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WIP: Engineering Leadership with the Forced Labor Ethical Concerns of Significant Slavery in the EV Battery and Solar Panel Supply Chains

Prof. Lance Crimm, Kennesaw State University

Lance Crimm is the founding department chair in the Electrical and Mechatronics Engineering department since its inception, and was instrumental in bringing both of these exciting and relatively new engineering degree programs to Southern Polytechnic in 2007 and 2008. Crimm has been a professor at Southern Polytechnic since 1997, serving in a multitude of roles as he continually seeks to savor the joys of teaching and learning from faculty, staff, and students. Crimm earned his undergraduate and graduate degrees in Electrical Engineering from Georgia Institute of Technology and is also a registered Professional Engineer in the State of Georgia having been recognized by this GSPE organization in 2019 as the overall ”Engineer of the Year” among the several highly competitive categories such as Education, Private Practice, Industry, Government, etc.

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Abstract

This engineering ethics WIP serves as documenting a work-in-progress to explore and analyze surveyed learning results of freshman versus senior students when considering challenging (and perhaps even quite debatable and potentially divisive) ethical issues. More particularly, the objective of this work is to explore how students perceive and perhaps modify their original assumptions, thoughts, and potentially even conclusions on ethical concerns directly affecting our engineering professions, as well as our society and world. Discussing engineering ethics during class time can be often perceived as boring or uninteresting. Thus, student engagement can be discouraging and not conducive to accomplishing learning objectives. However, it's been observed that employing a contentious case study can often foster active student participation.

Choosing debatable issues seems to be more helpful when the topic addressed in class is both immediately applicable to almost everyone, as well as having challenging tradeoff concerns to spur active student engagement. Electric Vehicles (EVs) is among the top topics students resonate. Focused desire is for everyone to openly share their ideas assuming no wrong answers during brainstorming. Sometimes a solitary concern can trump someone's thoughts or even change minds to resolve ethical dilemmas. For example, harvesting raw materials needed for EV batteries and solar panels has a particular sensitive issue of significant slavery in their supply chains. This, coupled with our cultures potent interest in the proper application of green technologies, generally captures poignant attention of virtually all students in classes over 70+.

This issue of slavery in an overwhelming majority of the world's current EV battery supply chain even encouraged President Biden to sign into law the Uyghur Forced Labor Protection Act (https://www.cbp.gov/trade/forced-labor/UFLPA) in 2021. The Uyghur's are a marginalized Muslim minority, predominantly in western China. Since most (if not all) students generally abhor forced labor to anyone of any country, the direct impact to leadership in our engineering professions is incredibly highlighted with many often staying afterwards to discuss further. Many even ponder how they can help be part of a solution to spread awareness or even encourage a call to action for all in solving this challenging problem.

This work-in-progress will consider results of surveying these students in both the freshman level ENGR 1000, as well as the ENGR 4xxx senior level course. Currently, the key interest for the findings of this work-in-progress is threefold focusing primarily on **awareness**, **perception**, and **ethical leadership** on how best to respond as engineers to such an ethical dilemma, namely:

1) to determine how many freshman versus senior students were even aware of the issue of forced labor in EVs prior to our classroom discussions among other EV pros and cons,
2) whether our classroom discussion changed their perception of how rapidly we should encourage EVs as a society, as well as how the survey results compares and contrasts between freshmen and seniors, and
3) how active do both the freshmen versus senior students believe we engineers should be involved as an agent of change on this slavery issue in EVs as we seek to continue to provide a voice to our society with leadership in our roles as engineers.

Introduction

Discussing engineering ethics during class time can often be perceived by students as boring or uninteresting. Thus, their engagement level during either a lecture, classroom learning activity, or the like can be discouraging and not conducive to accomplishing the learning objectives when brainstorming together and listing the pros and cons from typical case studies analyzed (which all still can be helpful at times). Whether utilizing textbook principles, a guided PowerPoint presentation, or other such pedagogical techniques, it has been qualitatively and anecdotally observed by this author that employing a somewhat contentious case study is often aptly effective in fostering active student participation. Choosing such debatable issues seems to be more helpful when the topic addressed in class is both immediately applicable to almost all (or virtually all of society) as well as having challenging tradeoff concerns to spur and encourage active student engagement. This paper serves to address such key by analyzing survey results of both freshman students enrolled in an atypical 1-hour ENGR1000 introductory to engineering course supporting all our 10 engineering majors at a very large (6000+) college, as well as upperclassman engineering students of all our 10 diverse majors who are taking a dedicated 1-hour ENGR 4xxx ethics course. The focus of this WIP is to mainly determine their initial awareness, perception, and ethical assessment on whether engineers should best lead on such.

Ethics is a central, but not the only focused component, of our ENGR 1000 course learning outcomes just like many engineering courses across the country. The 1-hour ENGR 4xxx course has virtually its complete focus on engineering ethics. Note that the course titles as well as their specific learning outcomes have been omitted as it is not deemed pertinent to this study, nor would it be likely conducive for maintaining the blind nature of this research study in not identifying our particular institution. These two courses also serve well as "bookbinders" in the curriculum as most students more often take engineering courses only in their respective and related majors. In other words, these two courses are rarer in that they are common requirements to almost all of our college's degree programs. Thus, students are given the opportunity to hear and learn from diverse perspectives of a multiplicity of scholars in many engineering disciplines.

Solar panel manufacturing and Electric Vehicles (EVs) along with their ethical implications have certainly been among the top topics students have resonated with in this vein. This has been routinely and recently noted while teaching both many ENGR 1000 intro course sections, as well as many decades teaching our senior level ENGR 4xxx Engineering Ethics specific course. Both courses have most of our 6000+ students required to take in their curricula. Other case studies are also discussed in each course with ENGR 4xxx having more vast and diverse examples, along with also covering theories and techniques on how best to solve ethics as well as historical underpinnings. In both classes, the desire is for everyone to openly share their ideas of the pros and cons of EVs and solar panels where there are no wrong answers when brainstorming. In addition, we strive to present a no judging zone throughout our discussions where anyone or any group may have knowingly procured solar panels or EVs or done so not at all remotely aware.

In such classroom discussions, some students may mention more obvious issues of a lack of infrastructure to ensure reliability of travel, especially over long distances. Some students may even bring up how the overall weight of EVs is generally larger than their counterparts which can potentially do more damage to our roads. Often the taxes collected to maintain our thoroughfares is most typically provided by taxes on gasoline. Other students may focus on how utilizing a remote power plant only may create some isolated pollution to charge EVs and could be considered more environmentally sound than all internal combustion engine vehicles. Some

astute students may even note that our current American electrical grid production is far insufficient to even handle the power demands of even just about 30% of our gasoline powered non-commercial cars, trucks, vans, etc. This serves to highlight in class how it took an alarming 40+ years before Georgia (or any state in the USA) introduced a new fission nuclear reactor installation into active operation, such that this discussion can even discuss zero sum gain, cost analysis, or other techniques of how to approach and solve such engineering ethical concerns.

Rarely will a student mention (even with occasional instructor hint cajoling) the issue of forced labor affecting some of these engineering designs and technologies where companies and countries across the world have resorted to slavery in commercial expansion. This paper serves to document the work in progress so far of having such classroom discussions by surveying students, both those who **did**, and others who did **not** participate in such classroom discussions.

Literature Review

While it may be well known among many that this significant problem of forced labor slavery exists around the world, it is quite often surprising how many students and others are totally unaware how extensive and vast this travesty is within the supply chain of materials needed for EV batteries and silicon based solar panels. Even today as we commence the second quarter of the 21st century, it has been anecdotally noted that some in sadly a variety of our engineering industries have debated and disagreed with this author that this dilemma is even truly a problem. This is despite numerous studies documenting and estimating that well over 95 plus percent of the current worldwide solar panels have been impacted tremendously by slavery, especially in the Xinjiang region of China [1]-[3]. These reports use various sources, including corporate disclosures and government documents, to show that a significant portion of the world's solar-grade polysilicon is produced in this Xinjiang region [4]-[5].

The Uyghurs are a marginalized minority of Muslim people in the western China desert having endured such forced labor suffering for decades. There are also other regions around the world where the abysmal practice of slavery persists and arguably is worse than any time in world history, such as the Congo area in the harvesting of raw earth materials needed for lithium batteries predominantly used in EVs [6]-[7]. Even our US Congress has passed the *Uyghur Forced Labor Prevention Act* with President Biden signing it into law in 2021[8]. There are a plethora of websites summarizing this particular law, as well as many showing how some initial progress in curbing this dire problem has been providing promising results, especially starting in late 2025 and into 2026. https://www.state.gov/office-to-monitor-and-combat-trafficking-in-persons/releases/2025/01/uyghur-forced-labor-prevention-act-uflpa-fact-sheet is among the best of such links to peruse and share with students interested in learning more details about this all.

Estimating the exact number of Uyghurs subjected to slavery-like conditions is quite challenging due primarily to restricted access in the Xinjiang region. However, multiple research studies and human rights reports from 2024–2026 provide consistent estimates of the total population and those at risk. Official 2020 census data and 2024-2025 reports estimate there are approximately 12 million Uyghurs in China, the vast majority of whom reside in the Xinjiang Uyghur Autonomous Region (XUAR). The U.S. State Department *China 2024 Human Rights Report* publication from 2025 confirms over 1 million Muslims remain in extrajudicial internment [9]. Since 2017, human rights groups and the UN estimate over 1 million Uyghurs and other Muslims have been arbitrarily detained in internment camps. A 2024 analysis by the Uyghur Human Rights Project (UHRP) found that 1 in 26 Uyghurs in the region (1 in 17 adults)

were formally incarcerated, representing the highest prison rate in the world [10]. Overall, researchers estimate that over 2 million ethnic minorities (primarily Uyghurs) are at direct risk of state-imposed forced labor as of 2024-2025[11]. This problem is certainly not limited to EVs and solar panels as approximately 20% of global cotton production is estimated to be directly implicated by Uyghur forced labor among many other industry sectors [12]-[13].

Are we unaware and ignorant as a society or willingly complicit and continuing this festering problem? Can we be instruments of change and serve as leaders both within and beyond engineering to curtail and even hopefully put an end to these abominable business practices? It certainly is very challenging to competitively contend with woefully low labor costs when large swaths of the world condone and support slavery. China among other countries even circumvent the 2021 US law by utilizing additional nefarious practices, such as transshipment through third countries. Chinese solar and electronics manufacturers frequently relocate final assembly to third countries masking the origin of their components [14]-[15]. In addition, other strategies employed involve supply chain bifurcation (one intended for the U.S. market and another for the rest of the world), masking corporate transparency, "labor transfer" obfuscation (such as moving Uyghurs and other minorities to factories in different Chinese provinces beyond Xinjiang), and even laundering minerals such as the "artisanal" mixing in the DRC where both ethically and unethically sourced minerals are all blended into the supply chain.[16].

Despite the 2021 enactment of the Uyghur Forced Labor Prevention Act (UFLPA), state and corporate actors have even developed sophisticated strategies to bypass regulatory oversight and continue integrating forced-labor into global green energy markets. The primary tactic again often employed is ***transshipment***, where solar components containing Xinjiang-origin polysilicon are routed through other Southeast Asian nations—primarily Malaysia, Thailand, and Vietnam—to mask their true country of origin [17]. Further, many manufacturers have adopted ***supply chain bifurcation***, a dual-production model that isolates "clean" materials for the U.S. market while maintaining "dirty" supply lines for the rest of the world [18]. This practice often relies on the active ***masking of corporate transparency***, where data censorship and the restriction of independent audits can make it nearly impossible to verify the claims of non-Xinjiang sourcing [19]. Similar patterns of obfuscation are observed in the Democratic Republic of Congo (DRC), where **mineral laundering** techniques are used to mix cobalt from hazardous artisanal sites with industrial output, thereby shielding the EV battery supply chain from accountability regarding child and forced labor [20] – [23].

Engineering a transparent supply chain for processed minerals like polysilicon and cobalt is severely hindered by the physical and chemical transformations these materials undergo during refining. For polysilicon, the industry standard Siemens process involves the chemical purification of metallurgical-grade silicon into a volatile gas, which is then decomposed to form high-purity rods. This process effectively erases any geological “fingerprint" of the original quartz source, making it nearly impossible to distinguish between Xinjiang-derived and ethically sourced silicon through chemical analysis alone. While techniques such as Isotope Ratio Mass Spectrometry (IRMS) are used in other fields, these processes currently lack a standardized global reference database for solar-grade materials, rendering them insufficient for U.S. court evidence or customs enforcement. Similarly, in the cobalt supply chain, the integration of "artisanal" ore into industrial streams creates a "laundering" effect. Once cobalt hydroxide is processed into battery-grade sulfates, the trace metallic impurities that might indicate a specific mine site are often filtered out or homogenized. One solution engineers are exploring is blockchain-based digital passports to track batches from the mine-site onward. However, these

systems are still vulnerable to other "self-certification" loopholes and a lack of physical on-site metrology in high-risk zones. Thus, not only does this problem persist, but a continued active corruption also festers. Sadly this is despite corrective action when the ethical and moral dilemma of real slavery happening is presented and confirmed. This conundrum is indeed incredibly awful for our entire world's society with human rights being exploited in such awe-inspiring innovative technologies. Hopefully, we can be instrumental in affecting its eradication.

Research Methodology

Over many years it has been completely manifest and realized that all students have various learning styles where we seek to provide the diverse and flexible instruction delivery methods along with applicative hands-on learning opportunities for all. In the process, various technologies are explored while also seeking to stay abreast of any new tools available. For example, a minority of students (about 15 to 20%) heard these classroom discussions on slavery in the supply chain of Solar panels and EVs by engaging technology via a Zoom platform. At the end of the 2025 semesters, about 2000 students were offered to take a quick survey regarding this ethical dilemma. The participation rate varied from 30% in some class sections to almost half of the students enrolled in other sections. Many classes even had 100+ students enrolled.

Most students attended classes F2F (Face to Face) with about a fifth of them completely online in either synchronous or asynchronous means, or even through a hybrid, blended approach. A few sections of both ENGR 1000 and ENGR 4xxx that did NOT discuss this dilemma were also polled as a kind of a control group. This paper will analyze results from the data collected on the survey referenced at the top of the next page with very similar questions, both for the control group and the many thousands of attendees who participated in lecture discussions brainstorming the ethical dilemma of forced labor, primarily among the supply chain in engineering affected industries such as EVs and solar panels. Additional feedback from the students will also be explored from the open-ended comments they optionally provided in the final survey question. These surveys were conducted totally anonymously and online via our password protected learning management system. Thus, this is a quasi-experimental study where the samples were from requesting all ENGR 1000 and ENGR 4xxx students to participate with no incentive given, regardless of whether or not they were in the control group of not having the lecture discussions.

Currently the key interest for the findings of this work-in-progress is threefold:

1) to determine how many freshman versus senior students were even **aware** of the issue of forced labor in EVs prior to our classroom discussions among other EV pros and cons,
2) whether our classroom discussion changed **perceptions** of how rapidly we should encourage EVs as a society and how this compares/contrasts between freshmen and seniors,
3) and finally, how active do both the freshmen versus senior students believe we engineers should be involved as an agent of change on this slavery issue in the supply chain of solar panels and EVs as we seek to provide a continued voice to society in our **leadership** roles as engineers.

An example survey for polling students who did participate in the classroom brainstorming is shown at the top of the following page where a Likert scale was utilized. On the spectrum of answer choices, *5 is Strongly Agree, 4 is Agree, 3 is Neutral, 2 is Disagree, and 1 is Strongly Disagree.* In similar polls for students who did **not** participate the phrasing "PRIOR to our classroom discussions" was removed from question 1. Question 2 was changed to "Anonymously rank whether now being somewhat aware of this ethical dilemma changes your

perception on how rapidly we should encourage EVs as a society." Question 3 was not at all changed and remained the same for both the control group of students (numbering a total of 143 out of 700+ solicited via a campus email) who did not participate in these ethical discussions in a classroom setting versus those who did. (a total of 457 total students from an email sent to over 1500 students).

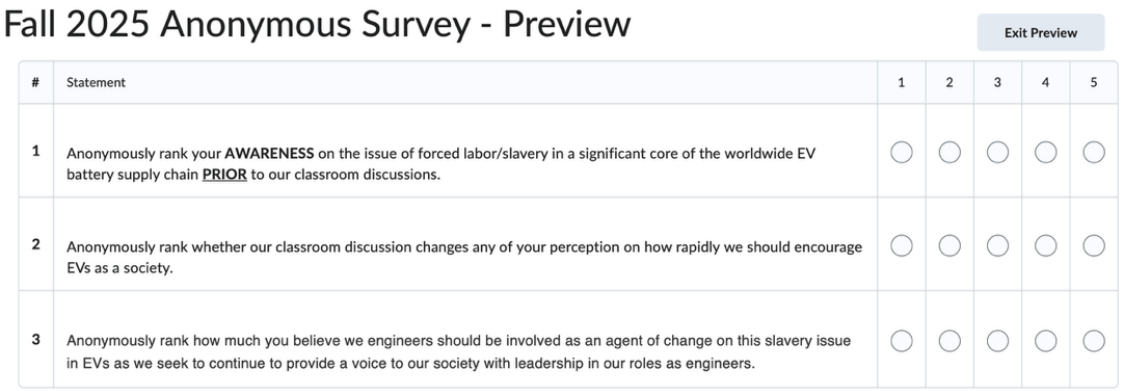


Figure 1: Sample survey used for students involved in classroom discussions on the forced labor ethical implications

Preliminary Results

The tables and graphs on the following page show the overall summary of all the survey data results mined and explored thus far on how three groups of students responded to the aforementioned three survey questions. In analyzing the below summary data, it is helpful to observe the trend of each of these three groups of surveyed students. The blue lines in the graphs below is from the control group of both freshman and upperclassmen students from either ENGR 1000 and ENGR 4xxx courses who were not in a lecture section that covered this brainstorming case study on forced labor slavery in the supply chain of EVs and solar panels. 143 students responded in this blue category of over 700 contacted and encouraged to respond via email.

The orange line graphs correspond to the freshman survey results from the 7 sections of ENGR 1000 surveyed with most of these course sections composed of over 100 total freshmen enrolled in each section. The total respondents of freshmen were 284 students of just over 1000 students contacted via email who did participate in a classroom discussion on the pros and cons of EVs and the issue of slavery as a major component to this unethical commercial expansion and profiteering of our engineering designs and discoveries at the expense of common decency and human rights to a marginalized smaller minority population.

The green line graphs correspond to the 173 upperclassmen survey results from the 5 sections of ENGR 4xxx surveyed with most of these course sections having nominally 72 total juniors and seniors enrolled in each section. Further study is needed to determine if the awareness or perception surveyed was significant or impactfully informative or not. Additionally, are the outliers (such as the very few *Strongly Disagree* 1's in Table 3) perhaps due to misunderstanding the survey spectrum order, or do they truly feel engineers should not speak to this concern? Reading raw comments feedback from the students on such a survey could assist in assessing.

Thus, continued surveying into the Spring 2026 semester will analyze whether their awareness or perception has changed or been impacted by discussing such an ethical dilemma. Does it spearhead among the students' encouraging ideas on how to best respond as future engineering leaders? Anecdotally, it seems at least in our institution such ethical discussions are generally

omitted from introductory freshman engineering courses (such as our ENGR 1000) or even in senior level engineering ethics courses like our ENGR 4xxx. Note again that their actual course titles, as well as their specific learning outcomes, have been omitted as it is not deemed pertinent to this study, nor does it seem likely conducive for maintaining the blind nature of this research study in not identifying our home institution.

	Control Group (n=143 of 700+)	Freshman (n=284 of 1000+)	Upperclassmen (n=173 of 350+)
1 (Strongly Disagree)	27.64%	9.80%	15.14%
2 (Disagree)	14.83%	7.32%	18.19%
3 (Neutral)	28.33%	34.15%	21.27%
4 (Agree)	13.91%	26.83%	15.09%
5 (Strongly agree)	15.29%	21.95%	30.31%

*Q1: Rank **AWARENESS** on the issue of forced labor/slavery **PRIOR** to or **without** having any classroom discussion*

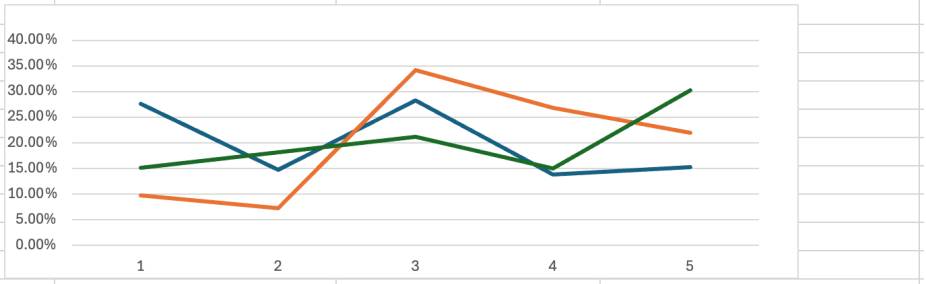


Table 1: Summary results for all students surveyed of Question #1

The above data appears to indicate that the control group was substantially less aware than both the freshmen in ENGR1000 and also among upperclassmen in ENGR4xxx who are most aware.

	Control Group (n=143 of 700+)	Freshman (n=284 of 1000+)	Upperclassmen (n=173 of 350+)
1 (Strongly Disagree)	13.83%	9.76%	9.41%
2 (Disagree)	19.47%	14.63%	18.75%
3 (Neutral)	21.39%	29.27%	37.51%
4 (Agree)	29.17%	31.71%	24.96%
5 (Strongly agree)	16.14%	14.63%	9.37%

*Q2: Rank if **AWARENESS** on the issue of forced labor/slavery changes your perception how society should respond*

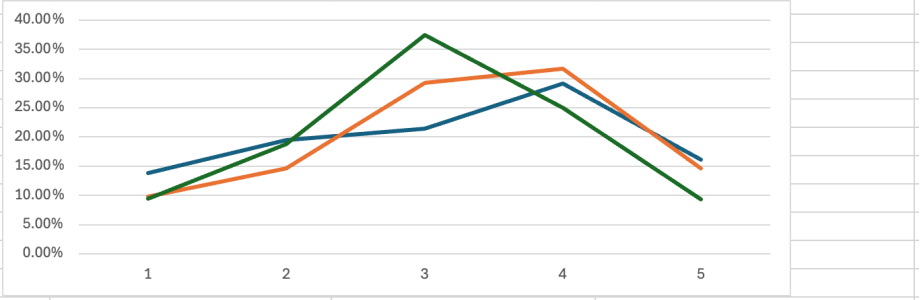


Table 2: Summary results for all students surveyed of Question #2

The above data in Table 2 does seem to continue the trend from Table 1 among the three groups regarding how their new awareness changed their perception on how society should respond. This can be key as modifying presuppositions or initial assumptions can be quite the obstacle for many. Table 3 on the following page also appears to show that while most everyone in all three groups find that engineers should lead in this ethical dilemma, the control group again appears the least motivated. Perhaps it could be considered encouraging that discussing this topic does appear to have at least a slight enhancing effect for the students involved with the upperclassmen most encouraged. Future surveys were conducted during Spring 2026 with plans of presenting these results as well at the annual ASEE 2026 conference. Digesting the feedback comments

from the students will also ameliorate understanding how such survey results address can help determine their **awareness**, **perception**, and **ethical leadership** on how best to respond as engineers.

	Control Group (n=143 of 700+)	Freshman (n=284 of 1000+)	Upperclassmen (n=173 of 350+)
1 (Strongly Disagree)	2.38%	0.00%	3.12%
2 (Disagree)	5.91%	2.44%	6.25%
3 (Neutral)	26.39%	24.39%	21.87%
4 (Agree)	27.87%	30.68%	25.14%
5 (Strongly agree)	37.45%	42.49%	43.62%

Q3: Rank how much you believe engineers should voice leadership and serve as agents of change on this slavery issue

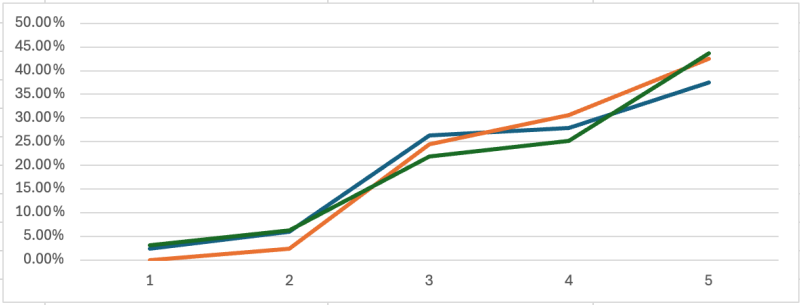
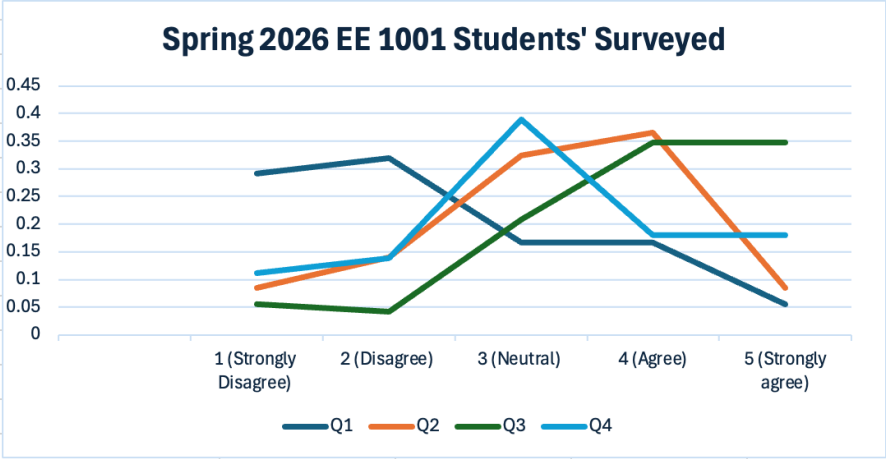


Table 3: Summary results for all students surveyed of Question #3

As previously mentioned above, this work in progress will continue to both monitor and observe our student perceptions and trends on this ethical conundrum. An additional question was added to the survey addressing the newfound idea of the ethical implications of why we do not have a 24-hour solar grid on the planet earth despite its challenging, yet certainly plausible feasibility. The preliminary results of surveying about 150 freshmen students after discussing in class these issues during a Spring 2026 EE 1001L course with the same focused three questions above as well as this additional fourth question are illustrated below. There was a total of 72 anonymous respondents where varying shades of purple color was used to highlight this Spring 2026 cohort.

Spring 2026 Freshmen	Q1	Q2	Q3	Q4
1 (Strongly Disagree)	29.17%	8.45%	5.56%	11.11%
2 (Disagree)	31.94%	14.08%	4.17%	13.89%
3 (Neutral)	16.67%	32.39%	20.83%	38.89%
4 (Agree)	16.67%	36.62%	34.72%	18.06%
5 (Strongly agree)	5.56%	8.45%	34.72%	18.06%

Q4: Rank how much you believe society is deprave for not implementing a 24 hour solar grid



Conclusion

Although there appears to be some potential correlations relating each of the three categories of students surveyed, further study is certainly needed. It is noteworthy and quite remarkable that a super majority of the survey respondents agree that we engineers should have an active voice in leading the conversation on how to address this challenging ethical dilemma of forced labor and slavery in the supply chains of EVs and solar panels. Surprisingly, there is still a small minority of students who disagree. Anecdotally, when sharing this potential problem with numerous coworker colleagues, many of them are also not aware that this particular issue exists in our world today. In over a score or more that I have had detailed discussions with, only about a quarter or them were aware of this tragedy and how engaging it can be to discuss in our courses.

Perhaps additional survey questions are merited to enhance this research work in progress, such as whether this case study was more engaging, interesting, or informative than others discussed. In other words, is this case study more relatable to our professions and/or more up to date than perhaps the typical case studies explored such as 2005 Hurricane Katrina rebuilding efforts, other historical disasters of impact over the decades, or the classic Ford Pinto example which is arguably overused? There is a plethora of Zoom video archives for most of these classroom discussions that could assess how best to present this issue to various constituencies.

Interestingly, this expansive topic has been utterly fascinating to study, as there has been so much learned and applications gleaned throughout the entire process. A most recent eureka in late fall 2025 was the remarkable realization that our sun of just about 93 million miles away is ***always*** shining somewhere on the planet! This notion could conceivably provide ample power for the entire planet Earth, well above even the total future electrical power demands needed in ever increasing AI and data centers, without any need for battery storage or high maintenance generators. However, is such truly plausible or possible? Could it even be remotely accomplished elsewhere as for future colonizing Mars or even harvested in space and sent wirelessly as Japan recently demonstrated [31]? Quite recently in early December of 2025, Japan was the first country to generate electricity via solar panels on a 180 kg satellite in a low Earth orbit and then transmit microwave energy back to a ground antenna array.

Such ideas had generally not been pondered or considered as a more localized perspective of solar application had only been previously contemplated. While not quite half of the Earth experiences full daylight, at least a fifth or more of the Earth's land mass can be expected to consistently be receiving concentrated solar energy. Utilizing key areas such as dry deserts and fantasizing on how a worldwide solar grid could conceivably exist would only require about 0.3 to 1% of the Earth's land mass to generate the total power demand of the entire planet! Various academic and environmental organizations are pursuing such ideas and have published reports or studies stating that a global solar energy system would require between 0.3% and 1% of the Earth's land mass [23-26]. When accounting for atmospheric interference and global cloud cover, the percentage of the Earth in "full sun" is significantly lower than 50%. While 50.73% of the planet is technically in daylight at any moment, NASA calculates that only about 16% to 17% of the Earth's surface typically receives clear, direct sunlight simultaneously [28].

It is manifest that global geopolitics prevents the physical feasibility of a global solar grid despite being scientifically supported. In other words, global politics sadly serves as a primary barrier to implementing a most passive means of providing power to the world. Current geopolitical shifts have moved the focus from global economic efficiency to national security, fragmented energy

regionalism, and technological protectionism. In fact, even though the United States spans enough longitudinal distance to technically experience daylight for minimally 17 to 18 hours across our entire territory on any given day (and maximally just above 20 hours a day in the summer), America remains divided into three primary, separate power grids that cannot easily share energy due to entrenched political and regulatory barriers [29]. Thus, the continental U.S. does not even provide a single synchronized system but instead is split into three major "interconnections" that act as separate “islands” of electricity. The Eastern Interconnection covers most of the U.S. east of the Rockies. The Western Interconnection covers the area from the Rockies to the Pacific. The Texas Interconnection (ERCOT) operates almost entirely within the state of Texas, primarily motivated to avoid federal regulations and oversight [30].

In our classroom discussions, ending the class with philosophical ponderings and wonder of where exactly all the immense energy originates from among the billions of stars in our universe can also serve to stimulate the budding minds of our future engineering leaders. Overall, highlighting the forced labor ethical concerns of significant slavery in the EV battery and solar panel supply chains has provided a tremendous learning experience for all. Additionally, there is so much more to continue to develop and consider as we engineers strive to be prominent leaders in our world evolution of technology and change. Regardless of whether we can promote a completely more moral response to these ethical concerns, discussing such challenging difficulties in our profession in open forums with those who likely are the engineers and leaders of the future will hopefully inspire better solutions, and not just complaining or bitter bickering.

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