Mat-Su Schools Foundation Proposal

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My students will create their own IoT (Internet of Things) devices. To do this, I will purchase Arduino compatible microcontrollers, proto boards, and sensors to make devices that stream data to the Internet. I will also purchase a variety of LEDs, servo motors, and other actuators so that my students can use these same devices to control objects in the physical world from the Internet. We will outfit a dollhouse (which a parent has kindly donated) with electronics and turn it into a demo smarthome. I have also already field tested a simple, student friendly setup using a humidity/temperature sensor that could be used as a simple weather station. For details, see http://tricorder.akrobotnerd.com. I will use the materials we purchase and the devices we create for years to come.

This year our school started offering a computers elective which I teach. I have been given latitude to cover whatever concepts and skills I deem necessary. Currently I teach students what most would consider standard in a computer class: how to type, how to send email, how to create documents, etc. In addition, I teach students to program. Currently my students learn programming by solving programming puzzles online, building simple apps, and programming robots. I want to add IoT to the list. Since most students find remotely observing and controlling something interesting and engaging, and demand for IoT skills is increasing, it seems only logical to add such projects to the list of things we do in my class. We will use the data we gather to create graphs when I cover spreadsheets.

I will use these materials to cover a range of computer science and computer engineering concepts and skills. Students will learn how various sensors work. They will learn the difference between analog and digital sensors and how to use various protocols for communicating with sensors. They will also learn to use libraries written for those sensors. In this way, students will gain a more fundamental understanding of how the tools they use to gather data in science class work. My students will also learn to use a simple API (provided by Ubidots) to send/stream information to the Internet and retrieve information/commands from the Internet via a web based control panel. While there will be a little overlap with what they learn in math and science, most of the content will be completely new.

Approximately 300 6th, 7th, and 8th graders will be exposed to this project at basic and intermediate levels every year. Around 50 of my 7th and 8th graders will move on to create their own devices and write programs of their own design.