

**Multi Modal Intelligent Traffic Signal System**

**Build Docker Image – User Manual**

Revision 0.0

(Initial Release)

July 13, 2020

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# Purpose of Document

This document is an instruction guide for building docker image to deploy Multi-Modal Intelligent Traffic Signal System (MMITSS) applications. The document contains the detailed instructions for building the docker image to deploy MMITSS software components in the docker container. The base image contains the source code, libraries, dependencies, tools, and other files which are required to run the applications. The vehicle side processor (vsp) image or mmitss roadside processor (mrp) image can be built from the base image. The vsp image contains only those applications which are required from the connected vehicle perspective and or mrp image contains only those applications which are required from the intersection perspective.

# Systems Requirements

To build docker image for deploying MMITSS in the docker container, following requirements are required to meet:

1. MMITSS roadside software components can be run in the Connected Vehicle Co-Processor (CVCP). To build the docker image and run the MMITSS roadside software components in the CVCP, install Ubuntu Bionic 18.04.3 operating systems. The operating systems can be installed by following the instruction from [https://boundarydevices.com/ubuntu-bionic-18-04-3-lts-for-i-mx6-7-boards-august-2019-kernel-4-14-x/#](https://boundarydevices.com/ubuntu-bionic-18-04-3-lts-for-i-mx6-7-boards-august-2019-kernel-4-14-x/)
2. MMITSS vehicle side software components can be run in the Raspberry pi. To build the docker image and run the MMITSS vehicle software components in the Raspberry pi, Ubuntu 18.04 Server operating systems can be installed.
3. Both roadside and vehicle side application can be run in the x86 box. To build the docker image and run the MMITSS software components in the x86 box, Ubuntu 18.04.4 operating systems can be installed.
4. Install docker and supervisor and clone mmitss repository.
5. If MMITSS path is not set already, set the MMITSS path in the .bashrc file by executing the following command:

Export /MMITSS\_ROOT=<mmitss directory>

For example if mmitss is cloned on home/user directory then the command will be:

Export /MMITSS\_ROOT=/home/user

# Build Docker Image

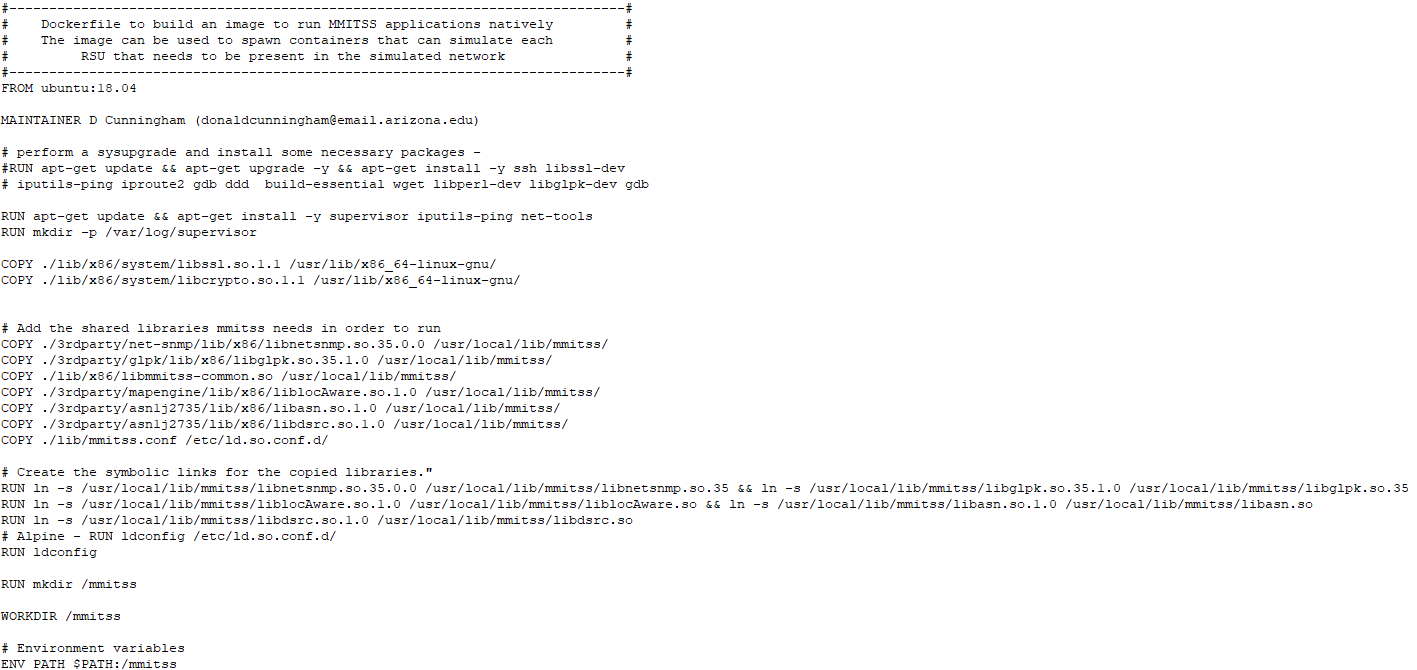
To build the docker image for deploying the MMITSS software components, following steps can be followed:

**Step1:** Define Dockerfile for base image

The base image can be for arm box or x86 box. The dockerfile for the base image can be placed in the root level of the mmitss repository. The snapshot of the base image of dockerfile for the arm box and the x86 box are following:



**Figure 1:** Snapshot of the dockerfile for base image (arm)



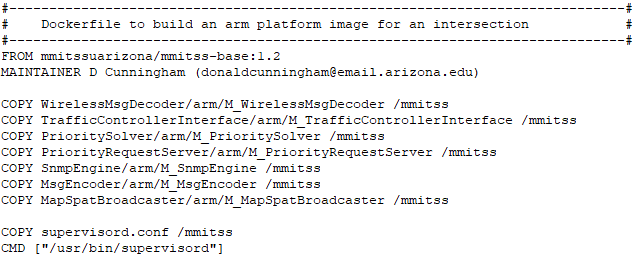
**Figure 2:** Snapshot of the dockerfile for base image (x86)

**Step 2:** Define Dockerfile for vsp/mrp

The applications for vsp and mrp are different. From the base image, it is required to create vsp docker image and mrp docker image. To create docker image for vsp and mrp, it is required to define to new dockerfiles. In the docker file, the name of the base image has to be defined correctly. Example of dockerfile for the vsp and the mrp are following:



**Figure 3:** Snapshot of the dockerfile for the vsp image



**Figure 4:** Snapshot of the dockerfile for the mrp image

**Step 3:** Build the docker image

To build the docker image for vsp and mrp following commands can be executed sequentiatlly:

1. Go to the directory where base image dockerfile is located. For example:

cd /home/user/mmitss

1. Build the base docker image.

docker build –t <name of the image>:<tag> -f <path to dockerfile> .

For example, to build the base image for the arm box following command can be executed:

docker build –t mmitss-arm-vsp-base:1.0 -f /home/user/mmitss/Dockerfile.arm\_base .

1. Go to mmitss/scripts directory and make all the applications For example to make all the applications for the arm box, execute the following:

cd /home/user/mmitss/scripts

./mmitss\_docker\_make\_all\_for\_arm.sh

To make all the applications for the x86 box, run the following script:

mmitss\_docker\_make\_all\_for\_x86.sh

1. Build vsp or mrp image by executing the following command

docker build –t <name of the image>:<tag> -f <path to dockerfile> .

For example to build the vsp docker image for the arm box, following command can be executed:

docker build –t mmitss-arm-vsp:1.0 -f /home/user/mmitss/bin/dockekerfiles/arm/Dockerfile-vsp.arm .