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EECE 371  
Smart Embedded Systems  
Assignment 2  
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The STMicroelectronic Nucleo F401-RE provides an affordable and flexible way for users to try out new concepts and build prototypes with the STM32 microcontrollers. The Arduino Uno V3 provides easy integration with the STM32. This microprocessor is attached to the development board STM32 Nucleo-64. This chip has an Arm architecture. This development board has a LSE crystal oscillator of 32.768 kHz. The development board also has a reset button in case the system gets caught up on a process. This board is able to connect via 3.3V, 5V, and 7 - 12V due to the USB VBUS. This chip can run on Windows (7, 8, and 10), Linux, or macOS. This kit could be used in any basic microcontroller project. This board would not excel at applications using image recognition.

The AM5749 has two Arm Cortex A15 for the system processing. It comes with C66x DSP cores for running machine vision algorithms and two embedded vision engines for running the interface. This device is mainly used in applications that require deep learning. This chip can be used with Texas Instruments deep learning software and it can run on the DSP cores or the Embedded Vision Engines.

The robot that I would design would be to lay mortar down and place bricks. The basic components of this system would be as follows:

- Robotic arm x 2
- Tracks x 4
- Suspension x 4
- Microprocessor
- Ultrasonic sensor x 4
- Raspberry Pi x 2

These components are important to performing this task. The robot will move using 4 tracks and use the ultrasonic sensors to align with the wall. After aligning with the wall, one robot arm will position itself using the camera and then lay mortar down. After this, the other arm will be used to place the brick. It will do this by using the camera. The robot will then move down the line by a specified distance.

The portable EEG headpiece needs to be below 5 lbs., the power requirements need to be between 5 - 12V, the delay on this device could be longer if needed. Measurements from this machine have to be accurate and do not require real time output. Car dashcam needs to be the size of a baseball ( as of not to distort the front window view), need to be able to run off the car battery, and needs to store video to an SD card or some sort of storage device. The drone controller needs to be light enough to hold with hands and carry around, it needs to operate off batteries and there needs to be the least amount of delay as possible. A heart pacemaker needs to be able to fit inside your body and not obstruct any organs, needs to run either passively or have an external battery source, and the device needs to work instantaneously.