types under their respective categories.

# Simulink 기초 사용법



한양대학교  
HANYANG UNIVERSITY

<https://web.yonsei.ac.kr/hgjung/Lectures/PME306/B4.%20Simulink%20%EA%B8%B0%EC%B4%88%20%EC%82%AC%EC%9A%A9%EB%B2%95.pdf>

E-mail: [hgjung@hanyang.ac.kr](mailto:hgjung@hanyang.ac.kr)  
<http://web.yonsei.ac.kr/hgjung>

---

# Content

## ■ Simulink 기초 실습 – 모델링

1. 예제 (Model a System Algorithm)
2. 예제 (Create Model Components)
3. 예제 (Manage Signal Lines)
4. 예제 (Manage Model Data)
5. 예제 (Reuse Model Components from Files)
6. 예제 (Create Interchangeable Variations of Model Components)

# 기본 모델링 워크플로

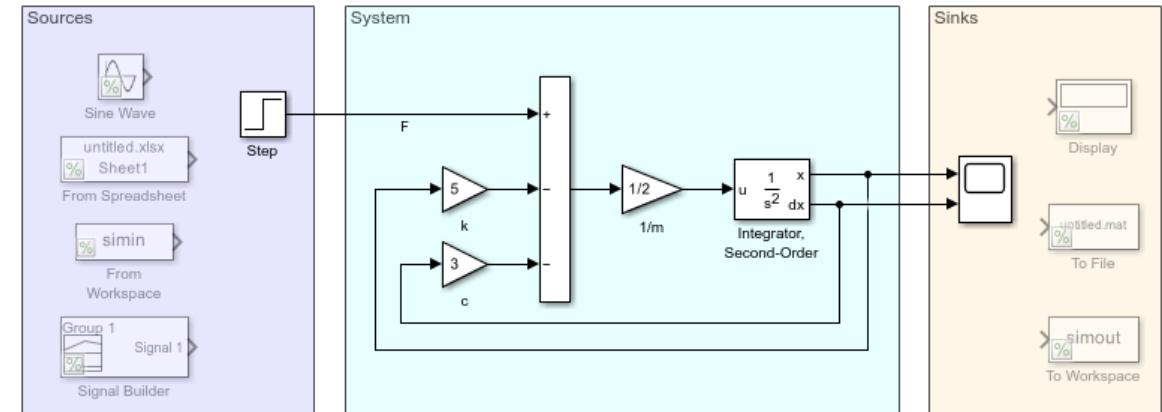
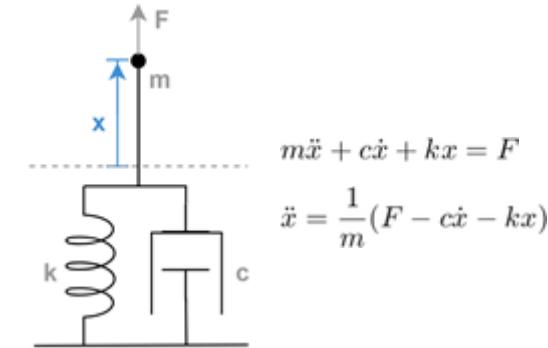
## Model a System Algorithm

- 매트랩 오픈

```
openExample('simulink/ModelBasedDesignSimpleSystemExample')
```

- 링크

[https://kr.mathworks.com/help/simulink/ug/  
model-a-mechanical-system.html](https://kr.mathworks.com/help/simulink/ug/model-a-mechanical-system.html)

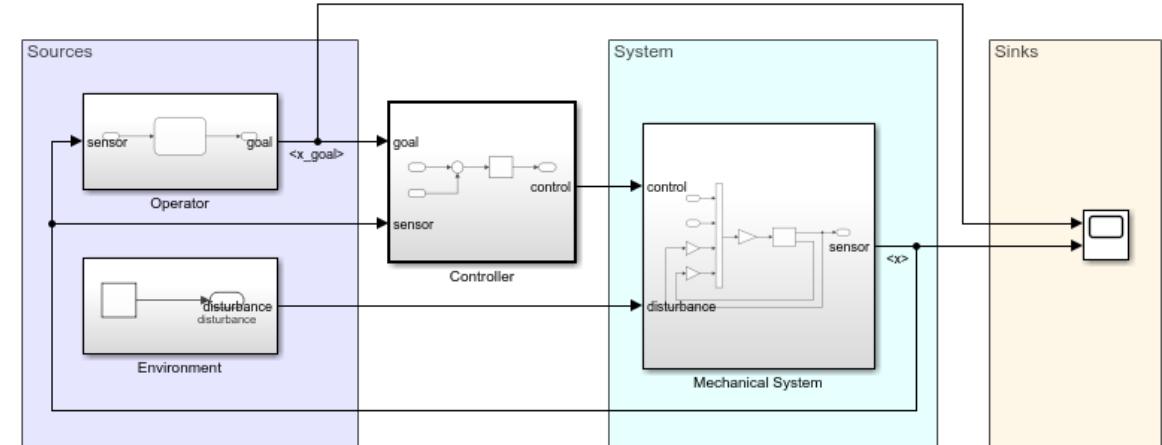
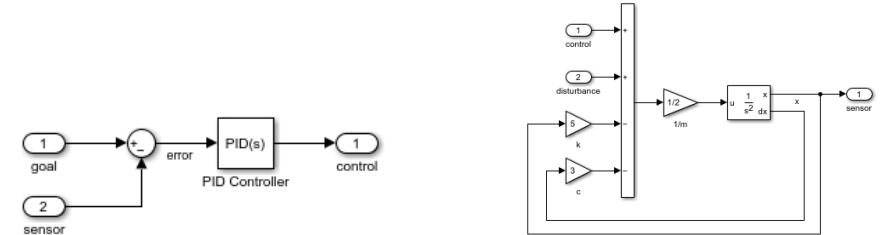


# 기본 모델링 워크플로

## Create Model Components

- 매트랩 오픈

```
openExample('simulink/VisualizeModelComponentsExample')
```



Copyright 2018-2019 The MathWorks, Inc.

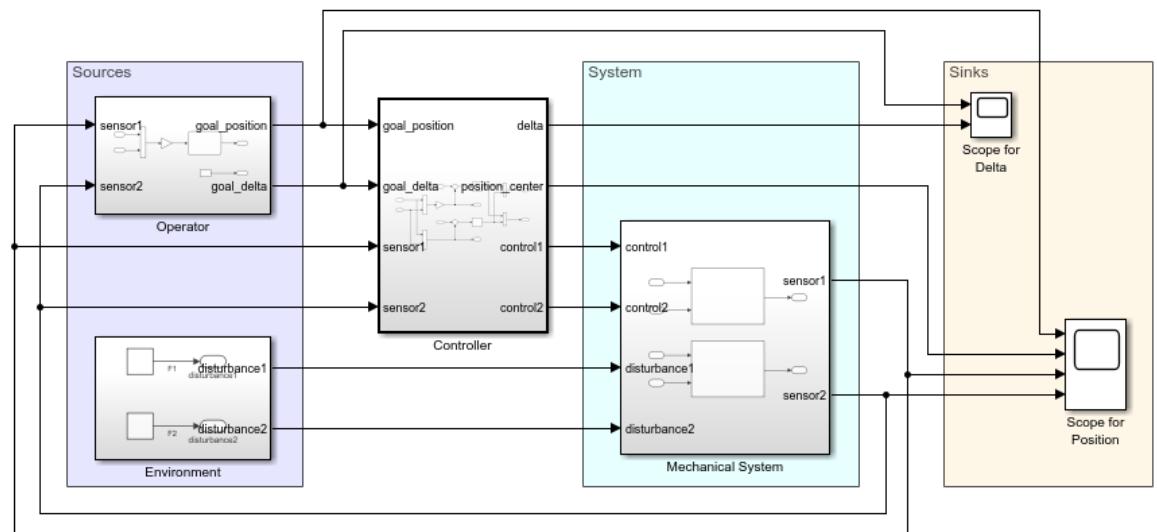
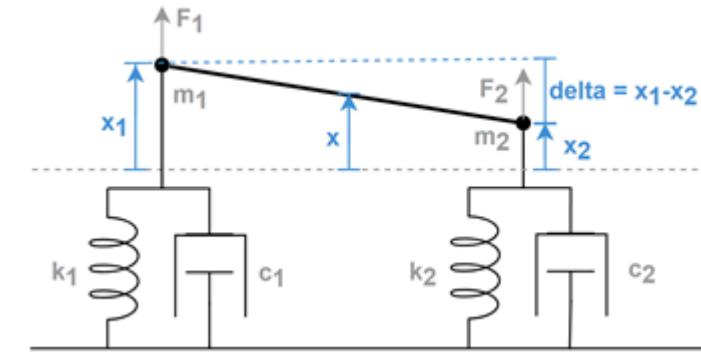
# 기본 모델링 워크플로

## Manage Signal Lines

- 매트랩

```
openExample('simulink/SimplifySignalLinesExample')
```

- ex\_modeling\_signals



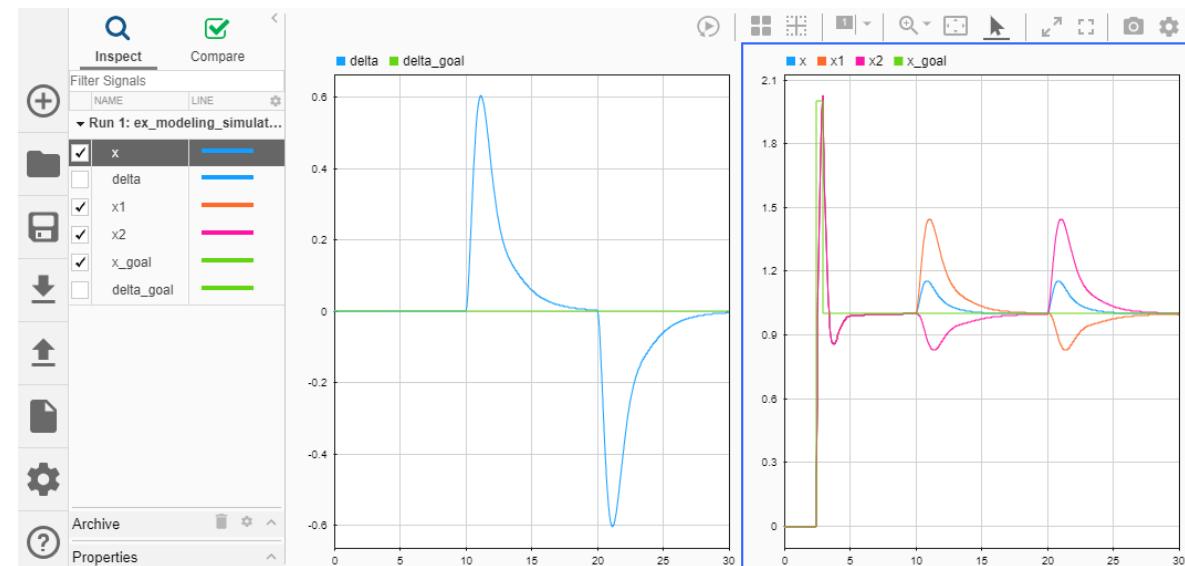
Copyright 2018-2019 The MathWorks, Inc.

# 기본 모델링 워크플로

## Manage Signal Lines

- Simulation Data Inspector (데이터 인스펙터) 버튼 클릭
- ex\_modeling\_simulation\_data\_inspector
- 링크

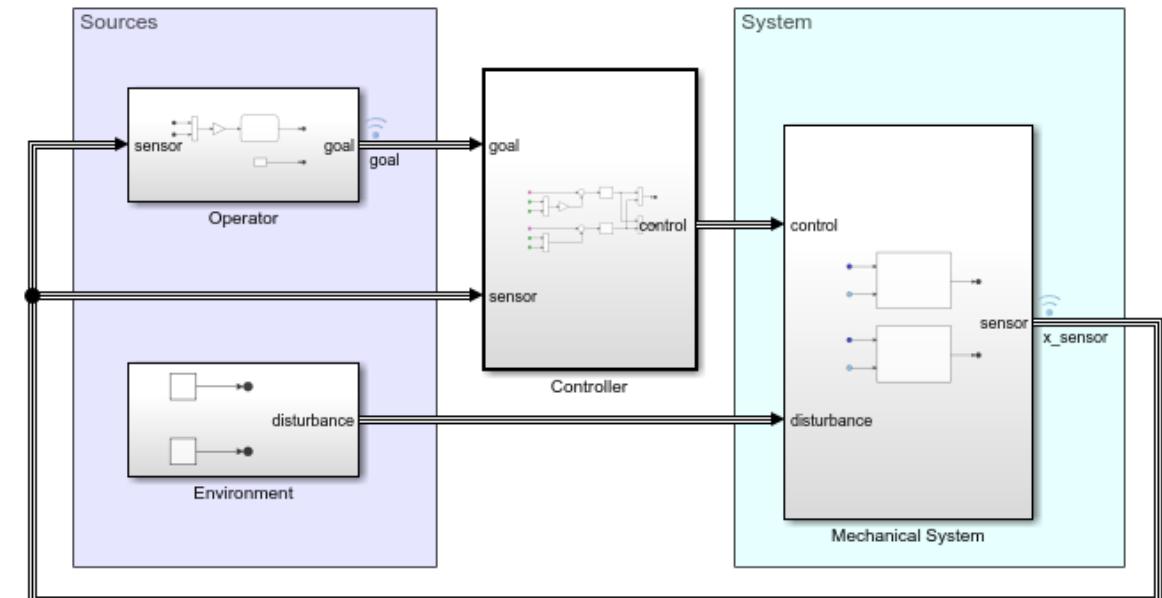
<https://kr.mathworks.com/help/simulink/ug/reduce-signal-lines.html>



## Manage Signal Lines

- Bus Creator or Out Bus Element 블럭
- ex\_modeling\_composite\_signals
- 링크

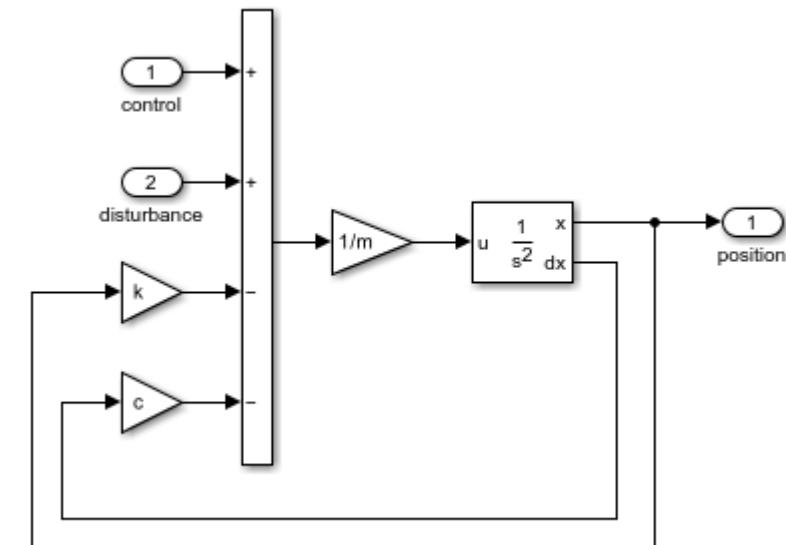
<https://kr.mathworks.com/help/simulink/ug/reduce-signal-lines.html>



## Manage Model Data

- 모델 속성 열기
- PreLoadFcn 확인
- 매틀랩

```
openExample('simulink/ManageModelVariablesExample')
```



# 기본 모델링 워크플로

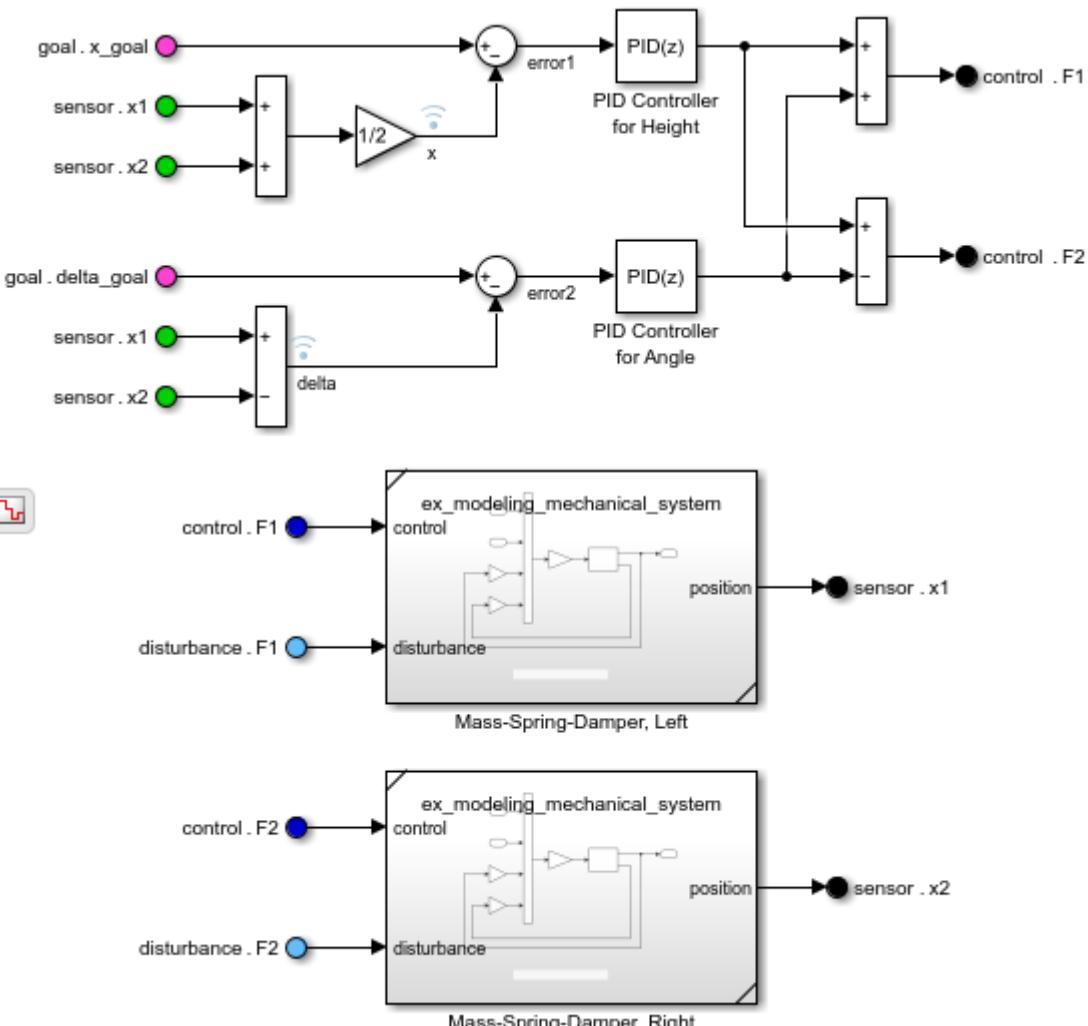
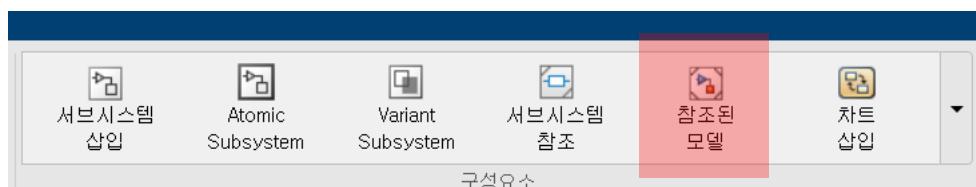
## Reuse Model Components from Files

- 매틀랩 오픈

```
openExample('simulink/ReferenceFilesForCollaborationExample')
```

- 모델 구성요소 링크

<https://kr.mathworks.com/help/simulink/ug/types-of-model-components.html>



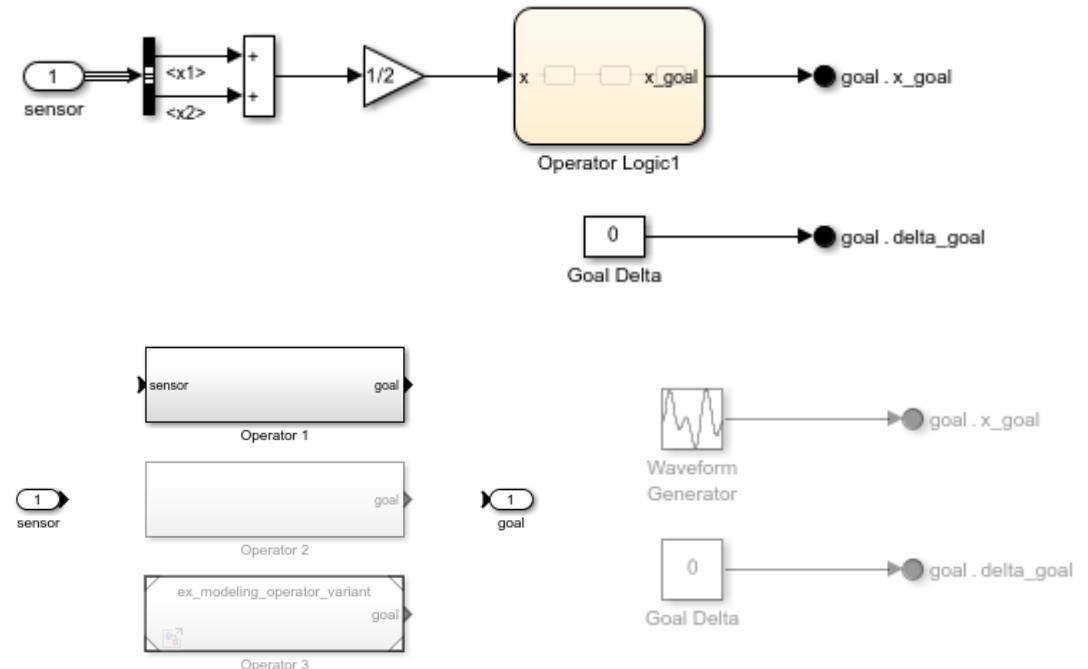
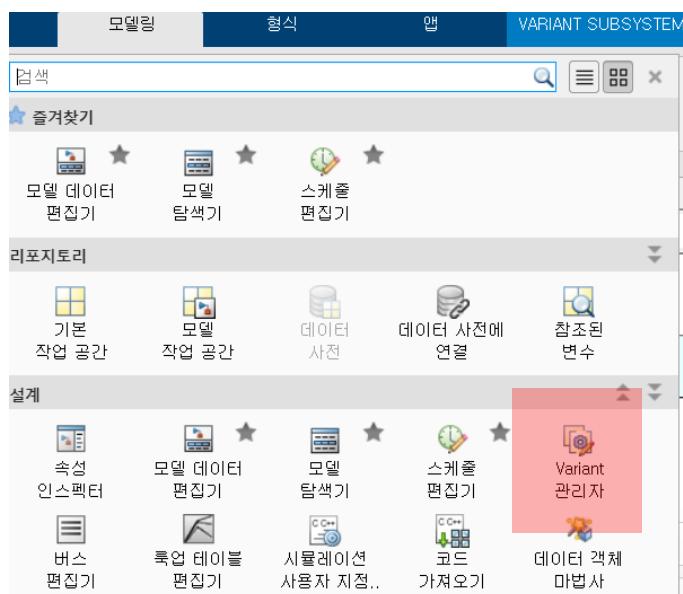
# 기본 모델링 워크플로

## Create Interchangeable Variations of Model Components

- ex\_modeling\_variant\_choice.m 확인

- 매틀랩

openExample('simulink/CreateInterchangeableComponentsExample')

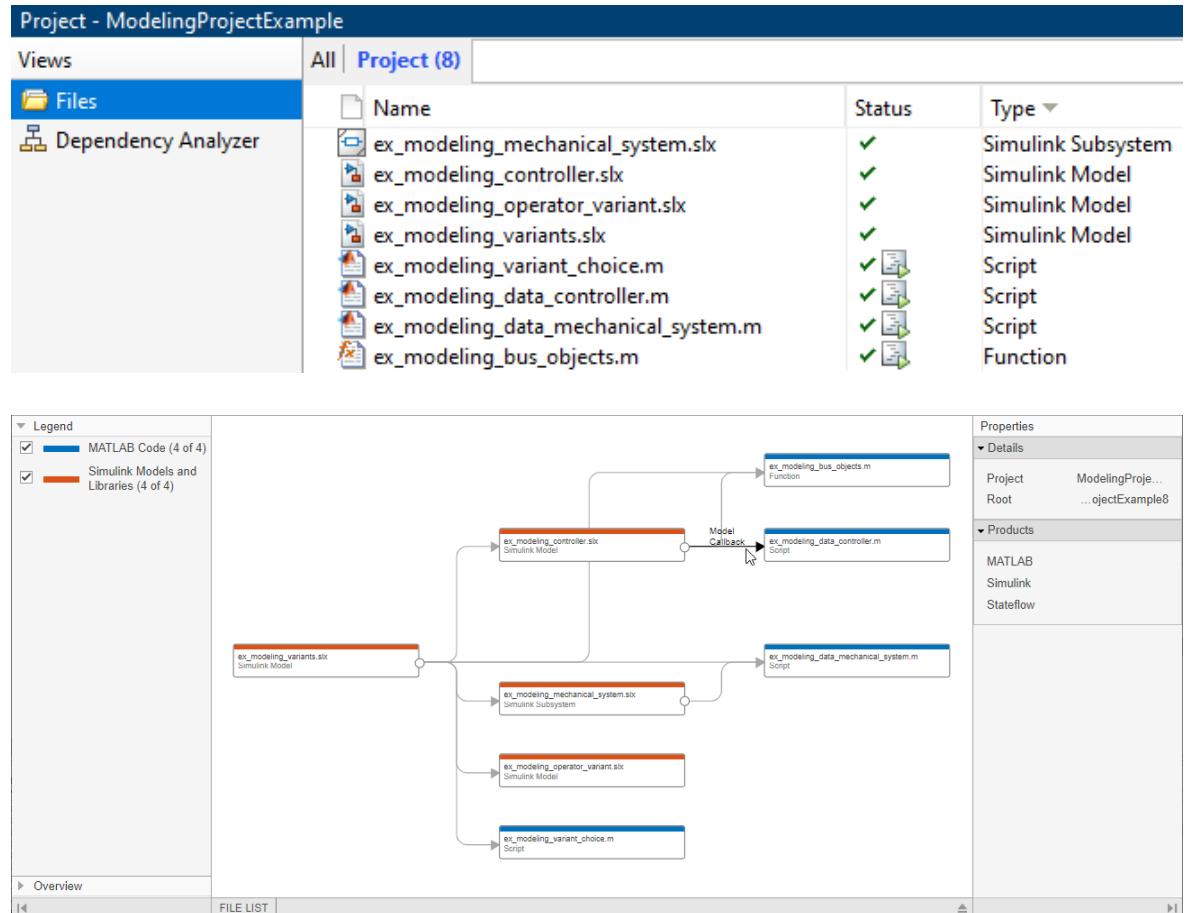
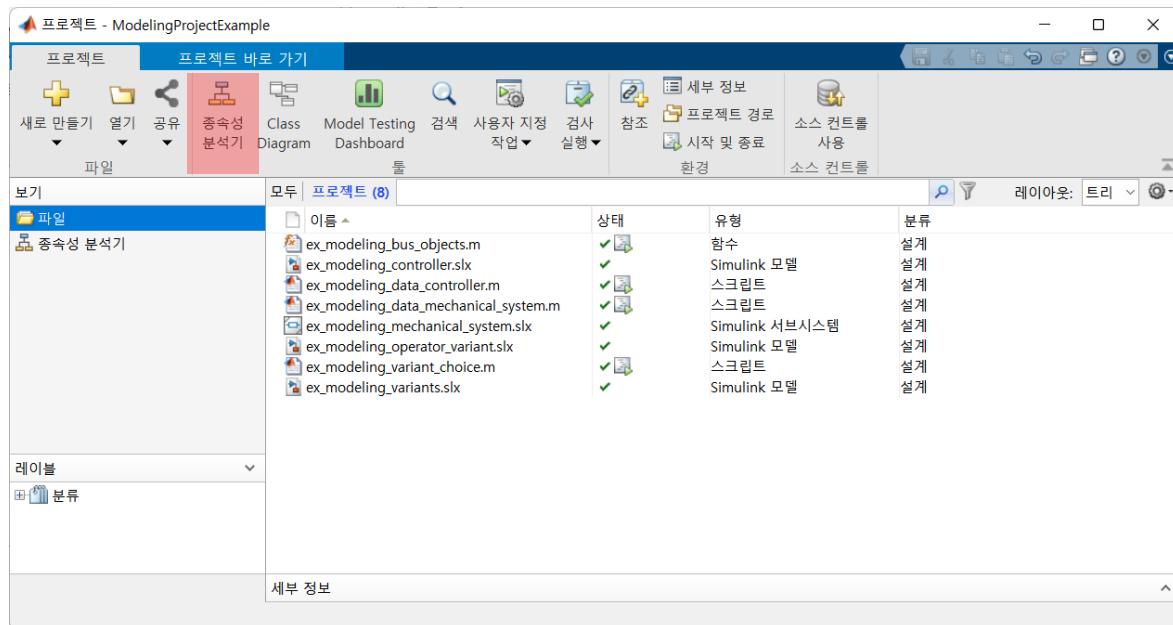


# 기본 모델링 워크플로

## Set Up a File Management System

- 매틀랩

openExample('simulink/SetupAFileManagerSystemExample')



---

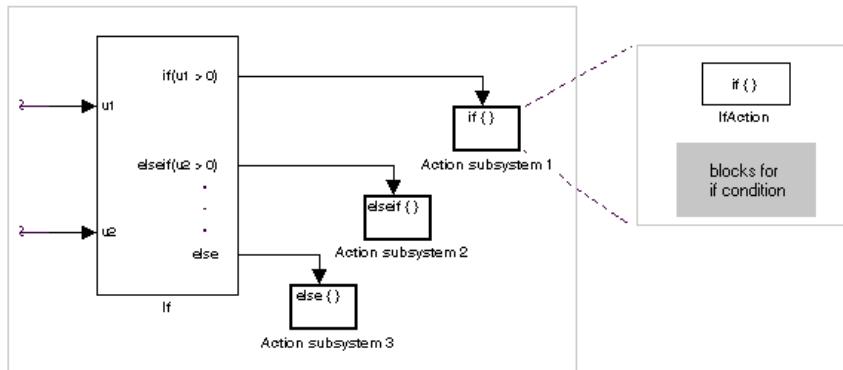
# Content

## ■ Simulink 중급 실습 #1

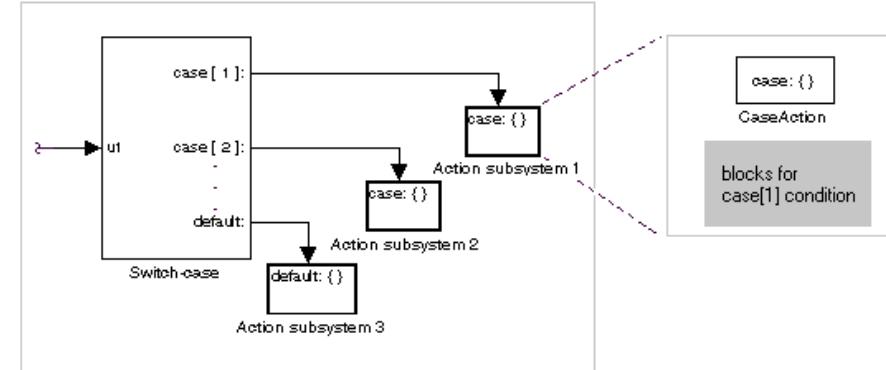
1. Use Control Flow Logic
2. 사용자 지정 블록 사용 (S-Function: Matlab, C 연동)

# Use Control Flow Logic – Ports & Subsystems

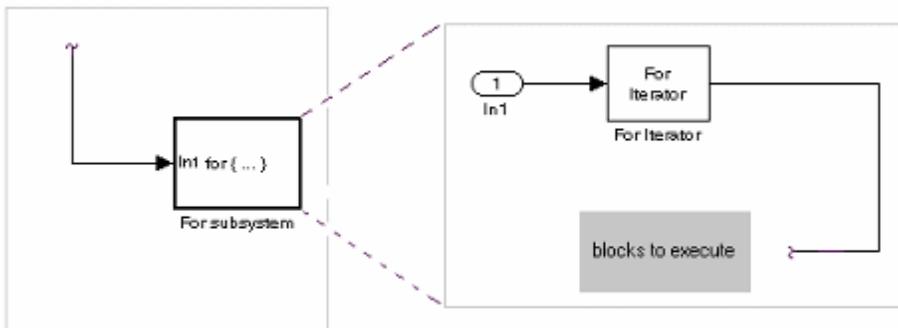
if-else



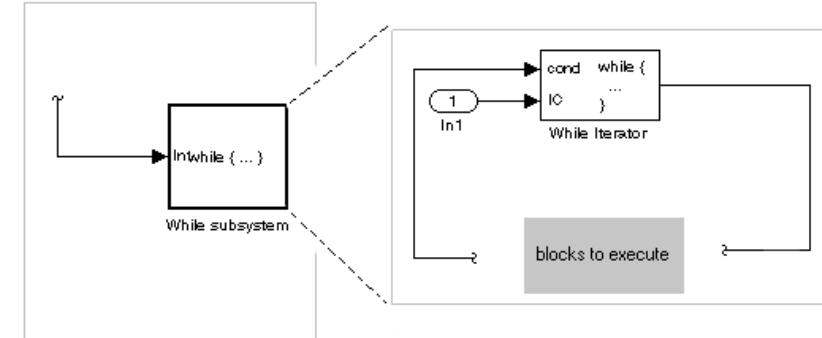
switch



for



while



# Simulink 중급 실습

## If-Then-Else 블록

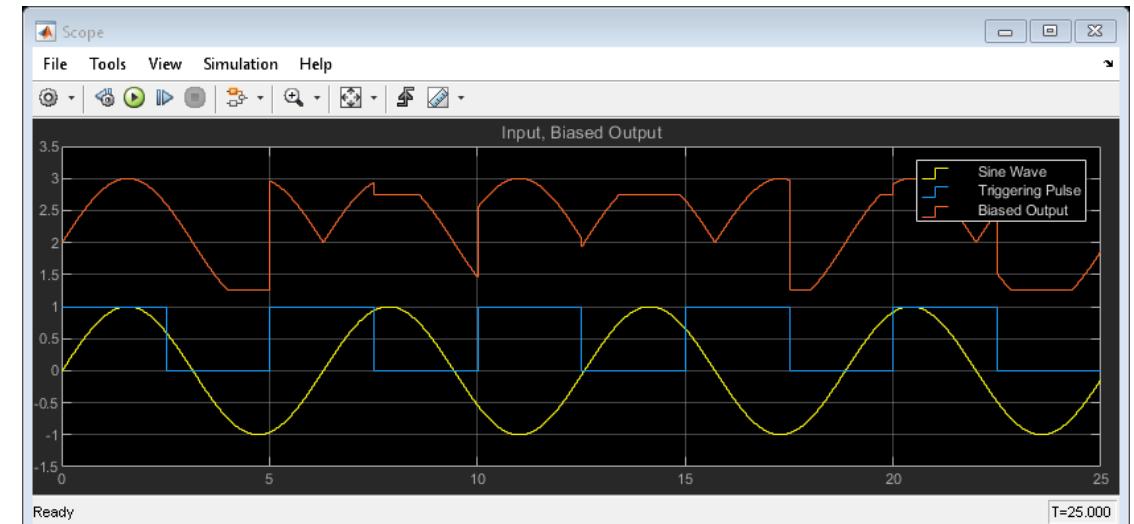
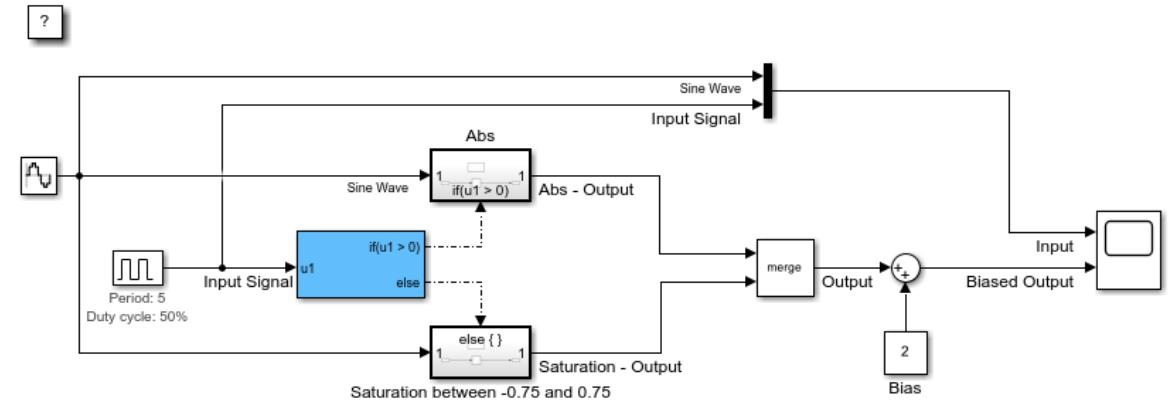
- 매틀랩 오픈

```
openExample('simulink_features/IfThenElseBlocksExample')
```

- 링크

<https://kr.mathworks.com/help/simulink/slref/if-then-else-blocks.html>

If Block Example



# Simulink 중급 실습

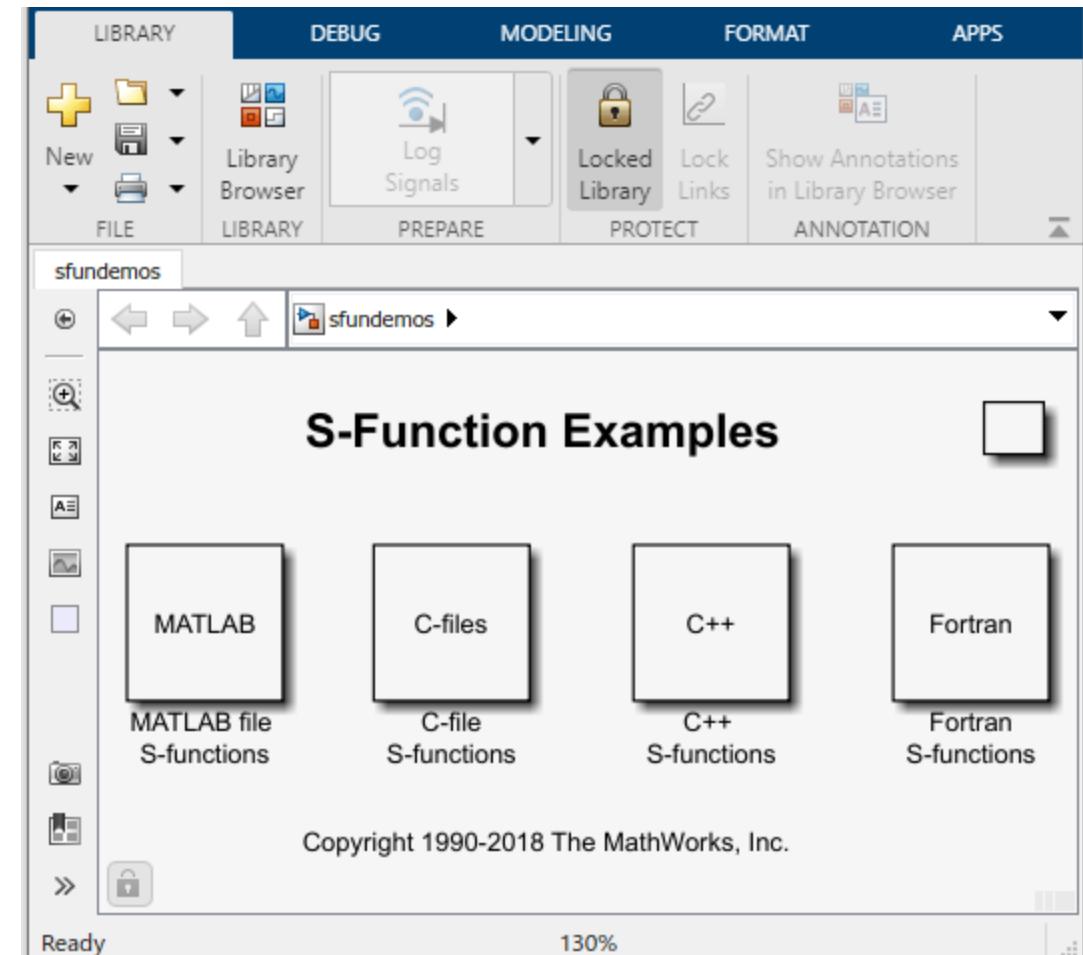
## S-Function API를 사용한 사용자 지정 코드 및 직접 코딩한 블록

- 매틀랩 오픈

```
open_system('sfundemos')
```

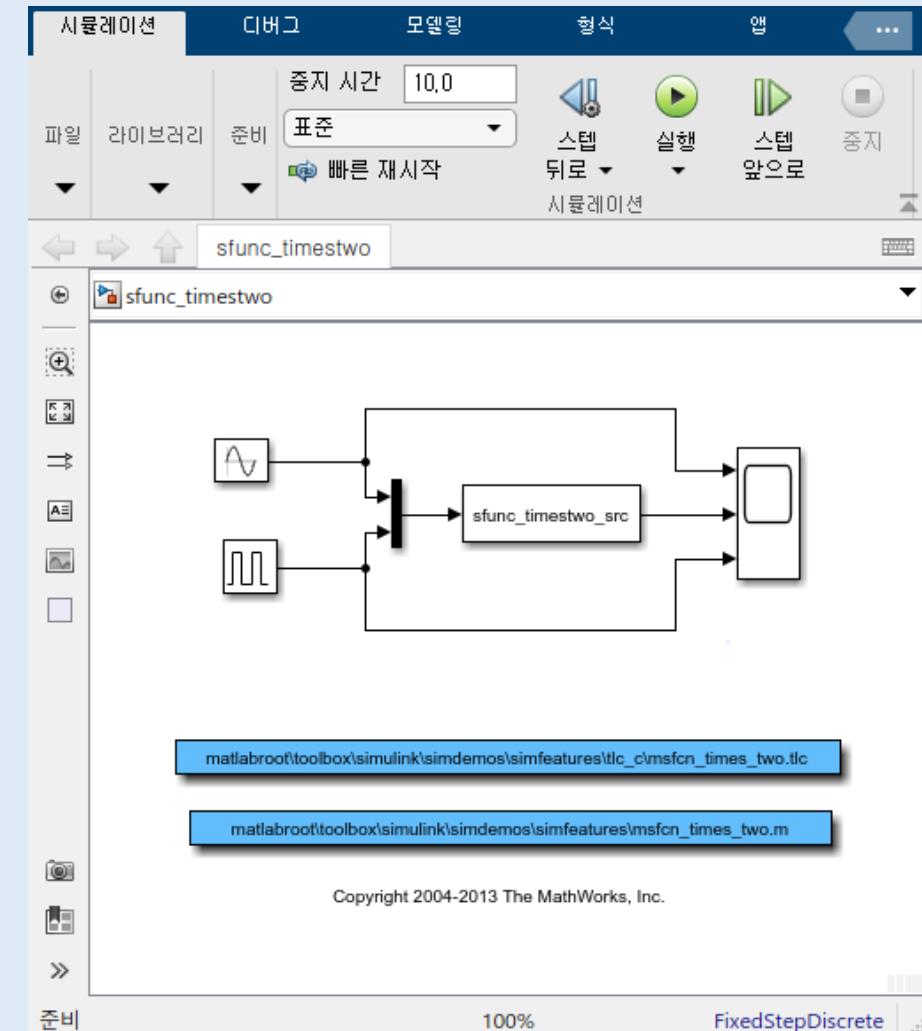
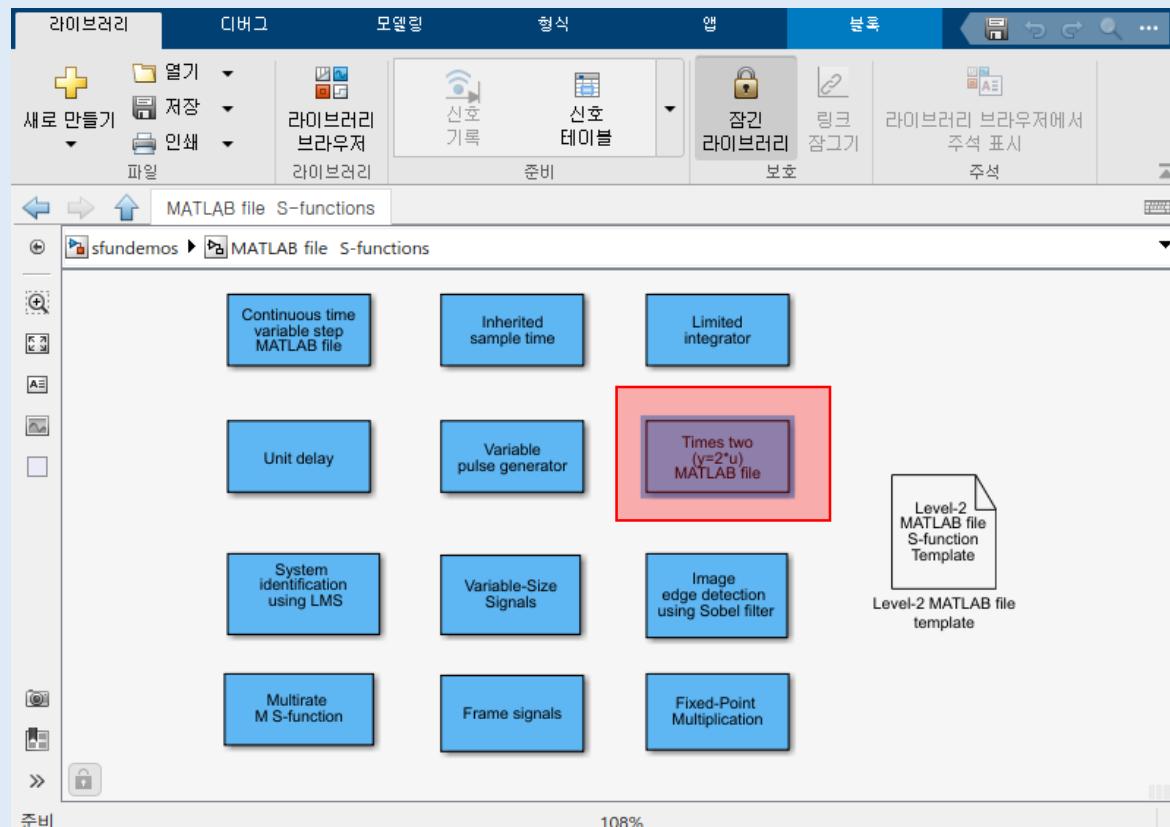
- 링크

[https://kr.mathworks.com/help/simulink/sfg/  
s-function-examples.html](https://kr.mathworks.com/help/simulink/sfg/s-function-examples.html)



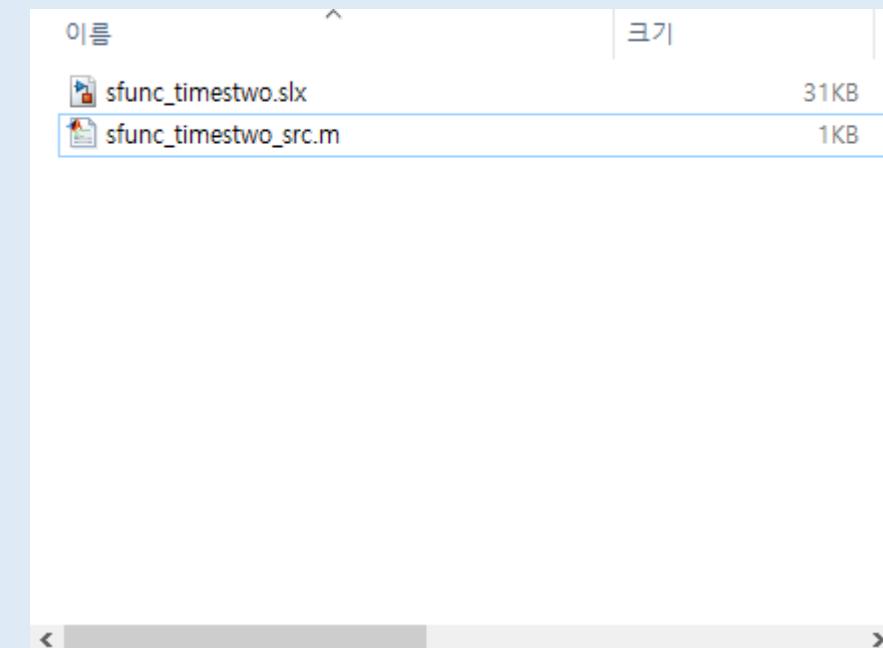
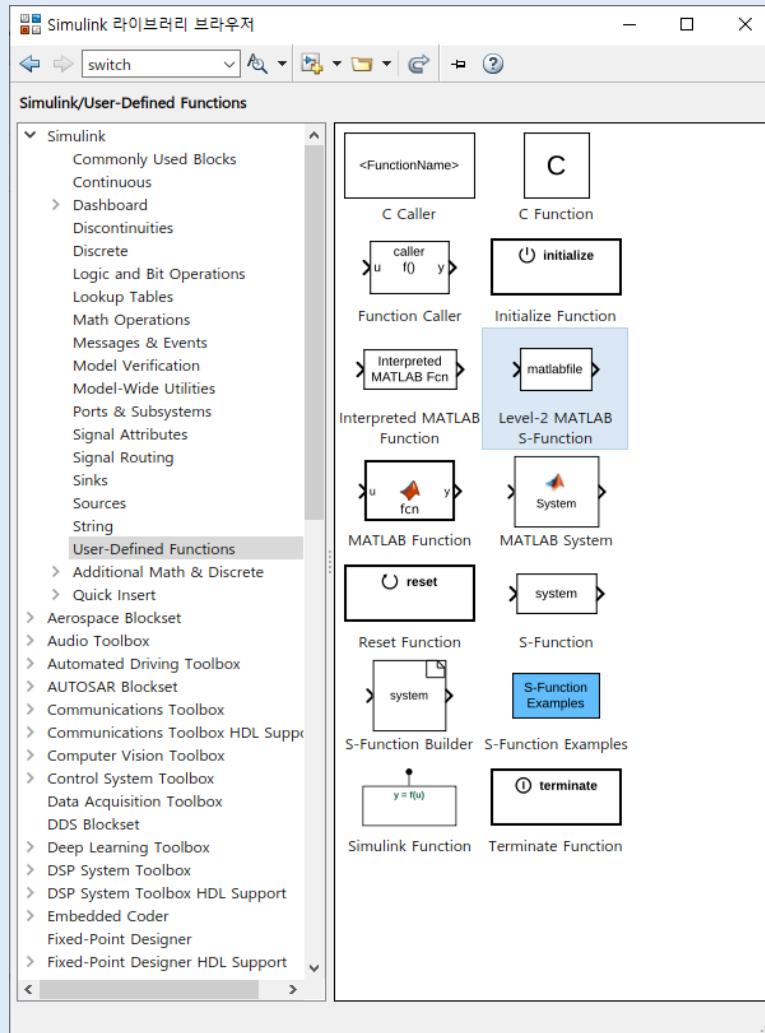
# Simulink 중급 실습

## Matlab S-Function 실습



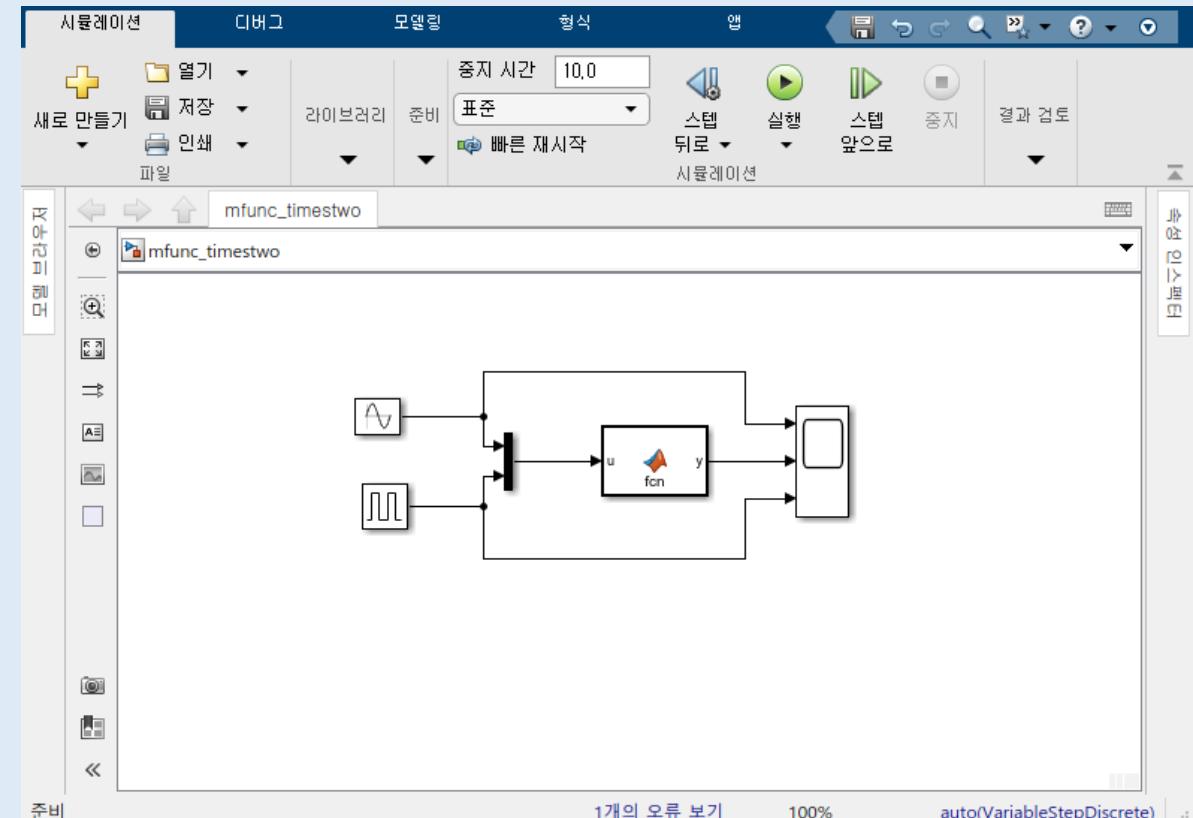
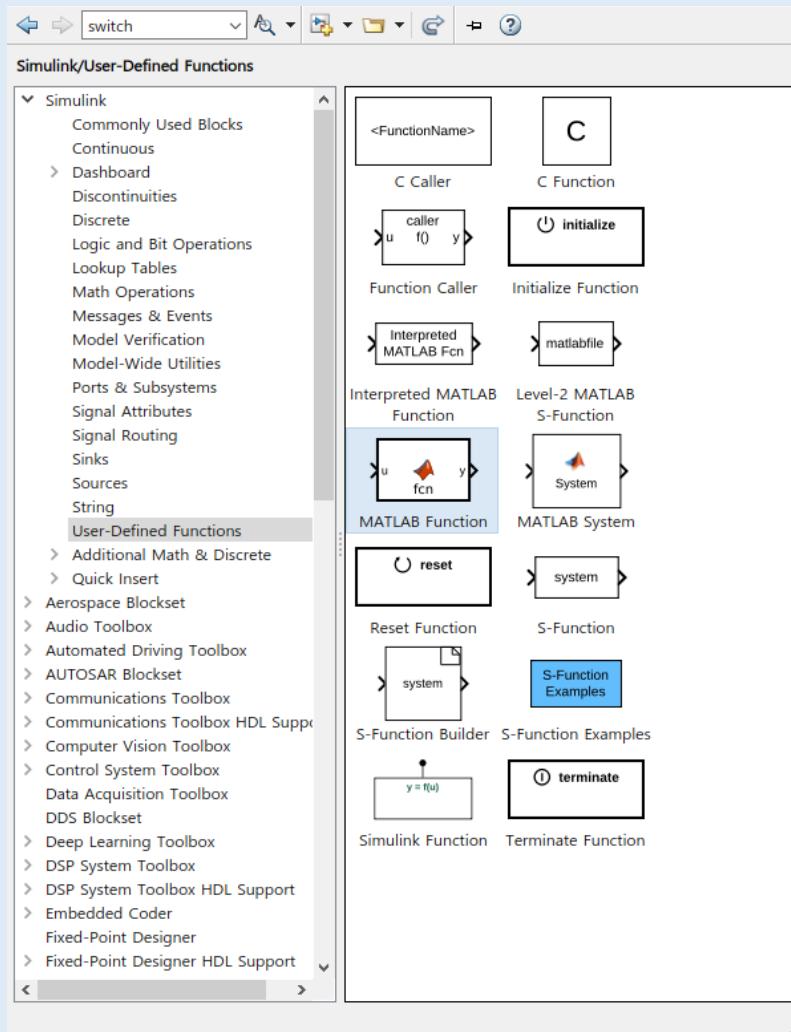
# Simulink 중급 실습

## Matlab S-Function 실습



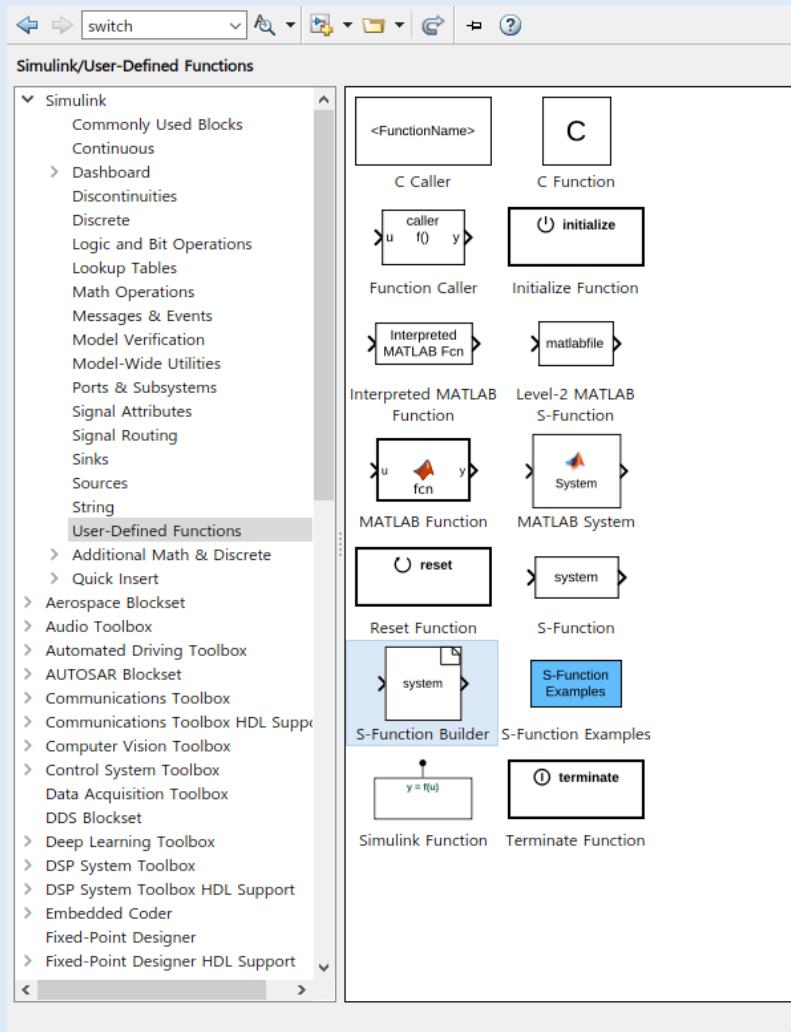
# Simulink 중급 실습

## MATLAB Function 실습



# Simulink 중급 실습

## S-Function Builder 실습



The screenshot shows the S-Function Builder interface for the 'cfunc\_timestwo/S-Function Builder'. The main window displays the generated C code for the 'cfunc\_timestwo' function. The code includes comments in Korean explaining the purpose of certain sections. The code is as follows:

```
/*
 * 사용자 지정 시작 코드 위치.
 */
/* Start-END */

void cfunc_timestwo_Outputs_wrapper(const real_T *u0,
                                      real_T *y0)
{
    /* Output-BEGIN */
    /* 이 샘플은 출력을 입력과 동일하게 설정합니다.
    y0[0] = u0[0];
    복소 신호의 경우 다음을 사용하십시오. y0[0].re = u0[0].re;
    y0[0].im = u0[0].im;
    y1[0].re = u1[0].re;
    y1[0].im = u1[0].im; */
    /* */
    y0[0] = u0[0];

    /* Output-END */
}

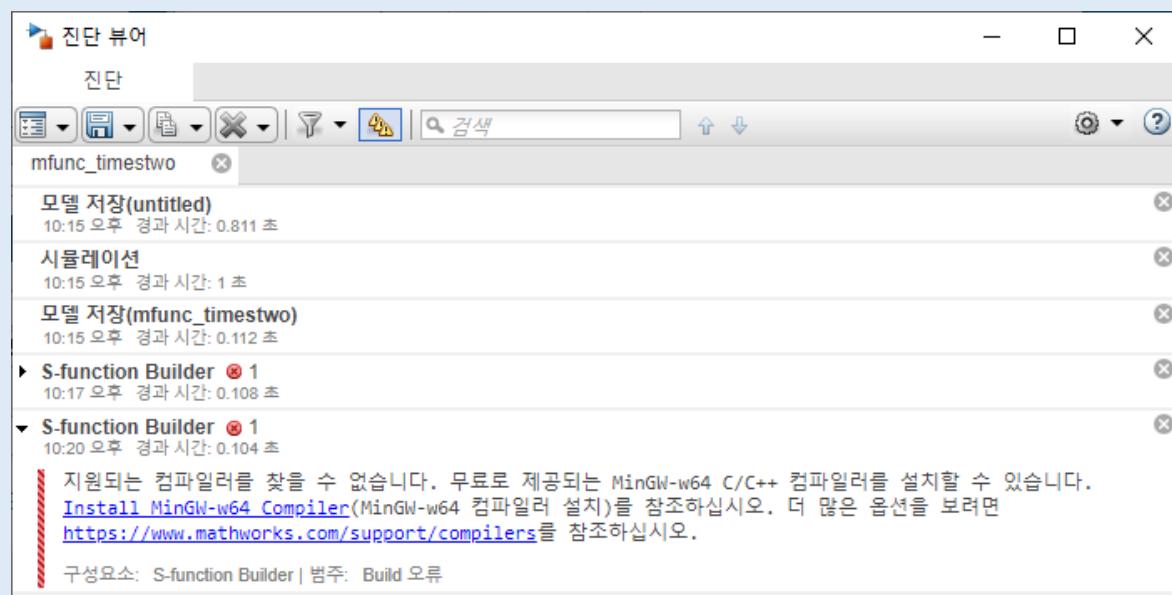
void cfunc_timestwo_Terminate_wrapper(void)
{
    /* Terminate-BEGIN */
}
```

The interface also includes tabs for '포트 및 파라미터' (Ports and Parameters) and '라이브러리' (Library), and a table for port and parameter settings:

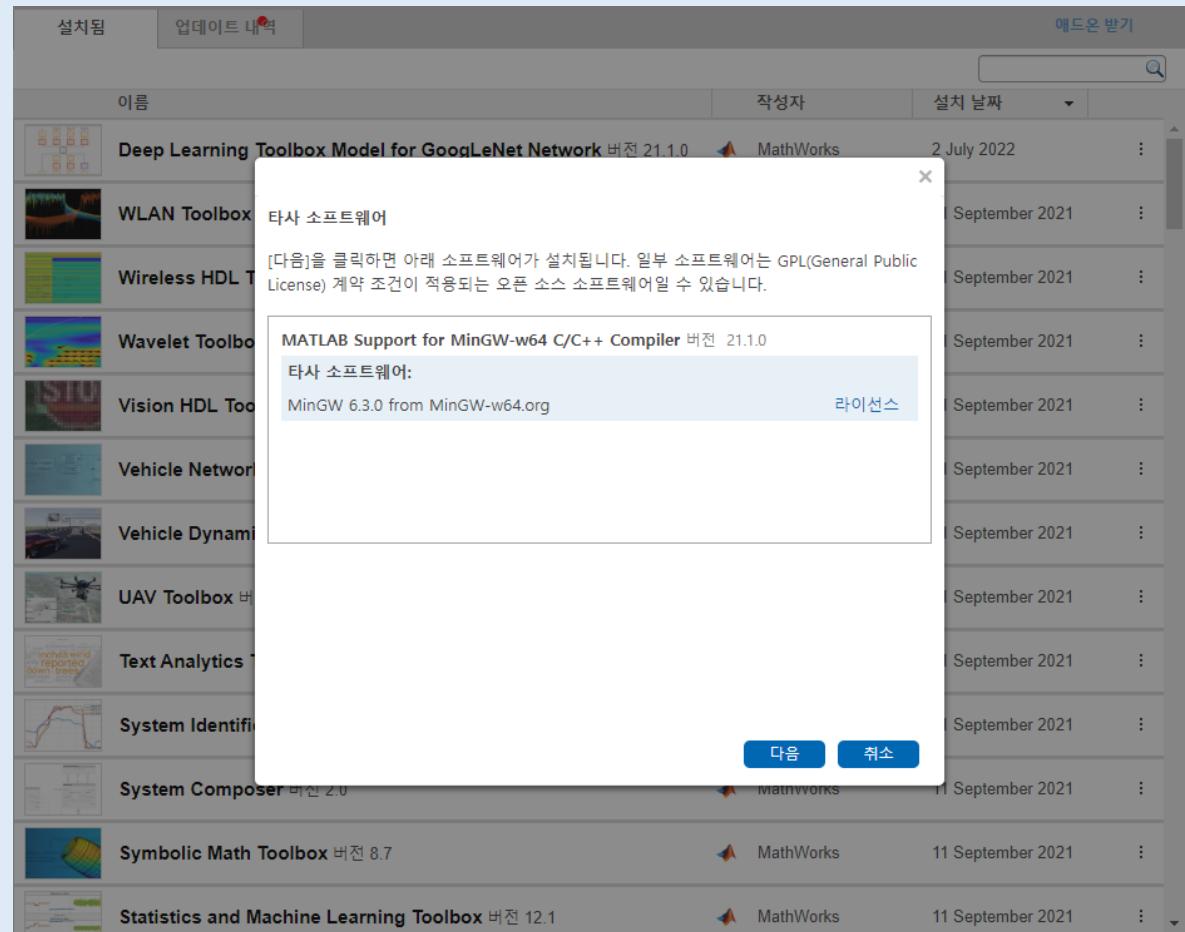
이름	스코프	데이터형	차원	실수/복소수 여부
u0	input	double	[1,1]	real
y0	output	double	[1,1]	real

# Simulink 중급 실습

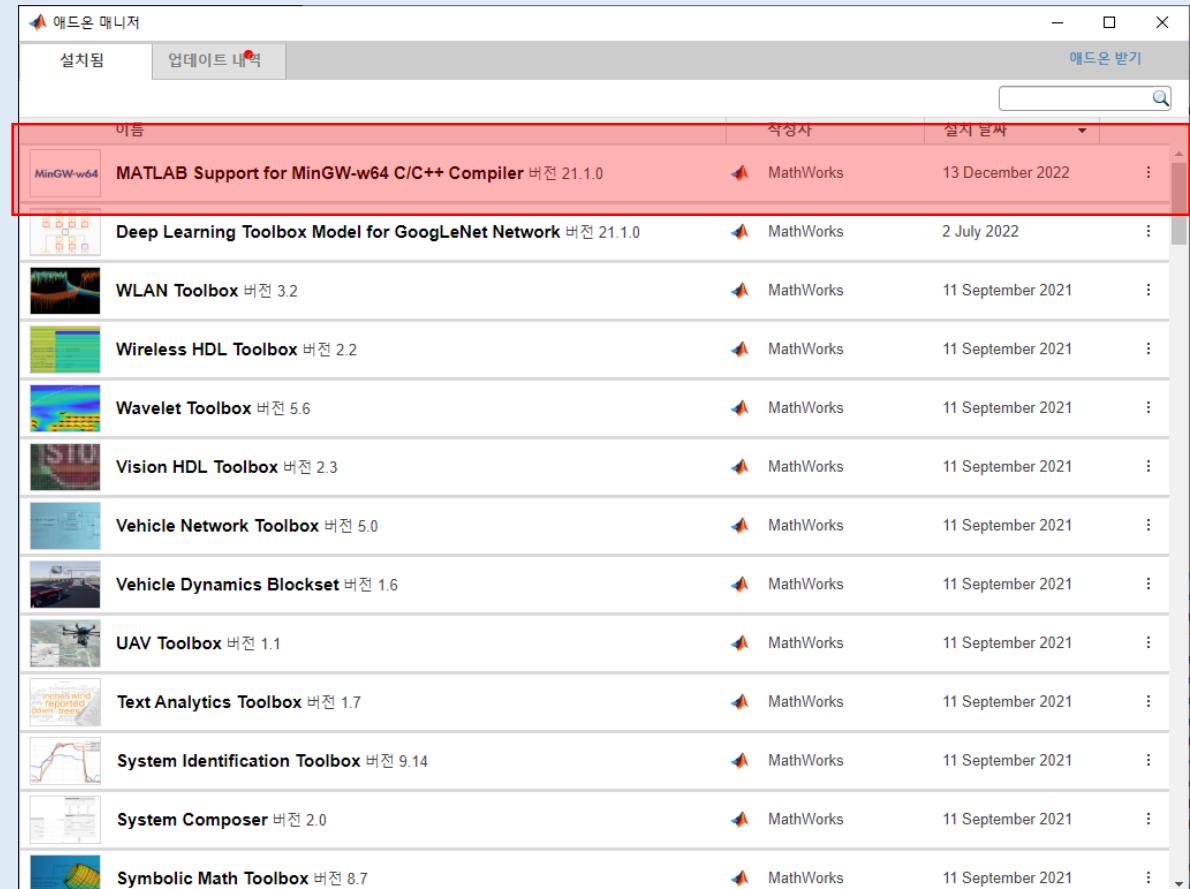
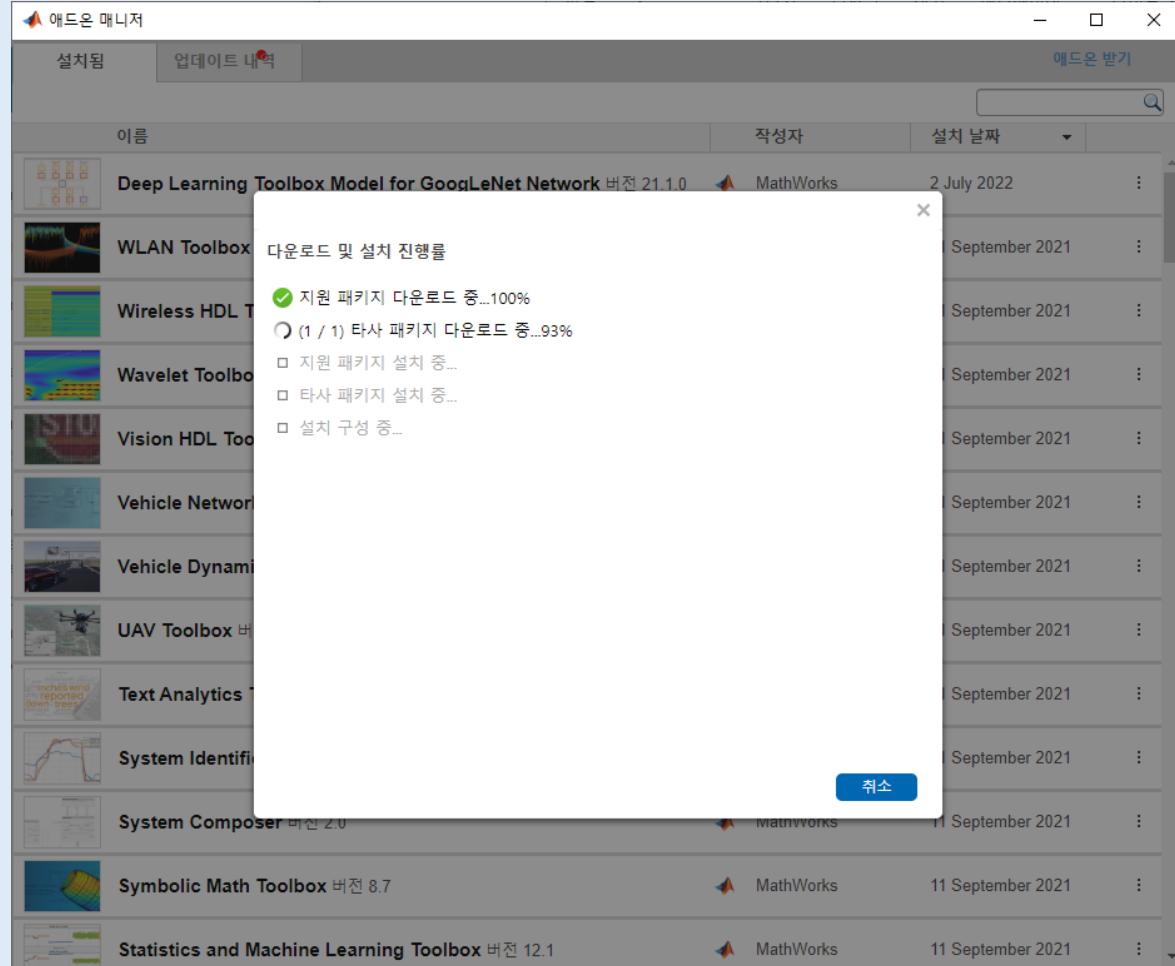
# S-Function Builder 실습 – 컴파일러 오류



<https://kr.mathworks.com/support/requirements/supported-compilers.html>

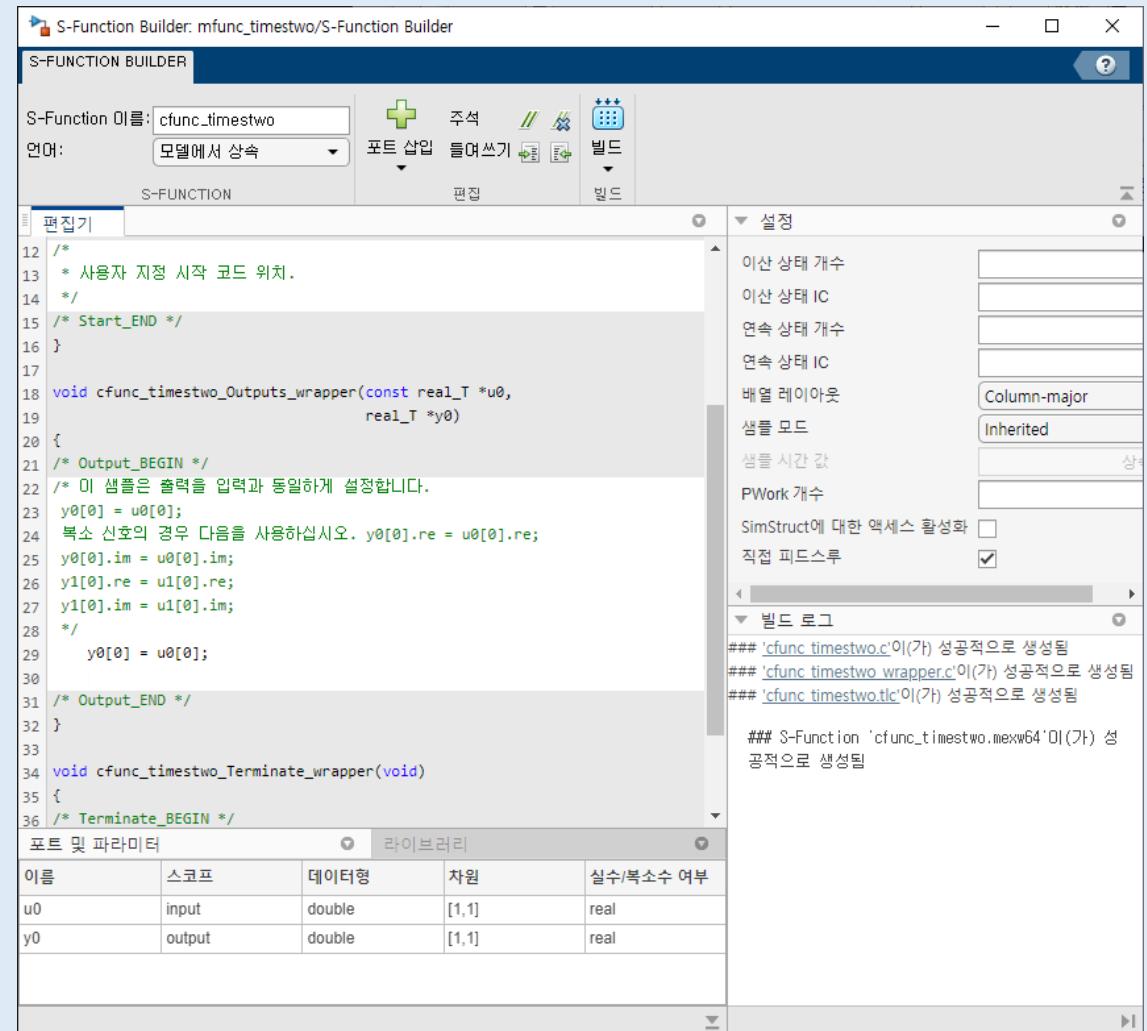
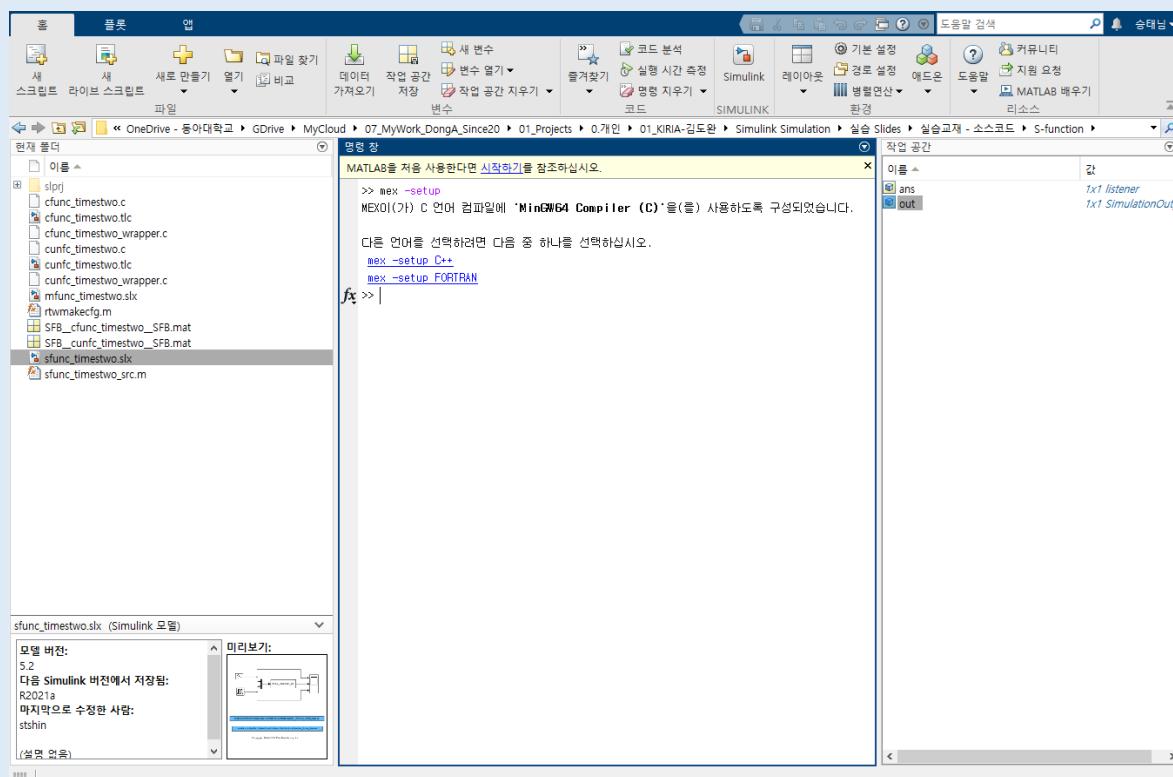


## S-Function Builder 실습 – MinGW 설치

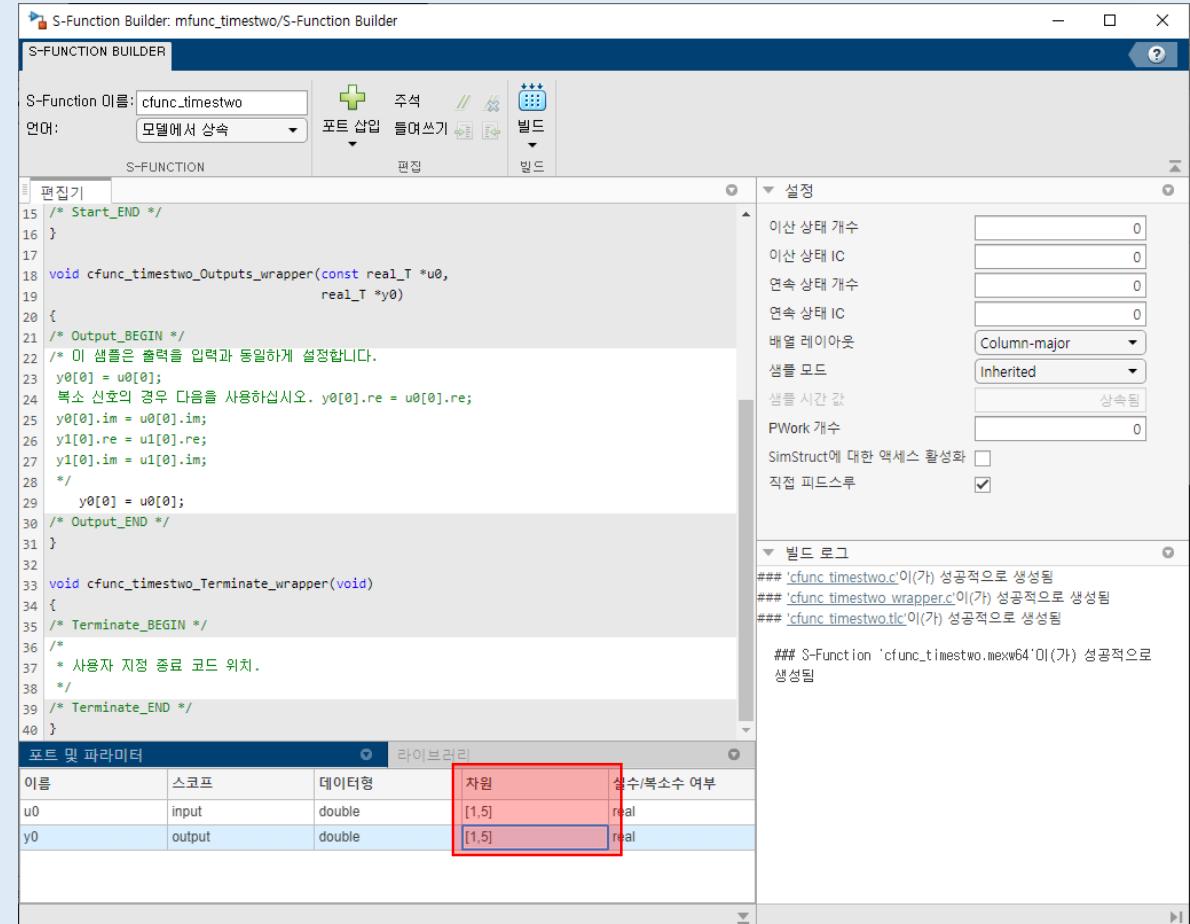
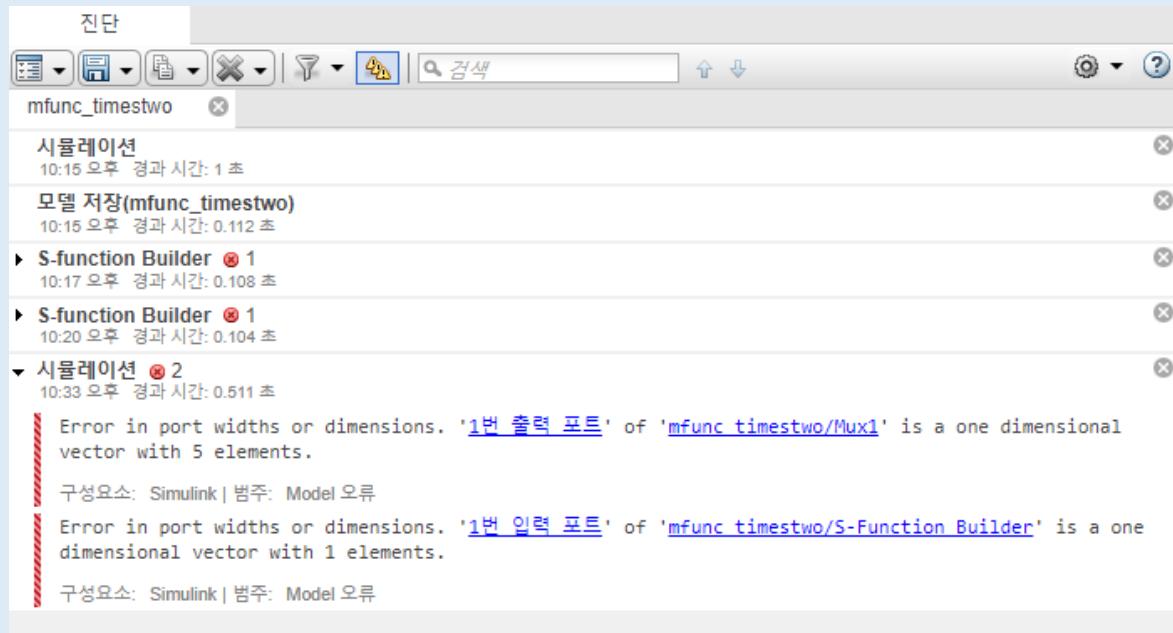


# Simulink **중급** 실습

S-Function Builder 실습 – mex setup

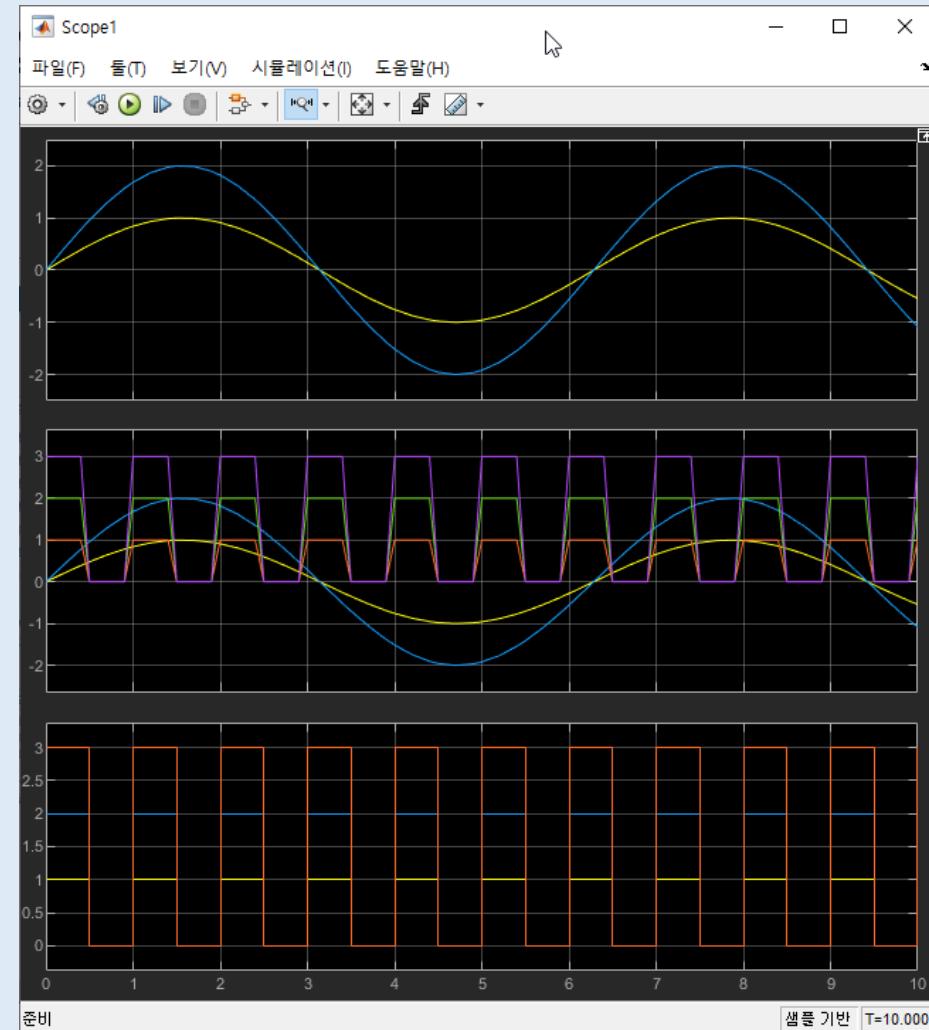
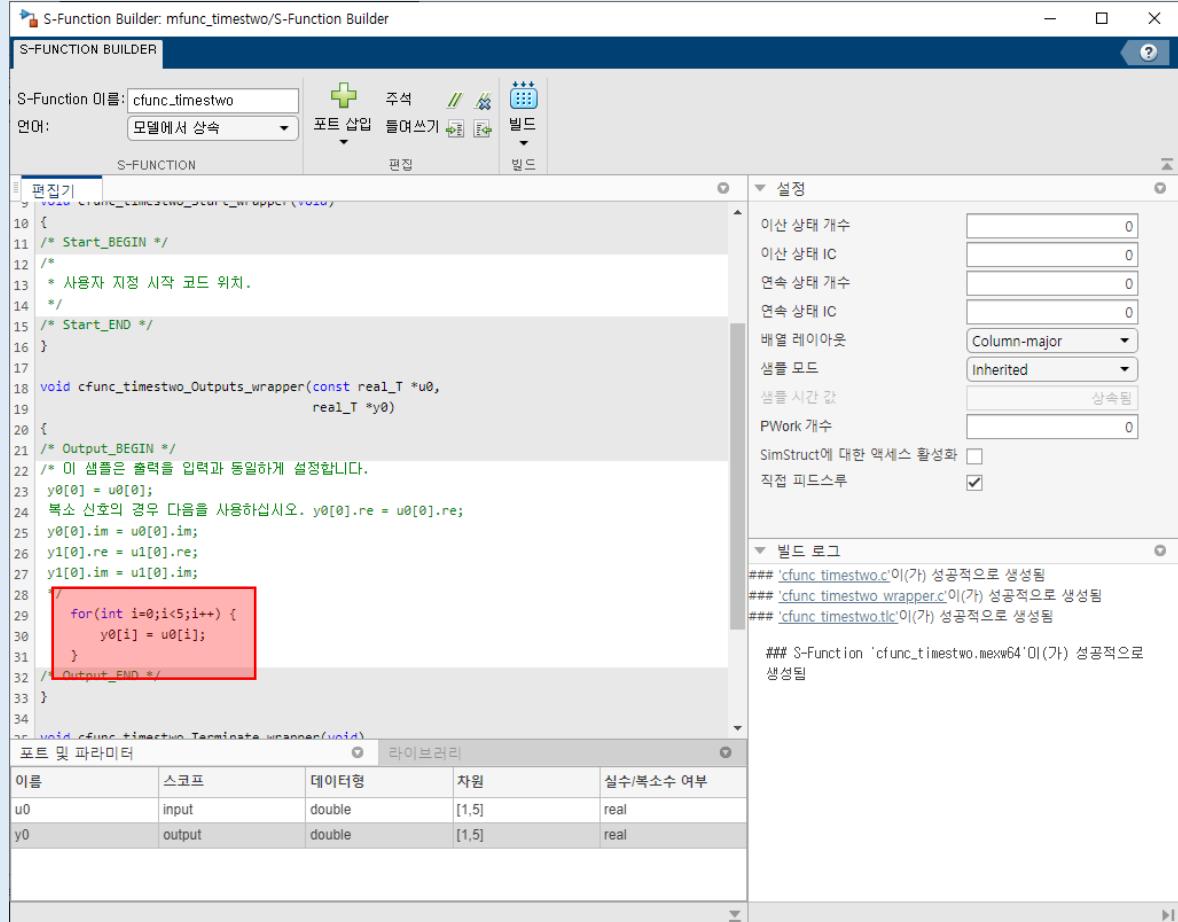


## S-Function Builder 실습 – Port Size 오류



# Simulink 중급 실습

## S-Function Builder 실습 – 5채널 핸들링



---

# Content

- Simulink 중급 실습 #2
  - 1. 사용자 라이브러리 제작
  - 2. 튜어 오르는 공 시뮬레이션

# Simulink 중급 실습

## 실습: 사용자 라이브러리 제작

- 링크

### 실습: (라이브러리 브라우저에 라이브러리 추가하기)

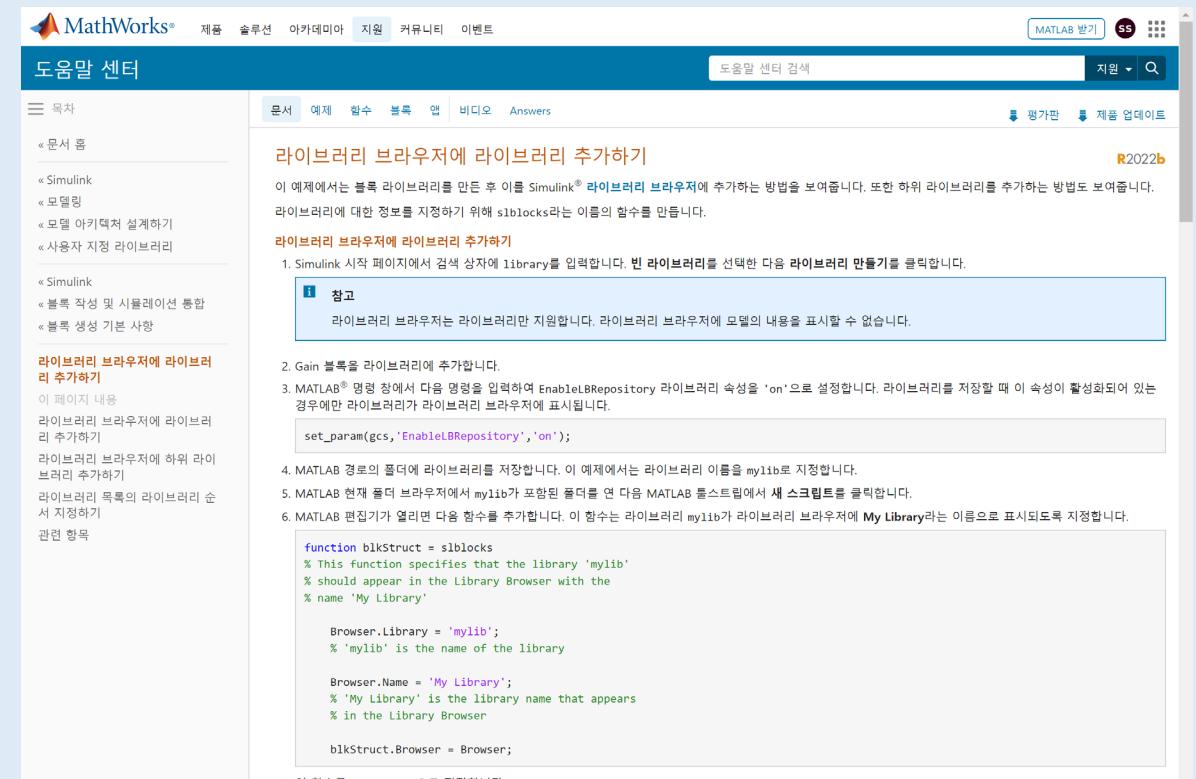
<https://kr.mathworks.com/help/simulink/ug/adding-libraries-to-the-library-browser.html>

### (툴박스 생성 및 공유)

[https://kr.mathworks.com/help/matlab/matlab\\_prog/create-and-share-custom-matlab-toolboxes.html](https://kr.mathworks.com/help/matlab/matlab_prog/create-and-share-custom-matlab-toolboxes.html)

### (Create Custom Library)

<https://kr.mathworks.com/help/simulink/ug/creating-block-libraries.html>



# Simulink 중급 실습

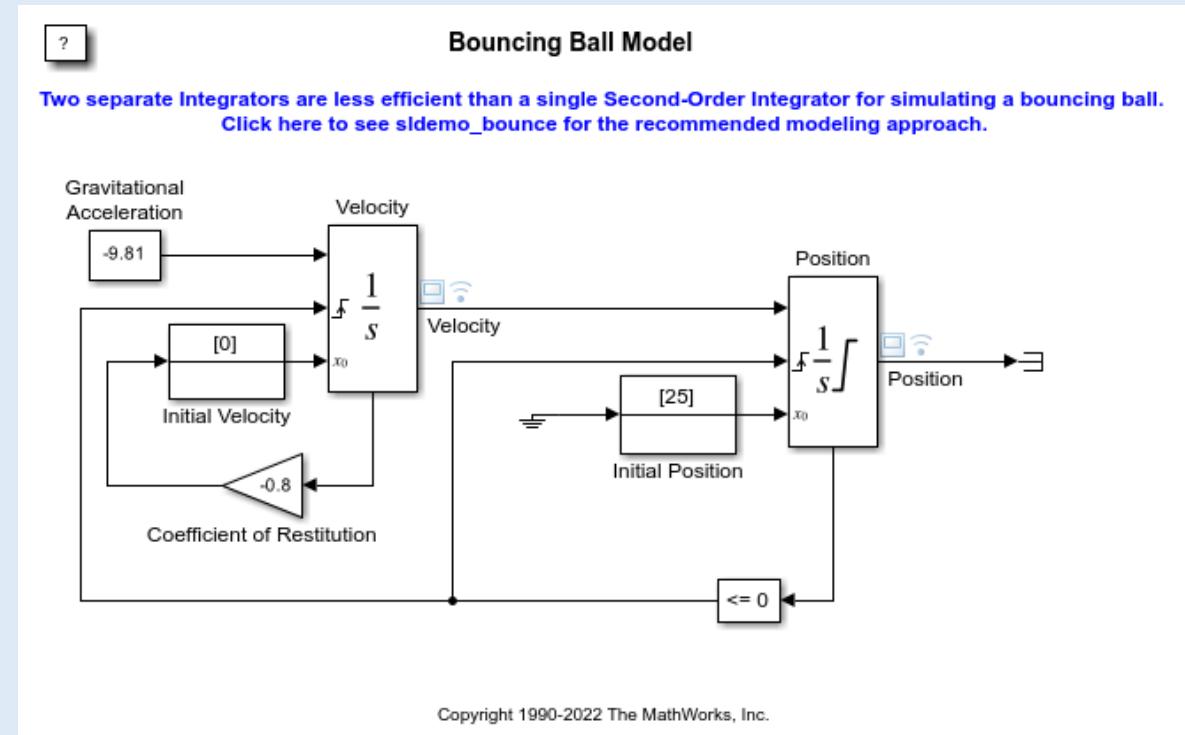
## 튀어 오르는 공 시뮬레이션

- 매틀랩 오픈

```
openExample('simulink_general/sldemo_bounceExample')
```

- 링크

<https://kr.mathworks.com/help/simulink/slref/simulation-of-a-bouncing-ball.html>



# Simulink 중급 실습

## Simulink - 물리 모델링

[https://kr.mathworks.com/help/examples.html?exampleproduct=all&s\\_tid=CRUX\\_lftnav](https://kr.mathworks.com/help/examples.html?exampleproduct=all&s_tid=CRUX_lftnav)

This screenshot shows the 'Examples' section of the MathWorks Help Examples page for Simulink usage. It includes sections for MATLAB, Simulink, and various application examples like AI, Data Science, and Signal Processing.

- MATLAB 사용**: MATLAB, Simulink, 물리 모델링, 이벤트 기반 모델링, 실시간 시뮬레이션 및 테스트.
- Simulink 사용**: Simulink, 물리 모델링, 이벤트 기반 모델링, 실시간 시뮬레이션 및 테스트.
- 워크플로**: 병렬 연산, 리포팅 및 데이터베이스 액세스, 시스템 공학, 코드 생성, 응용 프로그램 배포, 검증(Verification) 및 확인(Validation), 테스트, 클라우드 기능.
- 응용 분야**: AI, 데이터 사이언스 및 통계학, 수학 및 최적화, 신호 처리, 영상 처리 및 컴퓨터 비전, 제어 시스템, 테스트 및 계측, RF 및 혼합 신호, 무선 통신.
- 리소스**: 릴리스 정보, 설치 도구, 하드웨어 지원, 버그 리포트, 커뮤니티, File Exchange, 도서, 제품 다운로드.

[https://kr.mathworks.com/help/overview/examples.html?category=physical-modeling&exampleproduct=all&s\\_tid=CRUX\\_lftnav](https://kr.mathworks.com/help/overview/examples.html?category=physical-modeling&exampleproduct=all&s_tid=CRUX_lftnav)

This screenshot shows the 'Physical Modeling' section of the MathWorks Help Overview Examples page. It displays several examples related to Simscape and Mechanical Models.

- Simscape**: Mechanical Models, Mass-Spring-Damper in Simscape and Simscape, Double Mass-Spring-Damper in Simscape and Simscape.
- Mechanical Models**: Mass-Spring-Damper with Controller, Mass-Spring-Damper in Simulink and Simscape, Double Mass-Spring-Damper in Simulink and Simscape.
- Simple Mechanical System**: A model of a system that connects rotational and translational motion, A summing lever drives a load.
- Linkage Mechanism**: Mechanical System with Translational Hard Stop, Mechanical System with Rotational Hard Stop, Mechanical Rotational System with Stick-Slip.

## Simscape Multibody — Examples

[https://kr.mathworks.com/help/sm/examples.html?category=index&exampleproduct=all&stid=CRUX\\_lftnav](https://kr.mathworks.com/help/sm/examples.html?category=index&exampleproduct=all&stid=CRUX_lftnav)

The screenshot shows the MathWorks Help Center interface for Simscape Multibody Examples. The top navigation bar includes links for MATLAB, Help Center, Documentation, Examples, Functions, Blocks, Videos, Answers, and R2022b. The left sidebar contains a navigation tree with categories like Documentation Home, Examples, Physical Modeling, Simscape, Simscape Battery, Simscape Driveline, Simscape Electrical, Simscape Fluids, Simscape Multibody, and specific examples like Get Started with Simscape Multibody, Creating a Simple Pendulum in MATLAB, How to Build a Model, and How to Build a Multibody System in MATLAB. The main content area displays several examples with their titles, descriptions, and preview images.

**Documentation** Examples Functions Blocks Videos Answers

**R2022b**

### Get Started with Simscape Multibody

**Creating a Simple Pendulum in MATLAB**  
Constructs a simple pendulum in MATLAB. It demonstrates various classes under `simscape.multibody.*` package

**How to Build a Model**  
Highlights key concepts and recommended steps for building a mechanical model using *Simscape™*

**How to Build a Multibody System in MATLAB**  
Highlights key concepts and recommended steps for building a multibody system in MATLAB. A simple design

### Multibody Modeling

#### Bodies

**Creating a Simple Part**  
This example shows how to create a simple rigid body. This is a single rigid body with a fixed center of mass and a reference frame at the center of mass. The reference frame is defined by three orthogonal vectors: a local frame, a global frame, and a relative frame. The local frame is defined by three orthogonal vectors: a local frame, a global frame, and a relative frame at the center. The link has a hole of one end and a pin at the other end. The link has a hole of one end and a pin at the other end.

**Creating a Complex Part**  
This example shows how to create a complex rigid body. This is a rigid body with multiple parts and a reference frame at the center of mass. The reference frame is defined by three orthogonal vectors: a local frame, a global frame, and a relative frame at the center. The link has a hole of one end and a pin at the other end. The link has a hole of one end and a pin at the other end.

**Flexible Dipper Arm**  
Model parameters are defined in the model workspace

# Simulink 중급 실습 - 간단히 살펴보기

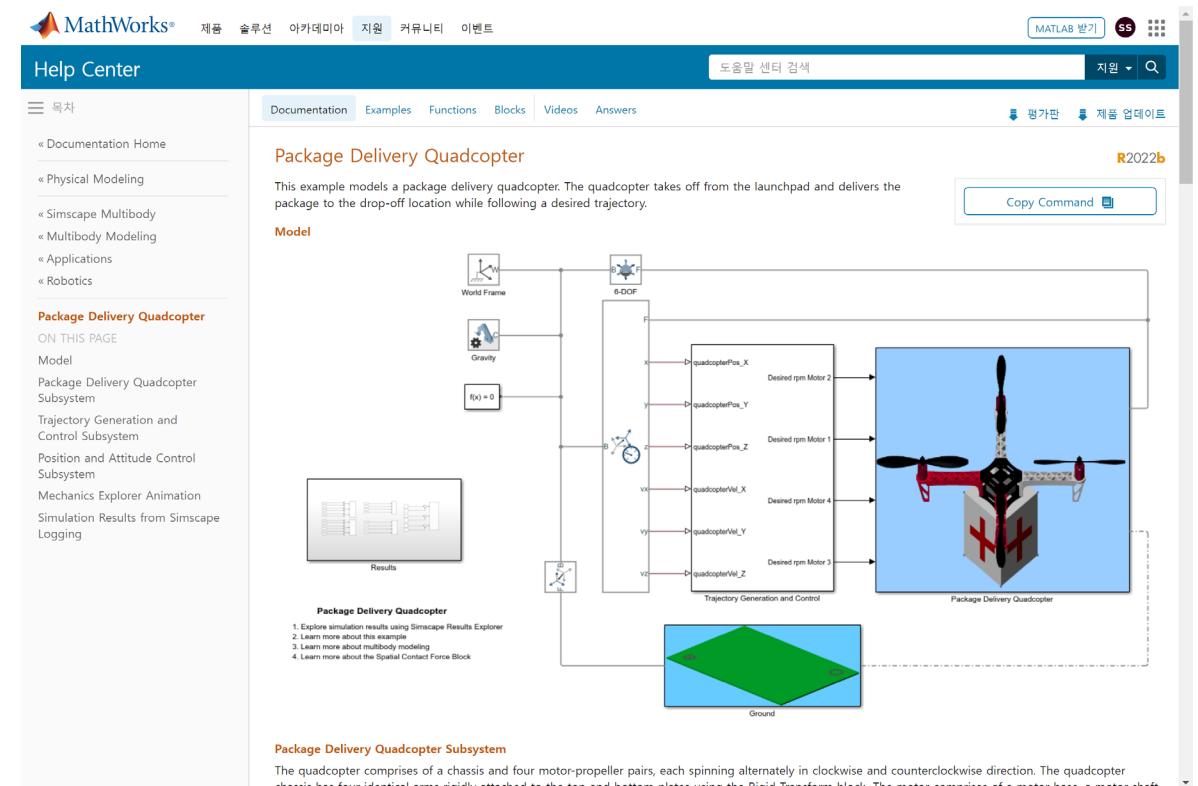
## Package Delivery Quadcopter

- 매틀랩 오픈

sm\_quadcopter

- 링크

<https://kr.mathworks.com/help/sm/ug/quadcopter.html>



# Simulink 중급 실습 - 간단히 살펴보기

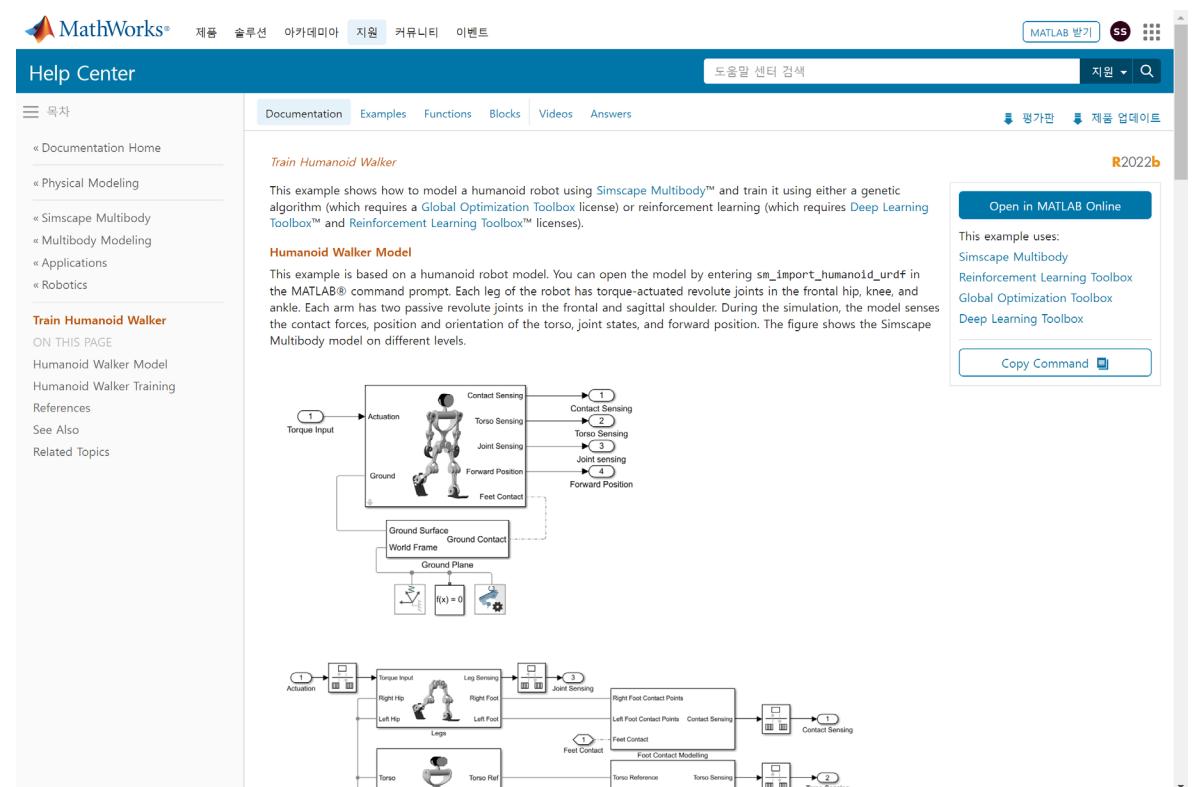
## Train Humanoid Walker

- 매틀랩 오픈

```
openExample('multibody_deeplearning/Train  
HumanoidWalkerExample')
```

- 링크

[https://kr.mathworks.com/help/sm/ug/humanoid\\_walker.html](https://kr.mathworks.com/help/sm/ug/humanoid_walker.html)



---

# Content

## ■ Matlab 고급 실습 – 딥러닝 Toolbox

1. 분류를 수행하는 간단한 딥러닝 신경망 만들기
2. 심층 신경망 디자이너를 사용하여 간단한 영상 분류 신경망 만들기

# Matlab 고급 실습 - 딥러닝 Toolbox

## Deep Learning Toolbox

### • 링크

분류를 수행하는 간단한 딥러닝 신경망 만들기

<https://kr.mathworks.com/help/deeplearning/ug/create-simple-deep-learning-network-for-classification.html>

심층 신경망 디자이너를 사용하여 간단한 영상 분류 신경망 만들기

<https://kr.mathworks.com/help/deeplearning/gs/create-simple-image-classification-network-using-deep-network-designer.html>

The screenshot shows the MathWorks website's help center for the Deep Learning Toolbox. The top navigation bar includes links for 제품 (Products), 솔루션 (Solutions), 아카데미아 (Academia), **지원 (Support)**, 커뮤니티 (Community), and 이벤트 (Events). A MATLAB logo is in the top right. The main content area has a blue header "도움말 센터" (Help Center) with tabs for 문서 (Documentation), 예제 (Examples), 함수 (Functions), 블록 (Blocks), 앱 (Apps), 비디오 (Videos), and Answers. Below this is a search bar and a dropdown menu. The main content area displays information about the Deep Learning Toolbox, including its capabilities for creating neural networks for classification and image processing. It also mentions other toolboxes like Curve Fitting Toolbox and Statistics and Machine Learning Toolbox. At the bottom, there are sections for "Deep Learning Toolbox 시작하기" (Getting Started) and "Deep Learning Toolbox 시작하기" (Getting Started).

# Simulink 고급 실습 - 딥러닝 Toolbox

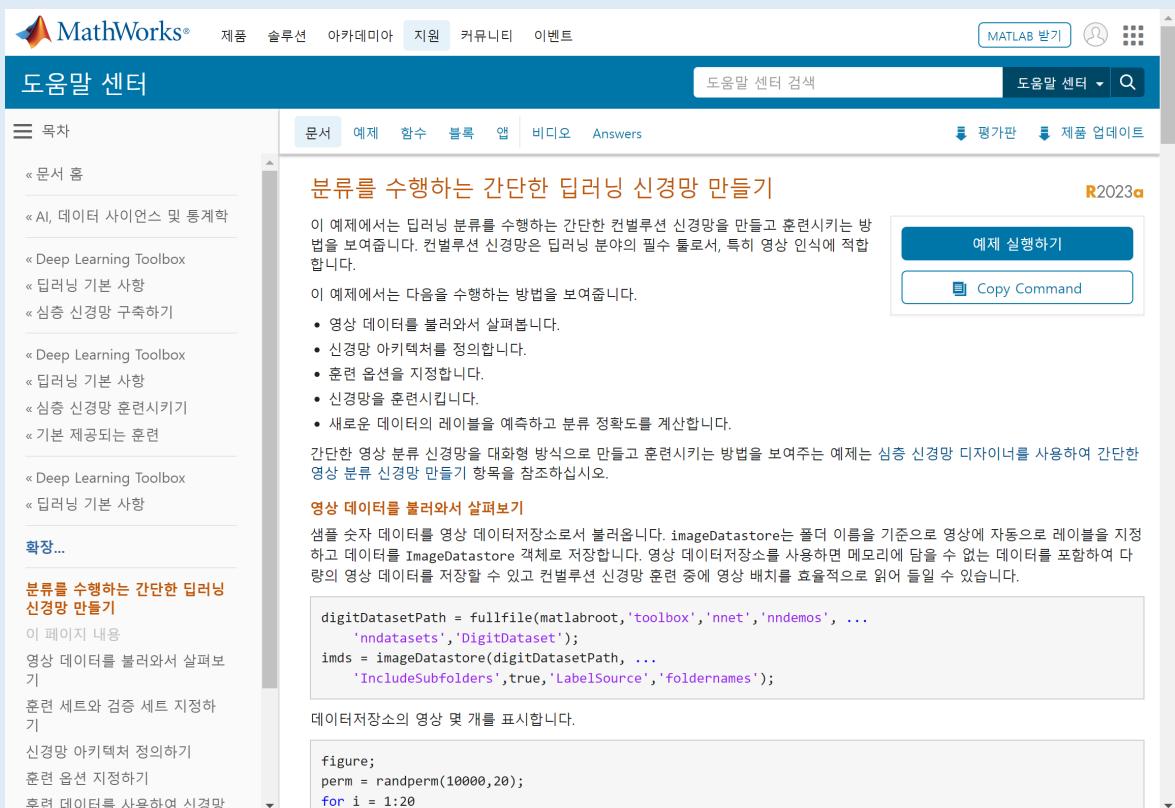
## #1 - 분류를 수행하는 간단한 딥러닝 신경망 만들기

### • 매틀랩

`openExample('nnet/TrainABasicConvolutionalNeuralNetworkForClassificationExample')`

### • 링크

<https://kr.mathworks.com/help/deeplearning/ug/create-simple-deep-learning-network-for-classification.html>



# Simulink 고급 실습 - 딥러닝 Toolbox

## #2 - 심층 신경망 디자이너를 사용하여 간단한 영상 분류 신경망 만들기

- 매틀랩

openExample('nnet/CreateImageClassificationNetworkUsingDeepNetworkDesignerExample')

- 링크

<https://kr.mathworks.com/help/deeplearning/gs/create-simple-image-classification-network-using-deep-network-designer.html>

The screenshot shows the MATLAB documentation interface for the Deep Learning Toolbox. The main title is "심층 신경망 디자이너를 사용하여 간단한 영상 분류 신경망 만들기". The page content includes a brief introduction, a bulleted list of steps, and a code snippet for creating a dataset. A "Copy Command" button is visible. The sidebar contains links related to the Deep Learning Toolbox and its sub-components.

도움말 센터

도움말 센터 검색

도움말 센터 ▾

문서 예제 함수 블록 앱 비디오 Answers

R2023a

예제 실행하기

Copy Command

심층 신경망 디자이너를 사용하여 간단한 영상 분류 신경망 만들기

이 예제에서는 심층 신경망 디자이너를 사용하여 딥러닝 분류용으로 간단한 컨벌루션 신경망을 만들고 훈련시키는 방법을 보여줍니다. 컨벌루션 신경망은 딥러닝 분야의 필수 툴로서, 특히 영상 인식에 적합합니다.

이 예제에서는 다음을 수행합니다.

- 영상 데이터를 가져옵니다.
- 신경망 아키텍처를 정의합니다.
- 훈련 옵션을 지정합니다.
- 신경망을 훈련시킵니다.

데이터 불러오기

샘플 숫자 데이터를 영상 데이터저장소로 불러옵니다. `imagedatastore` 함수는 폴더 이름을 기준으로 영상에 자동으로 레이블을 지정합니다. 데이터 세트는 10개의 클래스를 갖고 데이터 세트의 각 영상은  $28 \times 28 \times 1$  픽셀입니다.

```
digitDatasetPath = fullfile(matlabroot,'toolbox','nnet','nnemos',...
    'nndatasets','DigitDataset');
```

```
imds = imagedatastore(digitDatasetPath, ...
    'IncludeSubfolders',true, ...
    'LabelSource','foldernames');
```

심층 신경망 디자이너를 엽니다. 심층 신경망 디자이너를 사용하여 신경망을 만들고, 데이터를 가져와서 시작화하고, 신경망을 훈련시킵니다.

deepNetworkDesigner

빈 신경망을 만들기 위해 **빈 신경망**에서 잠시 멈추고 **새로 만들기**를 클릭합니다.

영상 데이터저장소를 가져오기 위해 **데이터** 탭을 선택하고 **데이터 가져오기 > 영상 분류 데이터 가져오기**를 클릭합니다. 데이터 소스를 선택한 후 데이터를 가져온 후에는 **데이터 가져오기** 버튼을 클릭합니다.

---

# Content

## ■ Simlink 고급 실습 - Simscape

### 1. Essential Steps for Constructing a Physical Model

Step 1: Create New Model Using `ssc_new`

Step 2: Assemble Physical Network

Step 3: Adjust Block Parameters and Variable Targets

Step 4: Add Sources

Step 5: Add Sensors

Step 6: Connect to Simulink with Interface Blocks

Step 7: Simulate Model

Step 8: View Simulation Results

# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

- 링크

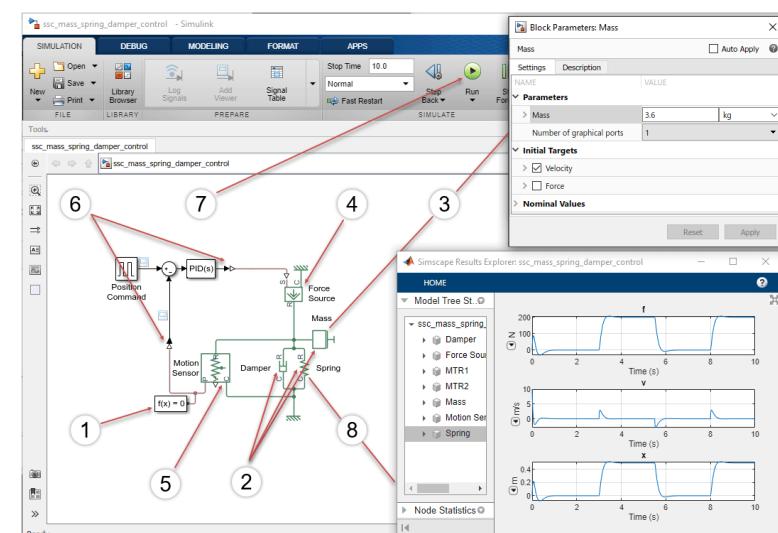
### Essential Steps for Constructing a Physical Model

<https://kr.mathworks.com/help/simscape/gs/essential-steps-for-constructing-a-physical-model.html>

### Basic Principles of Modeling Physical Networks

<https://kr.mathworks.com/help/simscape/ug/basic-principles-of-modeling-physical-networks.html>

The screenshot shows the MathWorks Help Center interface. The left sidebar contains a navigation tree with categories like Documentation Home, Physical Modeling, Simscape, and Mechanical Models. The main content area is titled 'Essential Steps for Constructing a Physical Model'. It includes a 'Workflow Overview' table listing eight steps from 'Create New Model Using ssc\_new' to 'View Simulation Results'. Each step has a corresponding link to detailed documentation. A 'Related Topics' section on the right provides links to topics such as 'Setting Up Solvers for Physical Models', 'Basic Principles of Modeling Physical Networks', and 'Modeling Best Practices'.



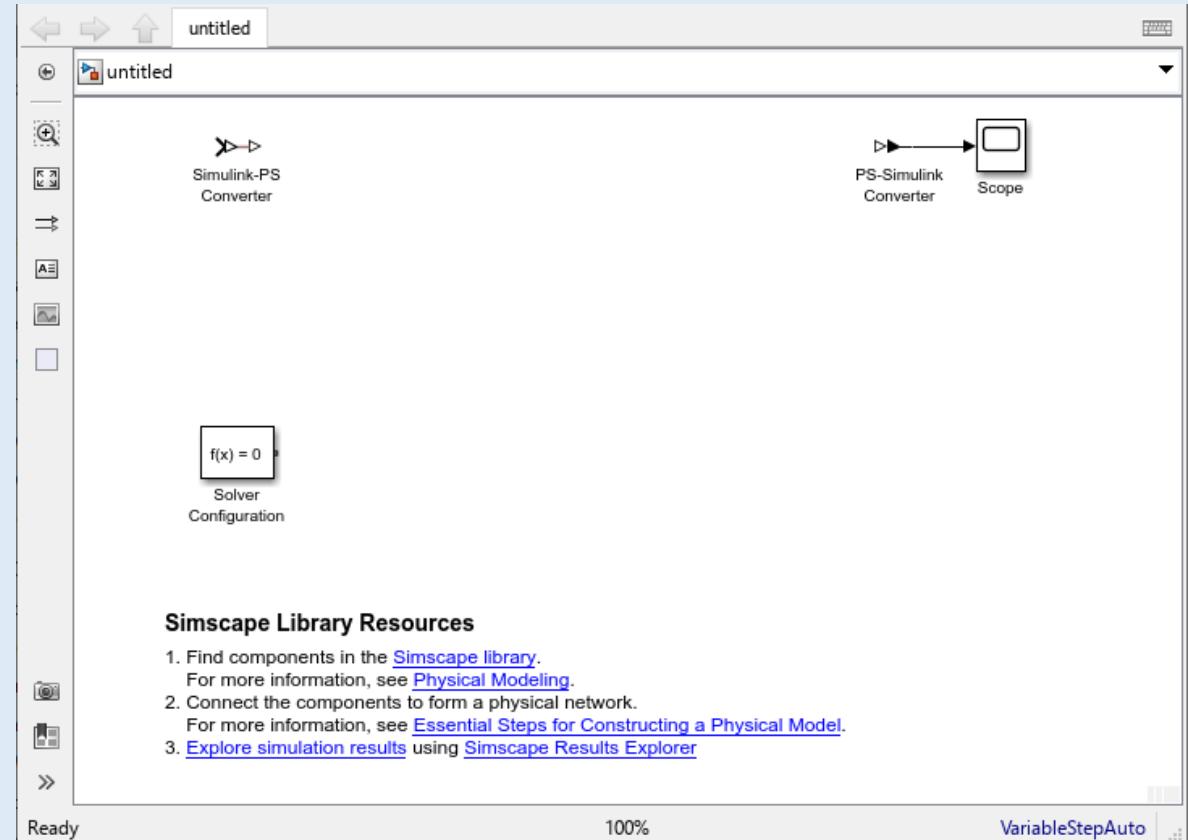
# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

### Step 1: Create New Model Using ssc\_new

MATLAB 명령창에 입력:

```
>> ssc_new
```



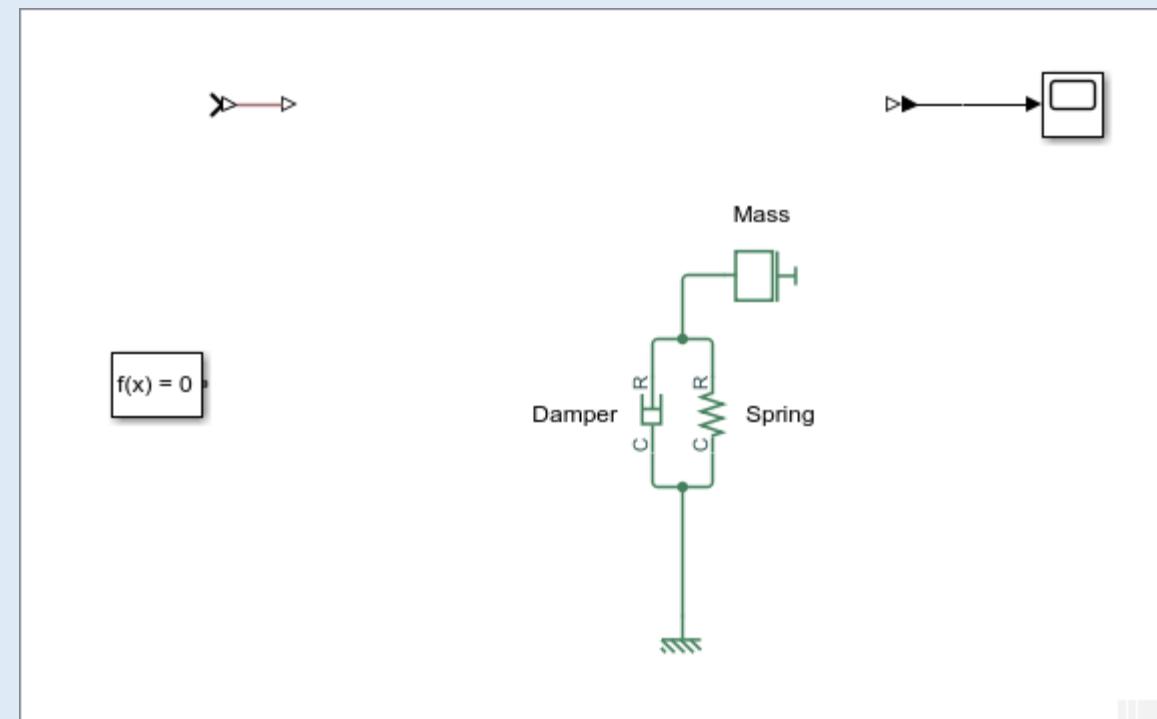
# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

### Step 2: Assemble Physical Network

Simscape > Foundation Library > Mechanical >  
Translational Elements에서

Mass, Translational Spring, Translational  
Damper, and Mechanical Translational  
Reference 블록 추가



## Essential Steps for Constructing a Physical Model

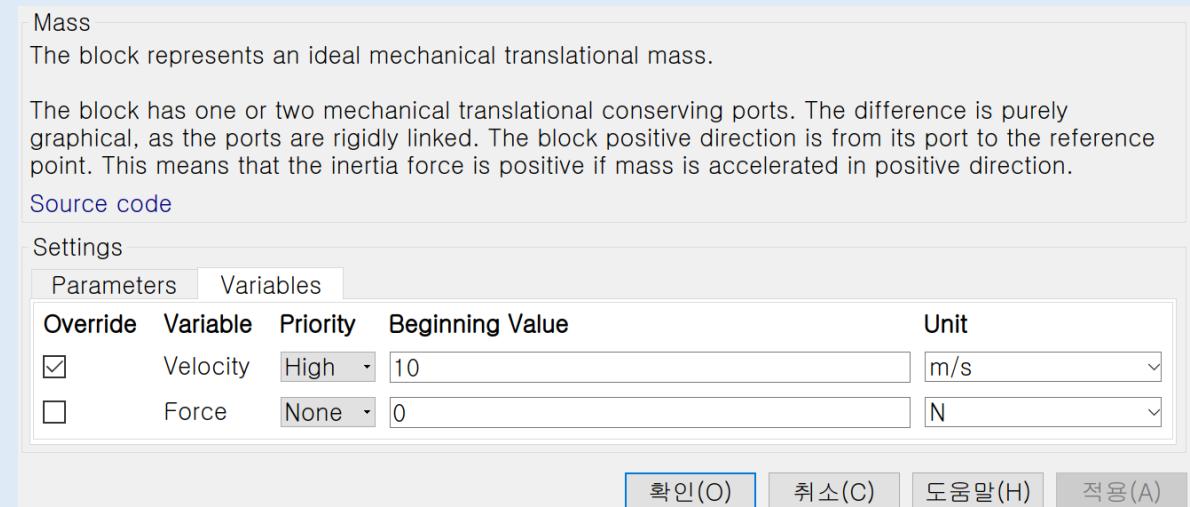
### Step 3: Adjust Block Parameters and Variable Targets

Spring rate : 400 N/m

Damping coefficient : 100 N/(m/s)

Mass : 3.6 kg

- Initial Targets > Velocity : 10



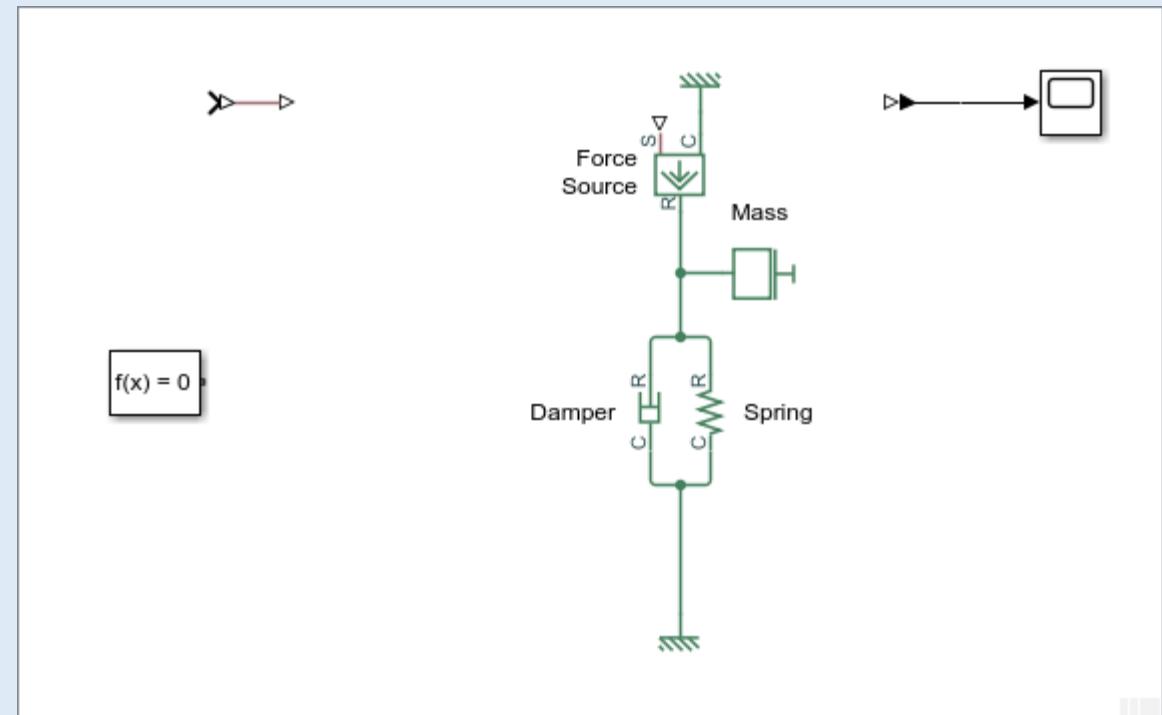
# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

### Step 4: Add Sources

Simscape > Foundation Library > Mechanical >  
Mechanical Sources에서

Ideal Force Source 블록 추가



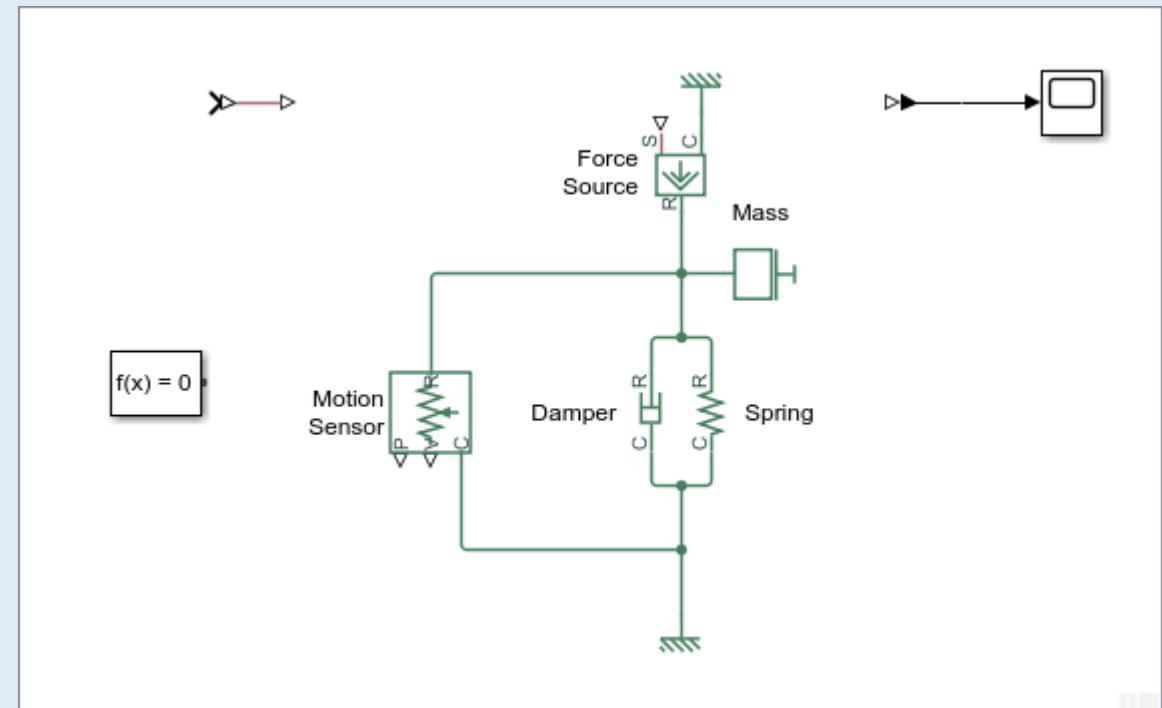
# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

### Step 5: Add Sensors

Simscape > Foundation Library > Mechanical >  
Mechanical Sensors에서

Ideal Translational Motion Sensor 블록 추가



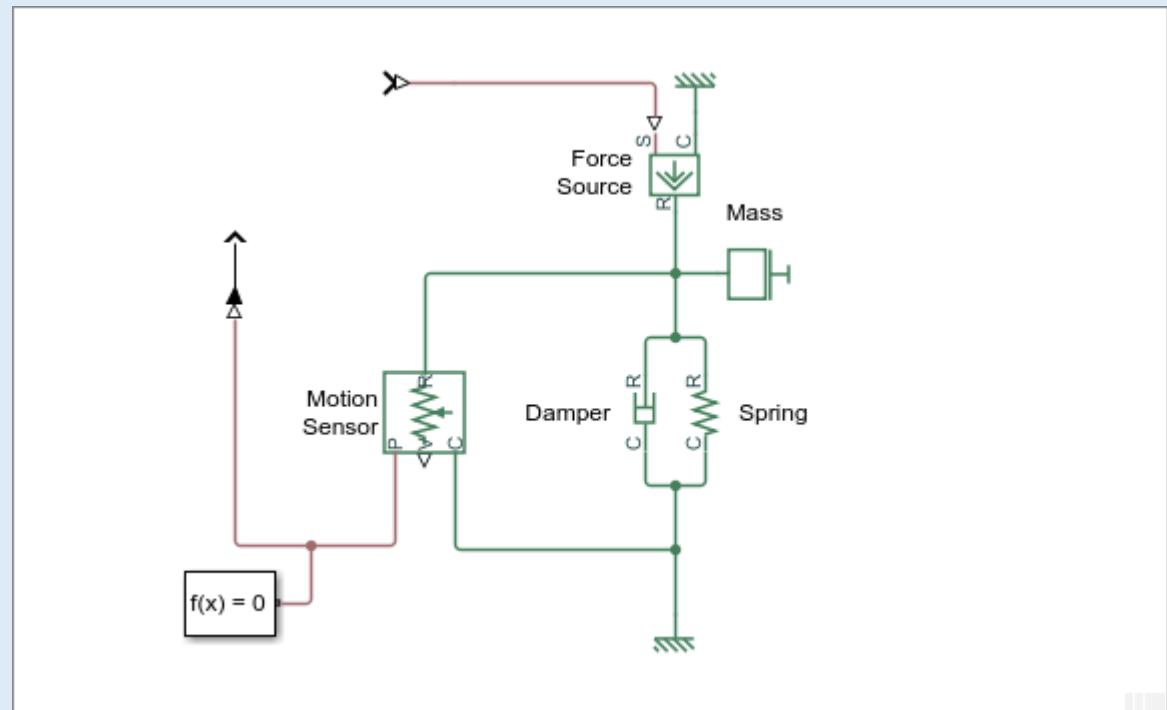
## Essential Steps for Constructing a Physical Model

### Step 6: Connect to Simulink with Interface Blocks

Simulink-PS Converter의 출력을 Force Source  
블록의 S 포트에 연결

Motion Sensor 블록의 P 포트를 PS-Simulink  
Converter의 입력에 연결

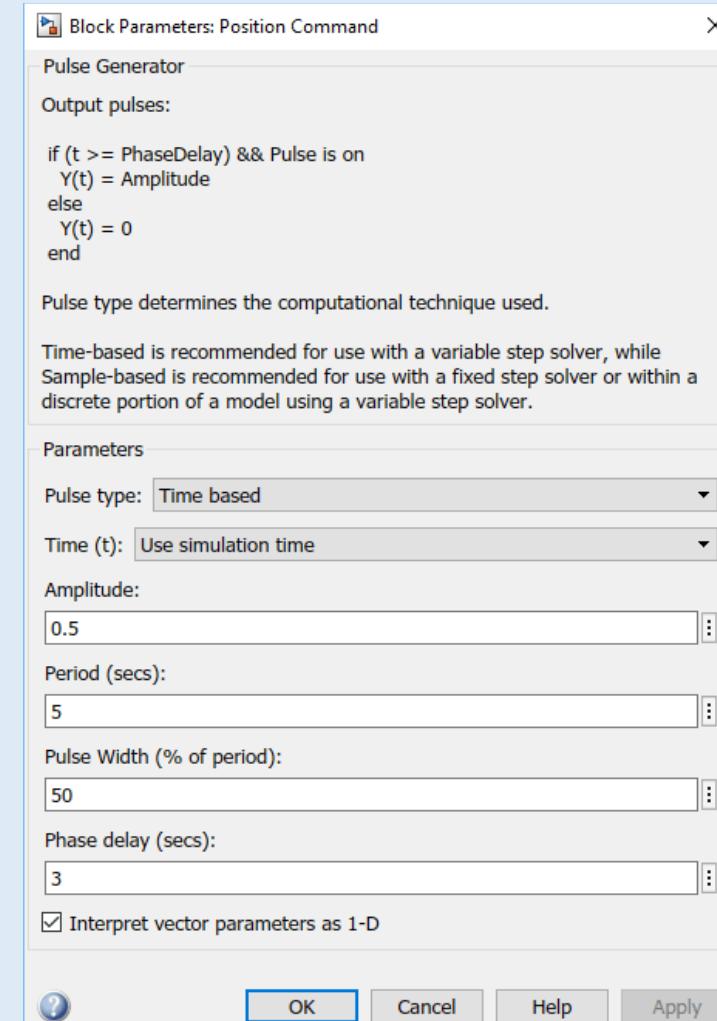
Solver Configuration 블록을 Motion Sensor 블록  
의 P 포트와 PS-Simulink Converter와 같이 연결



## Essential Steps for Constructing a Physical Model

### Step 6: Connect to Simulink with Interface Blocks

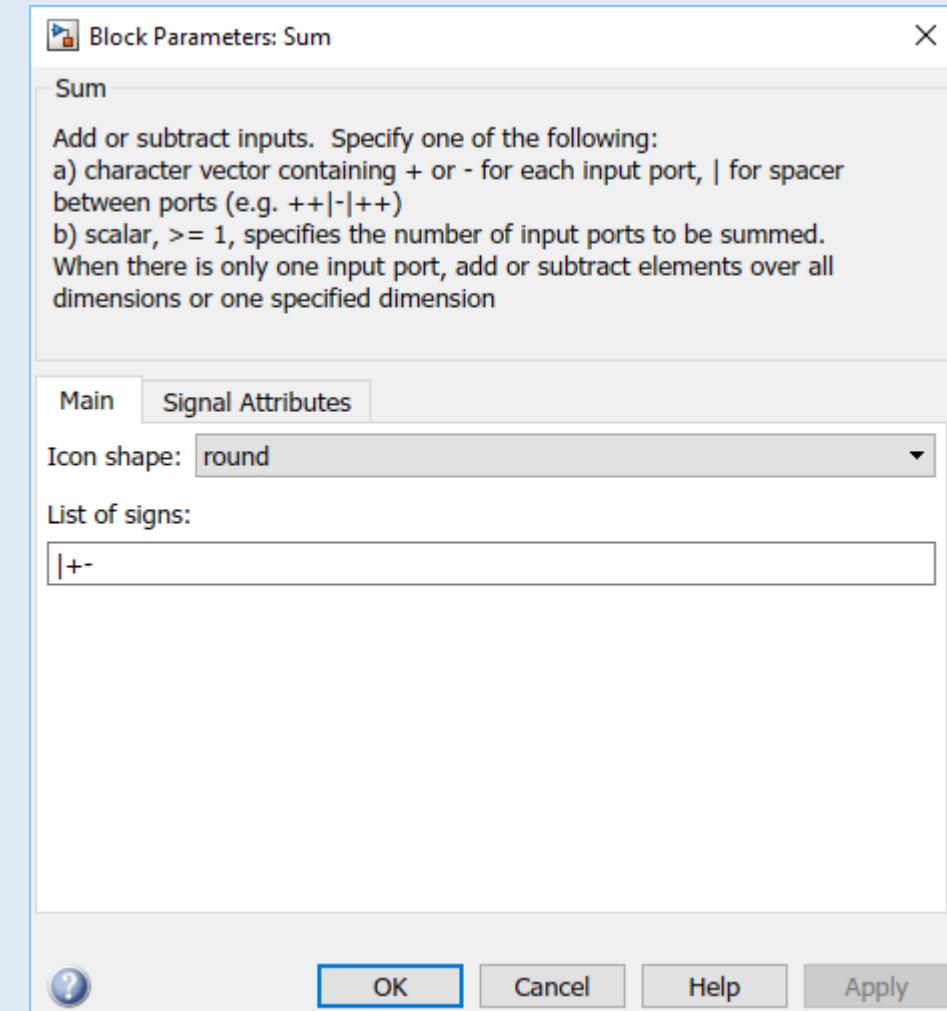
Simulink > Sources에서 Pulse Generator 블록 추가



## Essential Steps for Constructing a Physical Model

### Step 6: Connect to Simulink with Interface Blocks

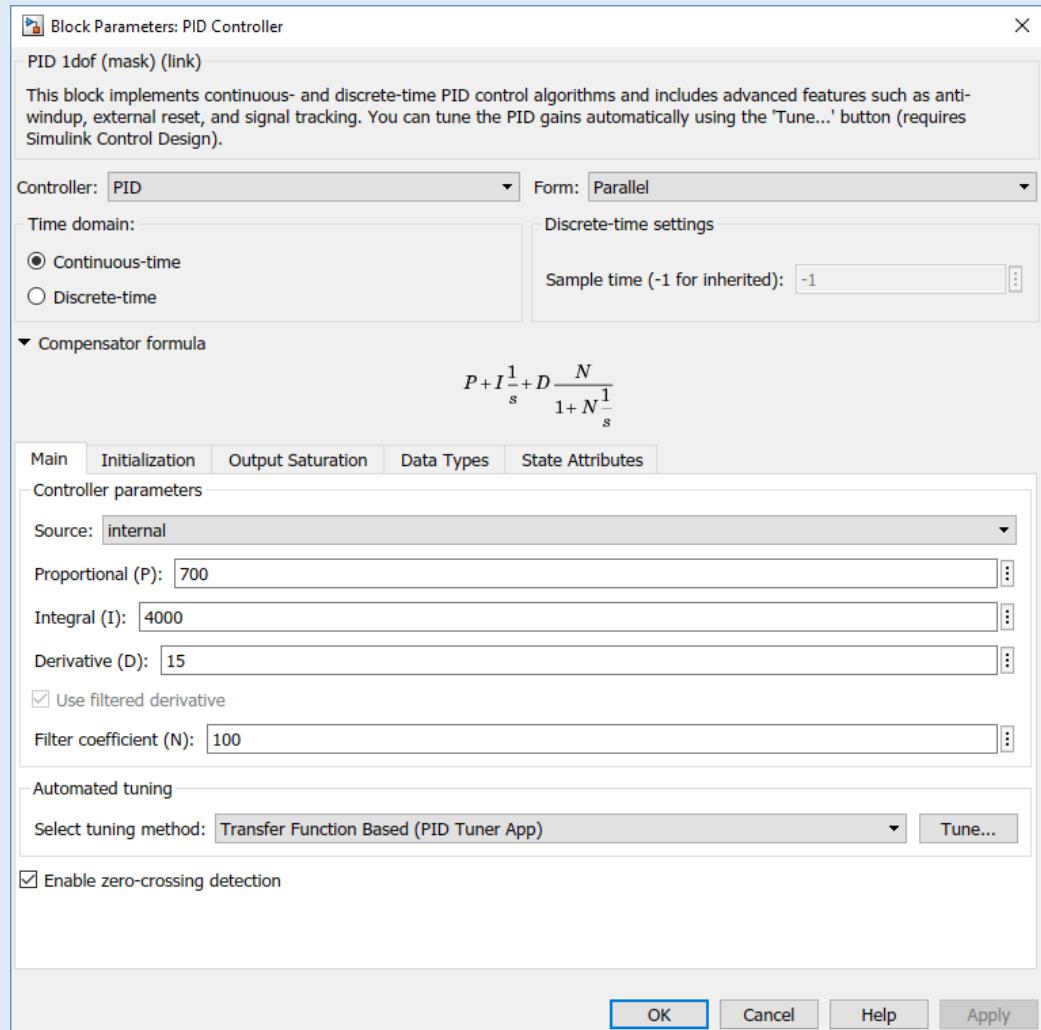
Simulink > Math Operations에서 Sum 블록 추가



## Essential Steps for Constructing a Physical Model

### Step 6: Connect to Simulink with Interface Blocks

Simulink > Continuous에서 PID Controller 블록 추가



## Essential Steps for Constructing a Physical Model

### Step 6: Connect to Simulink with Interface Blocks

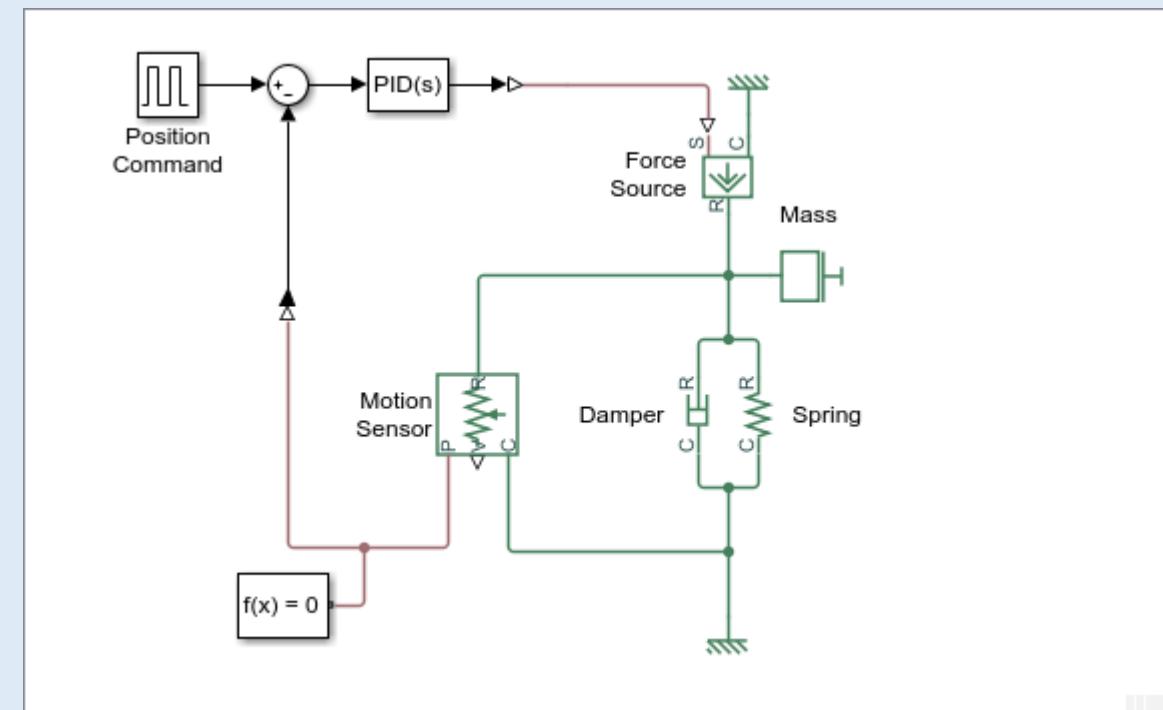
그림과 같이 연결

1. Pulse Generator블록에서 나오는 신호를 우클릭

› Create & Connect Viewer › Simulink › Scope  
클릭

2. PS-Simulink Converter 블록에서 나오는 신호를  
우클릭

› Connect To Viewer › Scope 클릭

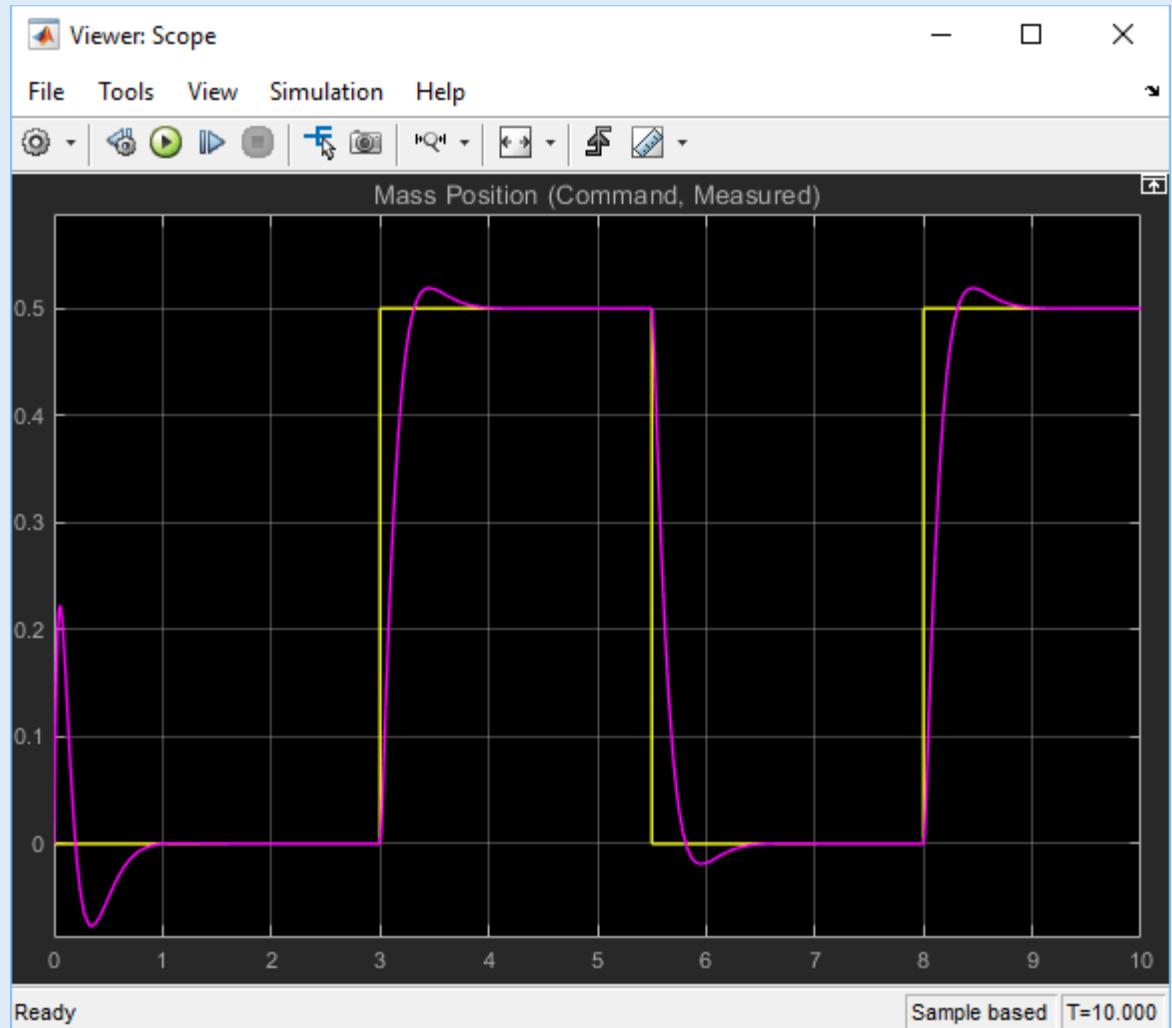


# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

### Step 7: Simulate Model

시뮬레이션 실행



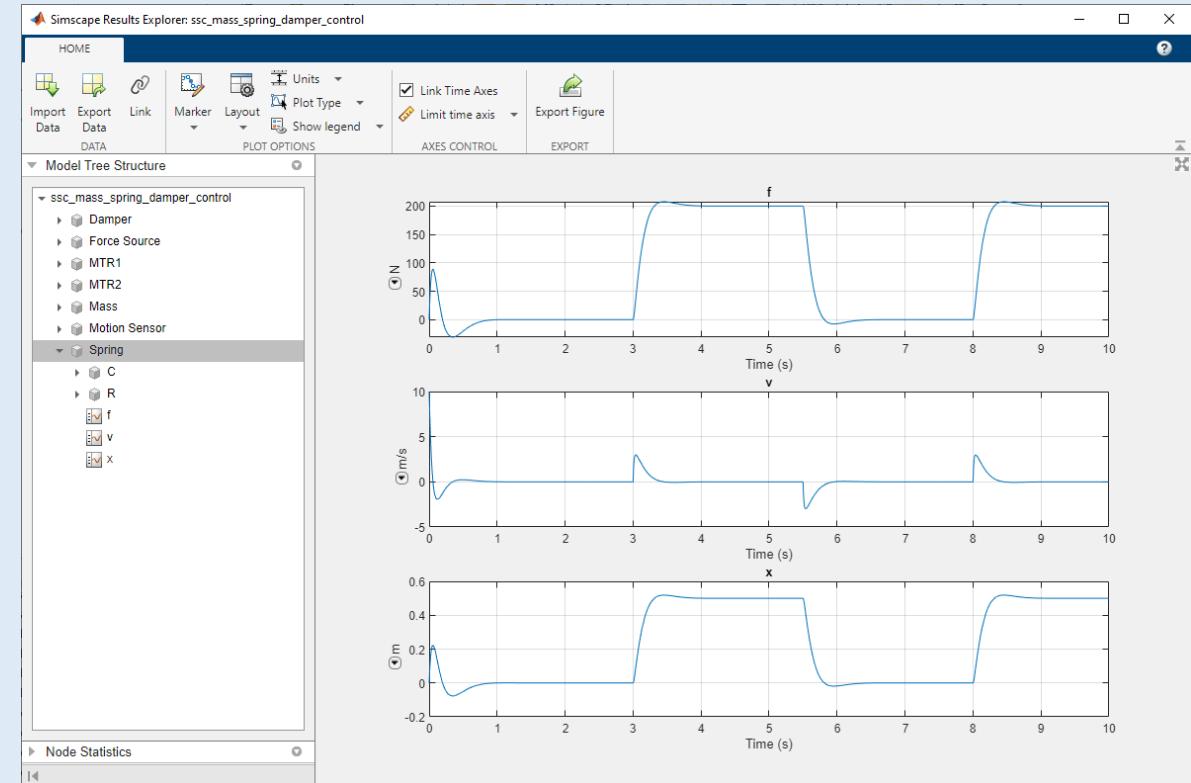
# Simlink 고급 실습 – Simscape

## Essential Steps for Constructing a Physical Model

### Step 8: View Simulation Results

Spring 블록 우클릭

Simscape > View simulation data > simlog 클릭



---

# Content

## ■ Simulink 고급 실습 - 딥러닝 Toolbox

1. Classify Images in Simulink Using GoogLeNet
2. Classify Images in Simulink with Imported TensorFlow Network
3. Lane and Vehicle Detection in Simulink Using Deep Learning

# Simulink 고급 실습 - 딥러닝 Toolbox

## Deep Learning Toolbox

- 링크

[https://kr.mathworks.com/help/deeplearning/index.html? s\\_tid=CRUX\\_lftnav](https://kr.mathworks.com/help/deeplearning/index.html? s_tid=CRUX_lftnav)

The screenshot shows the MathWorks website with the Deep Learning Toolbox documentation. The top navigation bar includes links for 제품 (Products), 솔루션 (Solutions), 아카데미아 (Academia), 지원 (Support), 커뮤니티 (Community), and 이벤트 (Events). A MATLAB logo is in the top right. The main title is "도움말 센터" (Help Center) with a sub-section for "Deep Learning Toolbox". The left sidebar lists various toolboxes: Curve Fitting Toolbox, Deep Learning Toolbox, Statistics and Machine Learning Toolbox, and Text Analytics Toolbox. The main content area describes the Deep Learning Toolbox's capabilities, mentioning ConvNet, CNN, LSTM, GAN, Siamese network, TensorFlow, PyTorch, ONNX, and DarkNet-53, ResNet-50, NASNet, SqueezeNet models. It also discusses parallel computing and GPU support. A "Deep Learning Toolbox 시작하기" (Getting Started) section provides basic usage information.

# Simulink 고급 실습 - 딥러닝 Toolbox

## Deep Learning Toolbox

- 링크

[https://kr.mathworks.com/help/deeplearning/examples.html?s\\_tid=CRUX\\_topnav](https://kr.mathworks.com/help/deeplearning/examples.html?s_tid=CRUX_topnav)

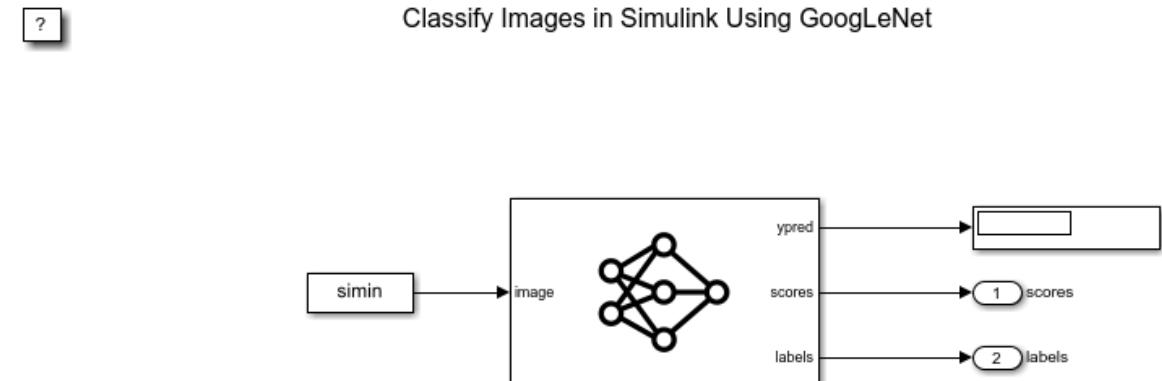
The screenshot shows the MathWorks Deep Learning Toolbox documentation page. At the top, there's a navigation bar with links for 제품 (Products), 솔루션 (Solutions), 아카데미아 (Academia), 지원 (Support), 커뮤니티 (Community), and 이벤트 (Events). A MATLAB logo and a "MATLAB 빙기" button are also present. The main content area has a blue header "도움말 센터". Below it, there's a sidebar with sections like "도움말 센터", "문서", "예제", "함수", "블록", "앱", "비디오", and "Answers". A search bar and a "자원" dropdown menu are at the top right. The main content area features several examples: "Deep Learning Toolbox 시작하기" (Getting Started with Deep Learning Toolbox) showing a coffee mug image and a probability bar; "딥러닝을 사용하여 웹캠 영상 분류하기" (Classifying Webcam Videos Using Deep Learning) showing a video frame and a neural network diagram; "새로운 영상을 분류하도록 딥러닝 신경망 훈련시키기" (Train a Deep Learning Network to Classify New Videos) showing a time-series plot; "딥러닝을 사용한 시계열 전망" (Perform Time Series Forecasting Using Deep Learning); "이 예제에서는 장단기 기억 (LSTM) 신경망을 사용하여 시계열 데이터를 전망하는 방법을 보여줍니다." (This example shows how to forecast time series data using long short-term memory (LSTM) networks); "사전 훈련된 신경망을 사용하여 영상 분류하기" (Classify Images Using Pretrained Networks) showing a bell pepper image and a neural network diagram; "전이 학습 시작하기" (Getting Started with Transfer Learning); and "이 예제에서는 사전 훈련된 컨볼루션 신경망의 구조를 재사용하여 이미지를 분류하는 방법을 보여줍니다." (This example shows how to reuse the structure of a pretrained convolutional neural network to classify images).

# Simulink 고급 실습 - 딥러닝 Toolbox

## #1 – Classify Images in Simulink Using GoogLeNet

- 매틀랩

```
openExample('deeplearning_shared/GoogLeNetImageClassificationSimulinkExample')
```



- 링크

<https://kr.mathworks.com/help/deeplearning/ug/simulink-image-classification-googlenet.html>

- Addons

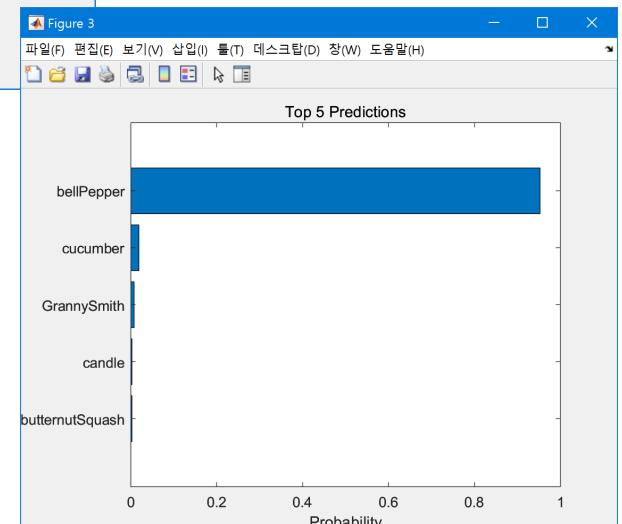
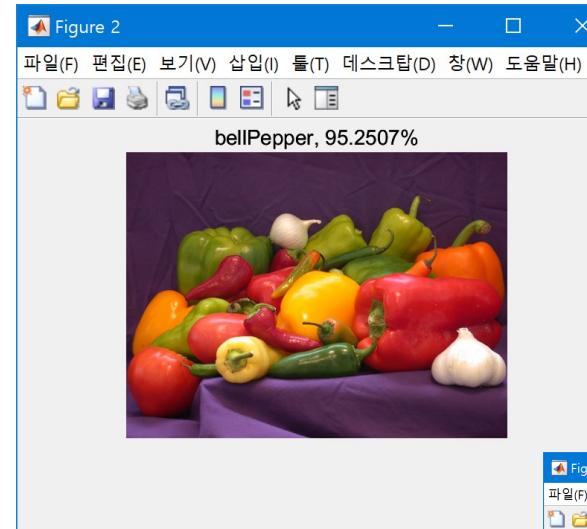
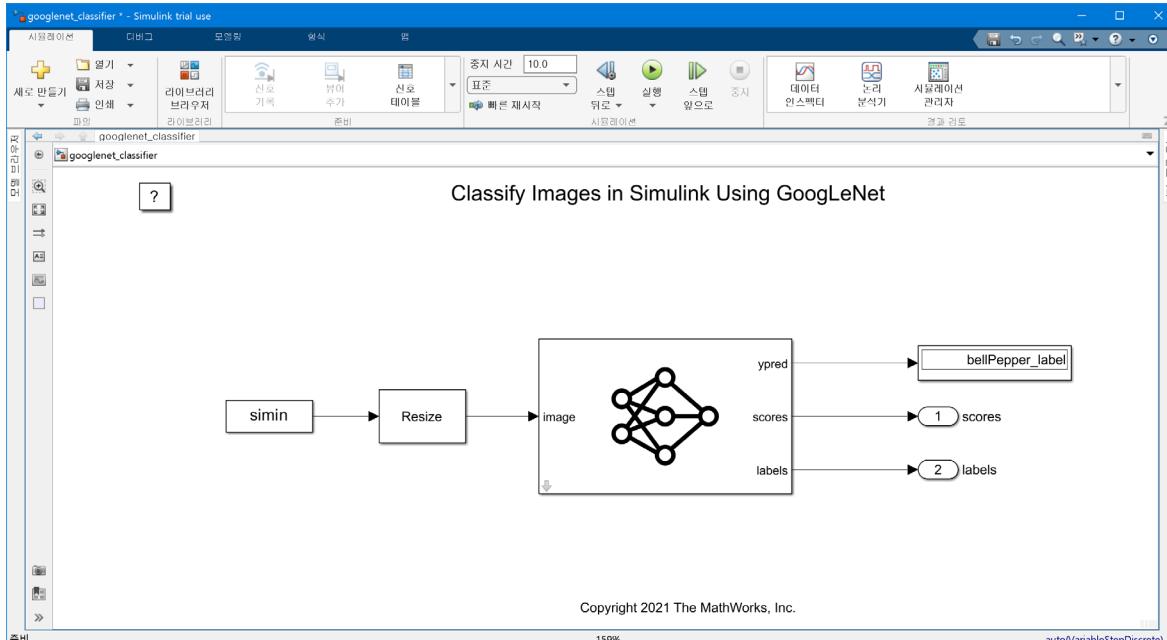
Deep Learning Toolbox Model for ResNet-50 Network

Deep Learning Toolbox Model for GoogLeNet Network

Copyright 2021 The MathWorks, Inc.

# Simulink 고급 실습 - 딥러닝 Toolbox

## #1 – Classify Images in Simulink Using GoogLeNet



Additional Data: <https://www.kaggle.com/competitions/imagenet-object-localization-challenge/data>

# Simulink 고급 실습 - 딥러닝 Toolbox

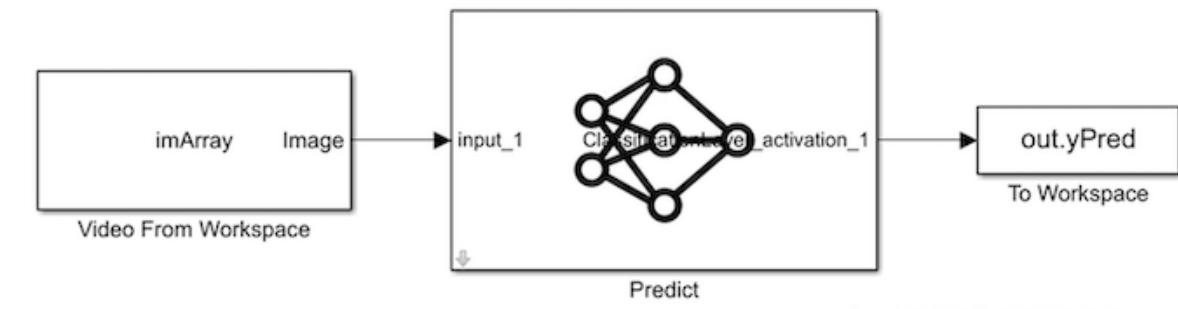
## #2 – Classify Images in Simulink with Imported TensorFlow Network

- 매틀랩

```
openExample('kerasimporter/ClassifySequen  
ceOfImagesInSimulinkWithTensorFlowNetwor  
kExample')
```

- 링크

<https://kr.mathworks.com/help/deeplearning/ug/classify-images-in-simulink-with-imported-tensorflow-network.html>

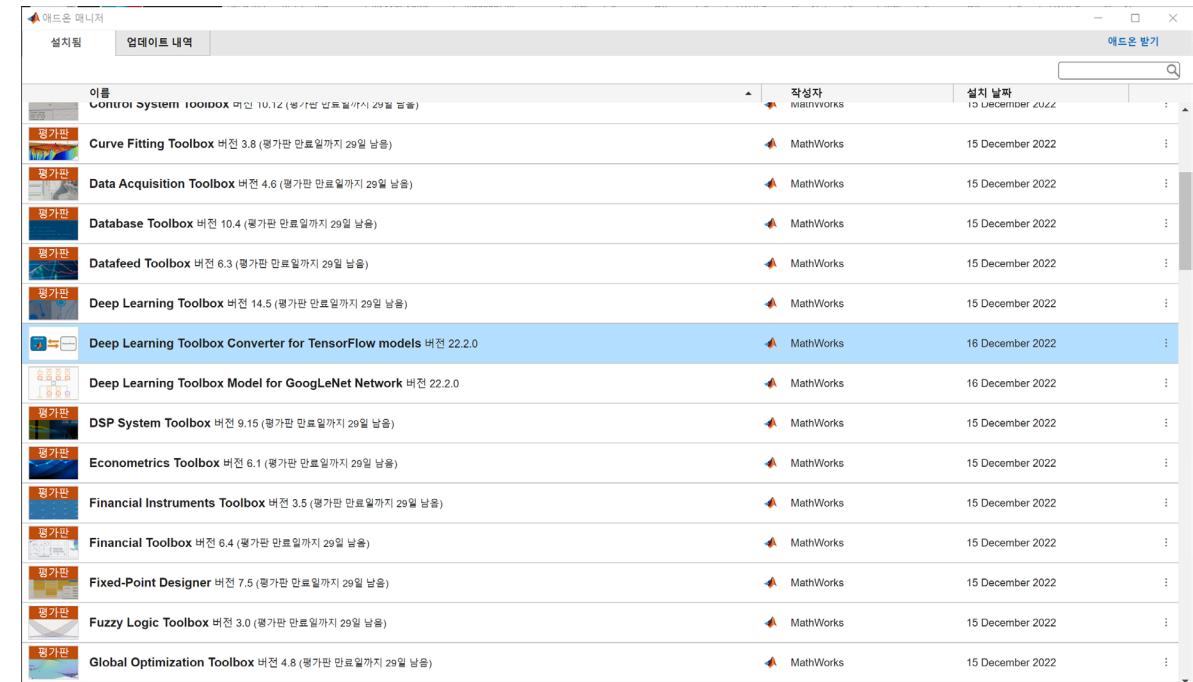
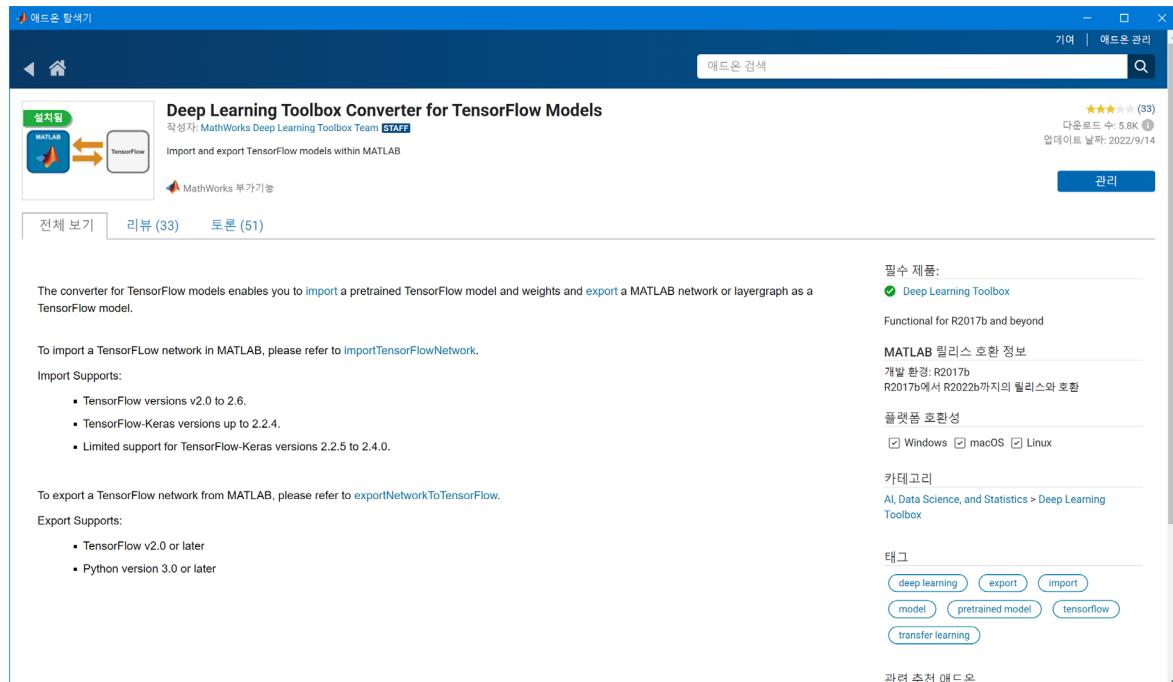


- Addons

Deep Learning Toolbox Converter for TensorFlow Models

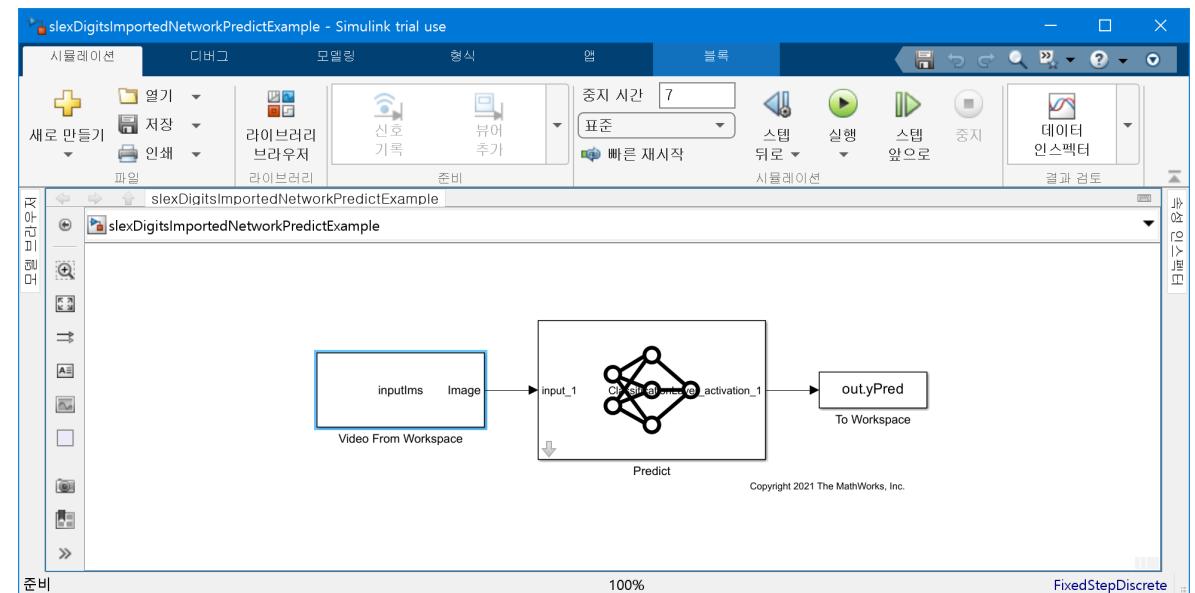
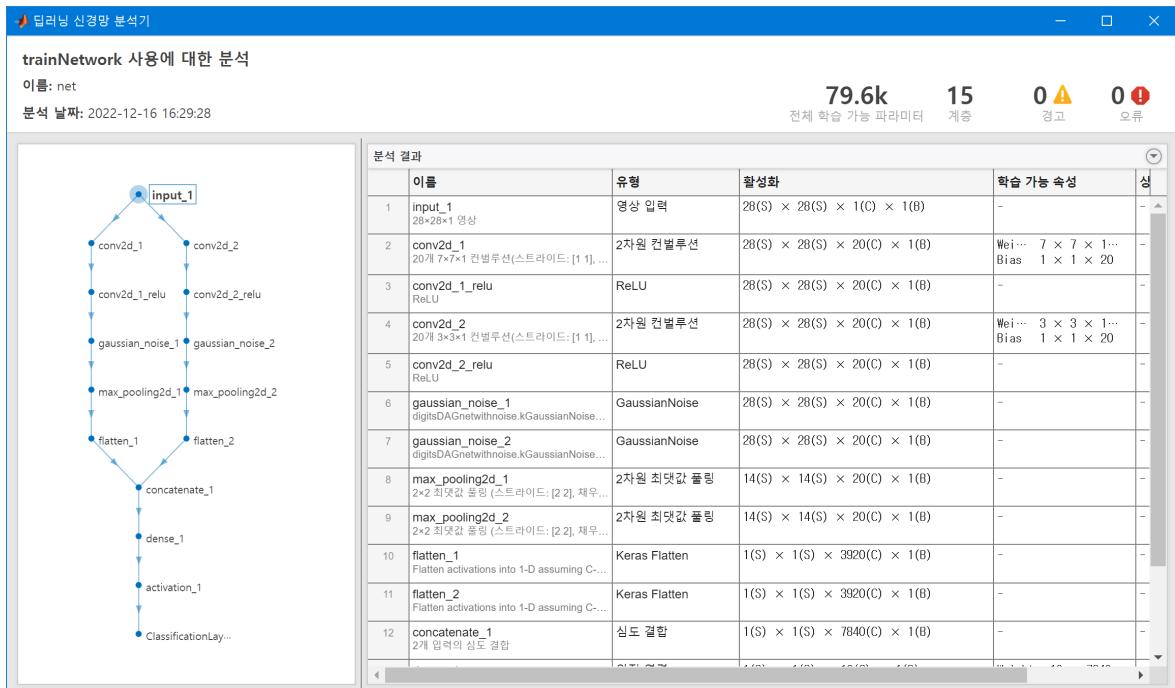
# Simulink 고급 실습 - 딥러닝 Toolbox

## #2 – Classify Images in Simulink with Imported TensorFlow Network



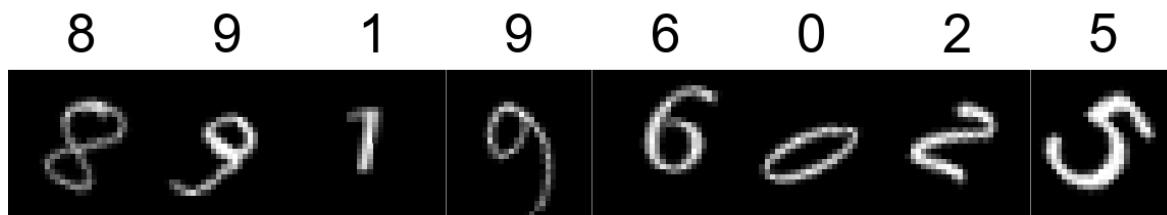
# Simulink 고급 실습 - 딥러닝 Toolbox

## #2 – Classify Images in Simulink with Imported TensorFlow Network



# Simulink 고급 실습 - 딥러닝 Toolbox

## #2 – Classify Images in Simulink with Imported TensorFlow Network



# Simulink 고급 실습 - 딥러닝 Toolbox

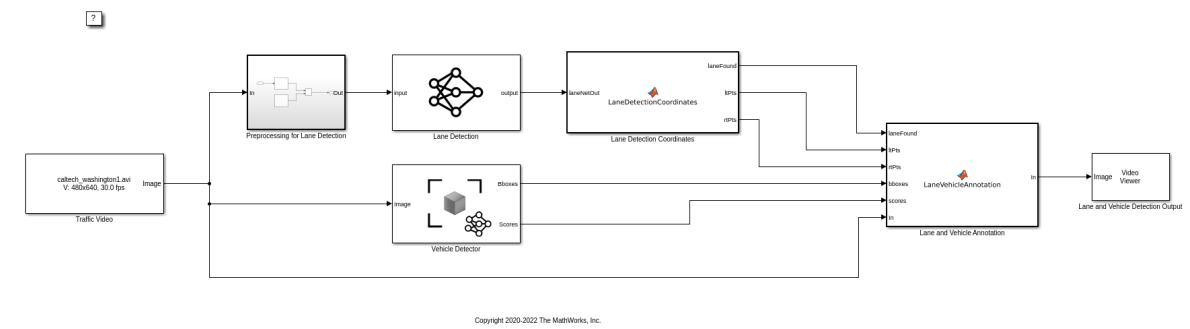
## #3 – Lane and Vehicle Detection in Simulink Using Deep Learning

- 매틀랩

```
openExample('deeplearning_shared/LaneVehicleDetectionInSimulinkUsingCNNExample')
```

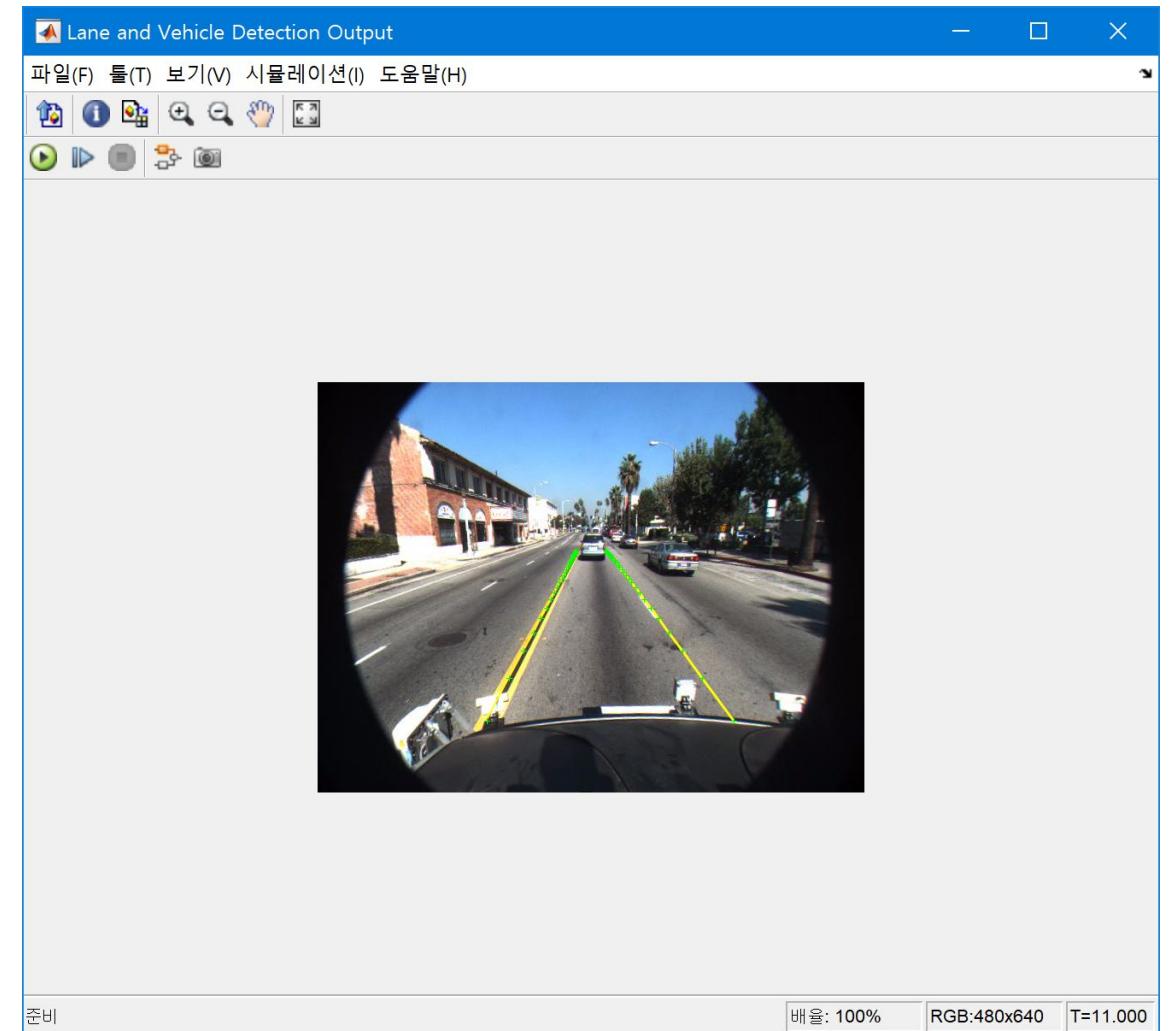
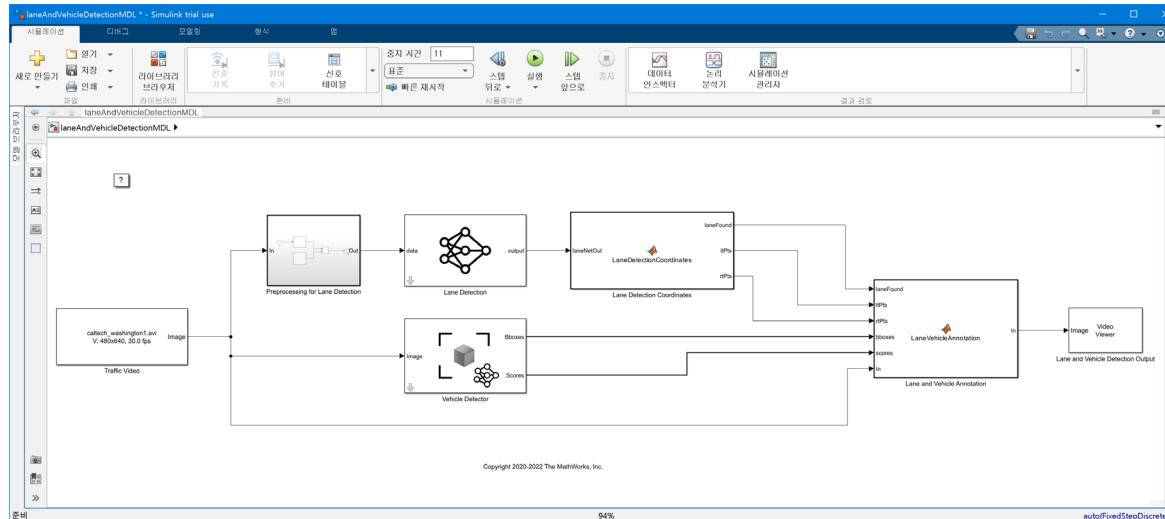
- 링크

<https://kr.mathworks.com/help/deeplearning/ug/lane-vehicle-detection-simulink-using-predict-block.html>



# Simulink 고급 실습 - 딥러닝 Toolbox

## #3 – Lane and Vehicle Detection in Simulink Using Deep Learning



---

# Content

## ■ Simulink 고급 실습 - 강화학습 Toolbox

1. Simulink 환경 만들기 및 에이전트 훈련시키기
2. Avoid Obstacles Using Reinforcement Learning for Mobile Robots
3. Train Biped Robot to Walk Using Reinforcement Learning Agents

# Simulink 고급 실습 - 강화학습 Toolbox

## Reinforcement Learning Toolbox

- Reinforcement Learning Toolbox (강화 학습을 사용하여 정책 설계 및 훈련)

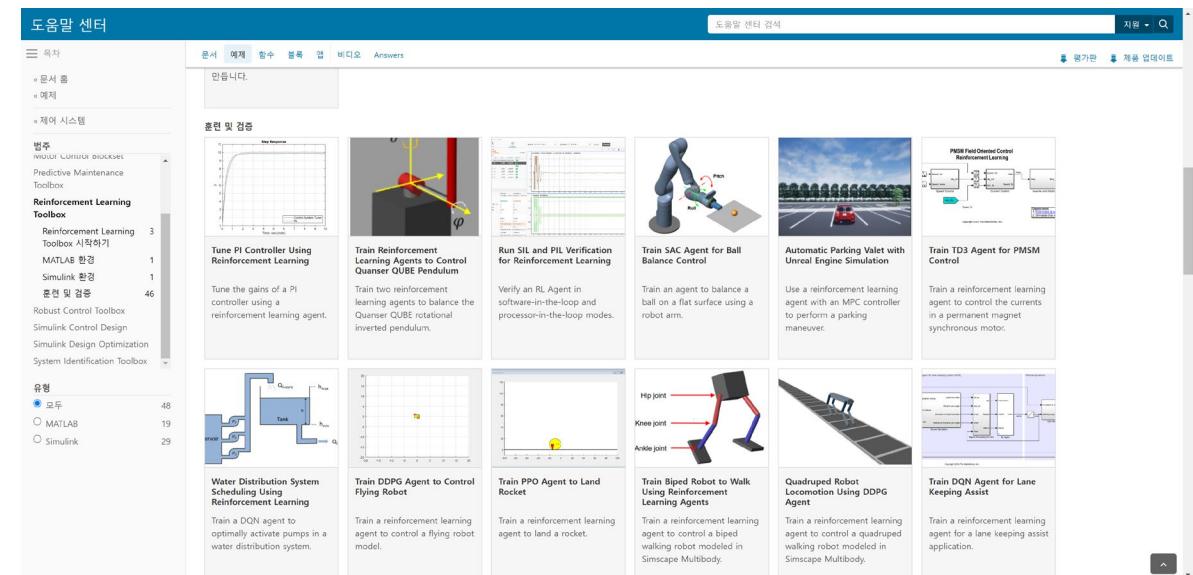
[https://kr.mathworks.com/help/reinforcement-learning/index.html?s\\_tid=CRUX\\_lftnav](https://kr.mathworks.com/help/reinforcement-learning/index.html?s_tid=CRUX_lftnav)

- Reinforcement Learning Toolbox — 예제

<https://kr.mathworks.com/help/reinforcement-learning/examples.html>

- Simulink 강화 학습 환경 만들기

<https://kr.mathworks.com/help/reinforcement-learning/ug/create-simulink-environments-for-reinforcement-learning.html>



# Simulink 고급 실습 - 강화학습 Toolbox

## #1 - Simulink 환경 만들기 및 에이전트 훈련시키기

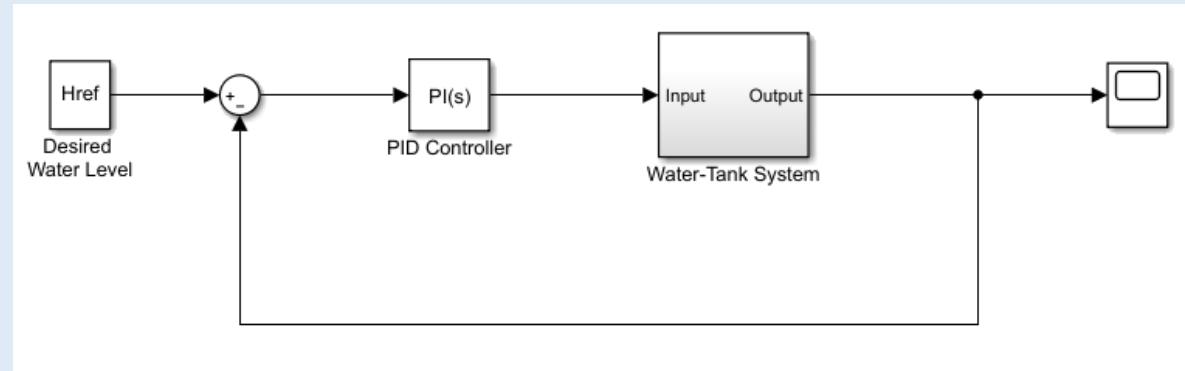
- 매틀랩

```
openExample('control_deeplearning/CreateSi  
mulinkEnvironmentAndTrainAgentExample')
```

- 링크

<https://kr.mathworks.com/help/reinforcement-learning/ug/create-simulink-environment-and-train-agent.html>

- 실습: PID 만들어보기
- 실습: Training
- 실습: Network 구조 변경해보기

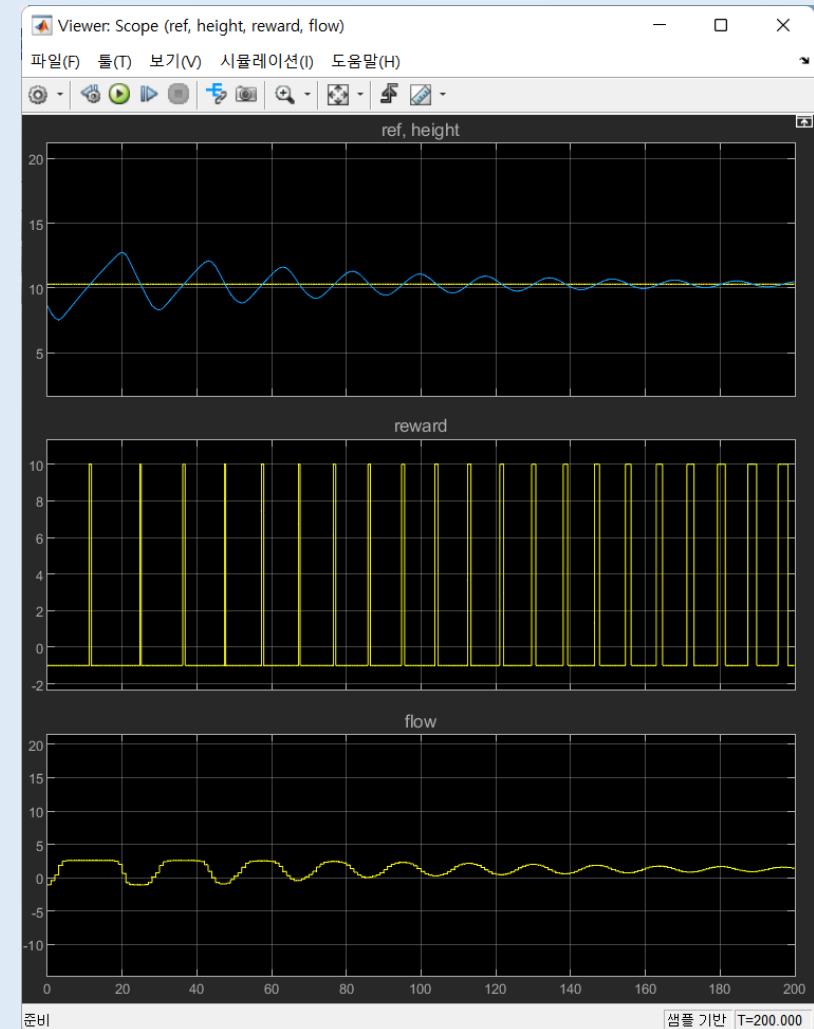
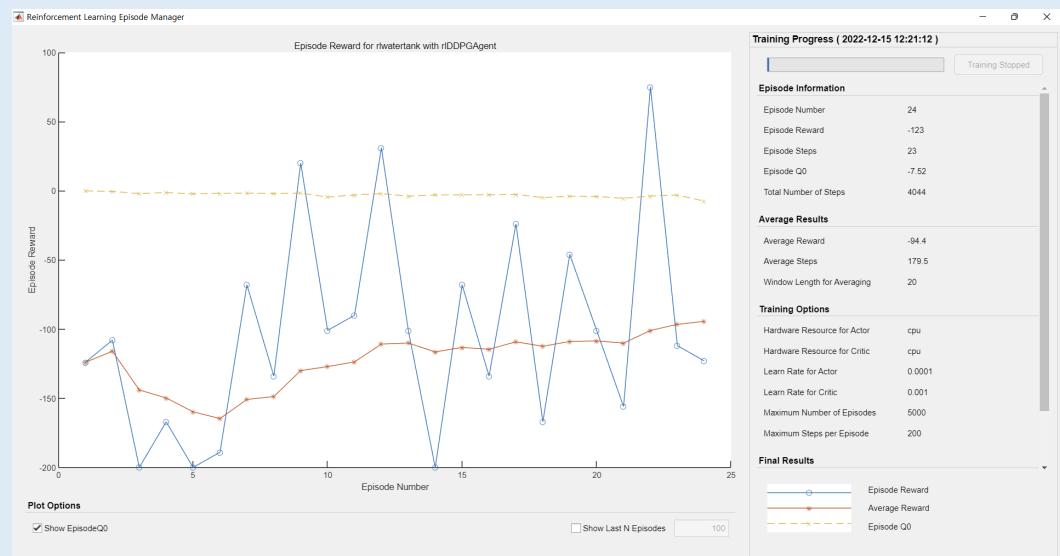


# Simulink 고급 실습 - 강화학습 Toolbox

## #1 – Simulink 환경 만들기 및 에이전트 훈련시키기 – Training

Train the agent using the `train` function. Training is a computationally intensive process that takes several minutes to complete. To save time while running this example, load a pretrained agent by setting `doTraining` to false. To train the agent yourself, set `doTraining` to true.

```
70 doTraining = true;  
71  
72 if doTraining  
73 % Train the agent.  
74 trainingStats = train(agent,env,trainOpts);  
75 else  
76 % Load the pretrained agent for the example.  
77 load('WaterTankDDPG.mat','agent')  
78 end
```



# Simulink 고급 실습 - 강화학습 Toolbox

## #2 – Avoid Obstacles Using Reinforcement Learning for Mobile Robots

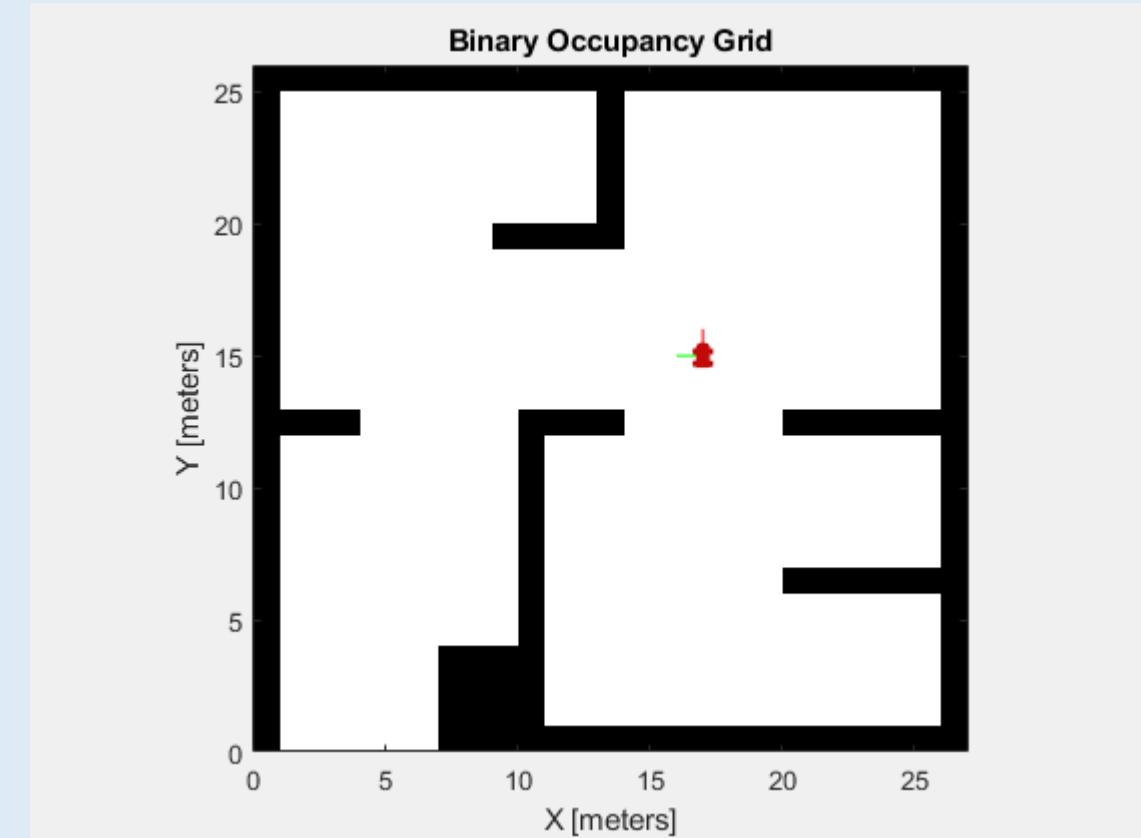
- 매틀랩

```
openExample('robotics/AvoidObstaclesUsing  
ReinforcementLearningForMobileRobotsExam  
ple')
```

- 링크

[https://kr.mathworks.com/help/robotics/ug/  
avoid-obstacles-using-reinforcement-  
learning-for-mobile-robots.html](https://kr.mathworks.com/help/robotics/ug/avoid-obstacles-using-reinforcement-learning-for-mobile-robots.html)

- 실습: Training



# Simulink 고급 실습 - 강화학습 Toolbox

## #3 – Train Biped Robot to Walk Using Reinforcement Learning Agents

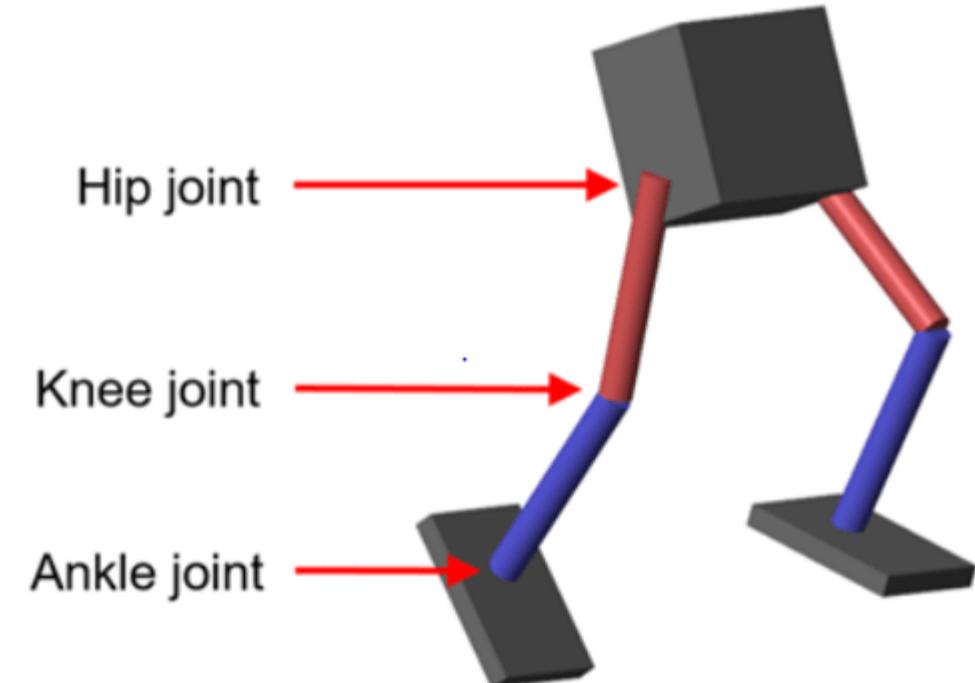
- 매틀랩

```
openExample('control_deeplearning/TrainBipedRobotToWalkUsingReinforcementLearningAgentsExample')
```

- 링크

<https://kr.mathworks.com/help/reinforcement-learning/ug/train-biped-robot-to-walk-using-reinforcement-learning-agents.html>

- 실습: Training



---

감사합니다.

---